PROCEEDINGS OF THE 15th INTERNATIONAL CONFERENCE ON INNOVATION AND MANAGEMENT

November 27-29, 2018

Chief Editors

Wang Aimin, Ma Ying, Ken Kaminishi

Associate Editor

Geert Duysters, Arnoldo de Hoyos, Josu Takala, Rubiyah Yusof

Wuhan University of Technology Press

Wuhan, China

【Summary】

The proceedings include Innovation and Strategy Management; Public Safety and Emergency Management; Risk Management and Decision Analysis; Organization Behavior and Human Resource Management; Marketing Engineering and Service Science; Supply Chain and Operation Management; Systemic Engineering and Knowledge Management; Big Data and Business Intelligence; Energy、Environment and Sustainable Development; Miscellaneous.

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The 15th International Conference on Innovation and Management (ICIM 2018)

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Investigating the Effects of Corporate Governance on the Relationship Between Earning Management and ROE in the Bursa Malaysia

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Abstract: The lack of transparency in financial reports has several reasons, but the most important is earnings management practice which is implemented by managers. Indeed, managers by using Earnings Management tools manipulate accounting information to achieve some goals. Corporate governance, whose primary goal is to deal with identifying potential mechanisms in which the shareholders of a corporation have more power and exercise to control over the managers to protect their interests, has recently brought the acute attention of academics and policymakers around the world. Most researches have been concentrating on the relationship between corporate governance and firm performance, but a few studies have regarded the moderator functionalities of corporate governance on firm performance from different aspects. This study investigates whether corporate governance affects the relationship between earnings management and corporate performance (ROE) by using listed companies' data in Bursa Malaysia. Data from FTSE Russell has been used by applying the intersection function to the constituents of FTSE Top 100 Bursa Malaysia during the years 2011 to 2015, which includes 59 companies in the form of 295 company-year. The results show that discretionary accruals (DAs) have a significantly negative effect on (ROE) return on equity in the case of lack of consideration corporate governance moderating effect. on the other hand, by considering the moderating influence of corporate governance variables, this equation has been changed, and the negative impact of earning management effects turns to neutral on ROE It implies that managers in weakly governed firms are more likely to abuse accounting discretion than those in strongly governed firms, leading to decreased firm performance. Managers prefer using DAs to window-dress financial earnings, but this causes a more significant reversal of corporate value in the subsequent period.
Key words: Corporate governance; Earnings management; Corporate performance; ROE; Discretionary current accruals

1 Introduction

The increasing pace of globalization, the deregulation and integration of capital markets in 1997, the world witnessed what came to be known as the South East Asian financial crisis (Mitton, 2002). When all the ASEAN (Association of Southeast Asian Nations) countries ranging from Thailand to South Korea faced an economic crisis, which led to a deceleration of economic growth in the area(Lemmon & Lins, 2003). The series of recent financial scandals around the world, and the spectacular corporate collapses which took place in Europe and the USA (e.g., WorldCom, Enron, Parmalat, and Xerox), have driven the previously robust debate on how to reduce the conflict between shareholders and managers and draw an efficient corporate governance system that will encourage sustainable economic growth. (Grant & Visconti, 2006)

The growing importance of a robust corporate governance regulatory structure gathered momentum after the events aforementioned. Furthermore, corporate governance, whose primary goal is to deal with identifying potential mechanisms in which the shareholders of a corporation have more power and exercise control over the managers to protect their interests, has recently brought the acute attention of academics and policymakers around the world. As a response to such scandals, and as a primary approach of protection for shareholders and stakeholders, an explicit strategy has developed concerning public listed companies adopting proper corporate governance standards. In fact, listed companies in most major markets throughout the world are now required to take high corporate governance standards. Particular attention is given to the corporate governance as it is widely regarded as one of the critical mechanism which affects firm performance. (Brav, Jiang, Partnoy, & Thomas, 2008)

Next, a brief overview of the evolution of the Malaysian Code on Corporate Governance is given. Here, this study aims to illustrate how corporate governance could be affected by the relationship between earnings management and firm performance and which part shall have more effects on this

equation. However, by referring to previous research findings and also recent incidences of corporate performance and earning management, this study challenges the notion of effective corporate governance monitoring in Malaysian listed companies. In this dissertation, it will address two critical related questions on governance and firm performance, which have not been adequately answered in the existing academic literature. Individually, it will be examined (1) whether governance changes lead to an effect on the correlation between earning management and substantial performance changes, and (2) what causes firms to change their governance. This study will cover the academic literature related to this topic and, in particular, review the corporate governance mechanisms literature, focusing mainly on the agency theory impact. The significance of this study academically and practically will be demonstrated and established through further discussion. This introductory chapter will present the study background, its objectives, importance, and significance.

2 Model One

First of all, the relationship of DAC and ROE has analyzed by panel data diagnostic tests the results present the strong effects of DAC on ROE, in continue this study will test the relationship of DAC and ROE by considering the effects of corporate governance variable as moderator.

$$ROE_{it} = \alpha_0 + B_1 DAC_{it} + B_2 LEV_{it} + B_3 LMV_{it} + B_4 MB_{it} + e_{it}$$

Where

– αi (i=1…n) is the unknown intercept for each entity (n entity-specific intercepts).
– ROE it represents Return on equity as dependent variable (DV) where i = entity and t = time.
– DAC it represents Earning Management as moderator variable (IV),
– LEV it represents Leverage as control variable (CV),
– LMV it represents Log Market Value as control variable (CV),
– MB it represents Market-to-Book Value as control variable (CV),
– $\beta 1$ is the coefficient for that IV,
– eit is the error term

Table 1   Effect of DAC on ROE

Cross-sectional time-series FGLS regression						
Coefficients: generalized least squares						
Panels: heteroskedastic						
Correlation: no autocorrelation						
Estimated covariances = 59			Number of obs	=	236	
Estimated autocorrelations = 0			Number of groups	=	59	
Estimated coefficients = 5			Time periods	=	4	
			Wald chi2(4)	=	27.38	
			Prob> chi2	=	0	
ROE	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DAC D1.	-2965.256	1186.453	2.5	0.012	639.8521	5290.661
LEV D1.	-0.01626	0.030825	-0.53	0.598	-0.07667	0.044159
LMV D1.	0.009983	0.039872	0.25	0.802	-0.06817	0.08813
MB D1.	0.024384	0.006683	3.65	0.000	0.011285	0.037483
_cons	0.105856	0.004062	26.06	0.000	0.097895	0.113817
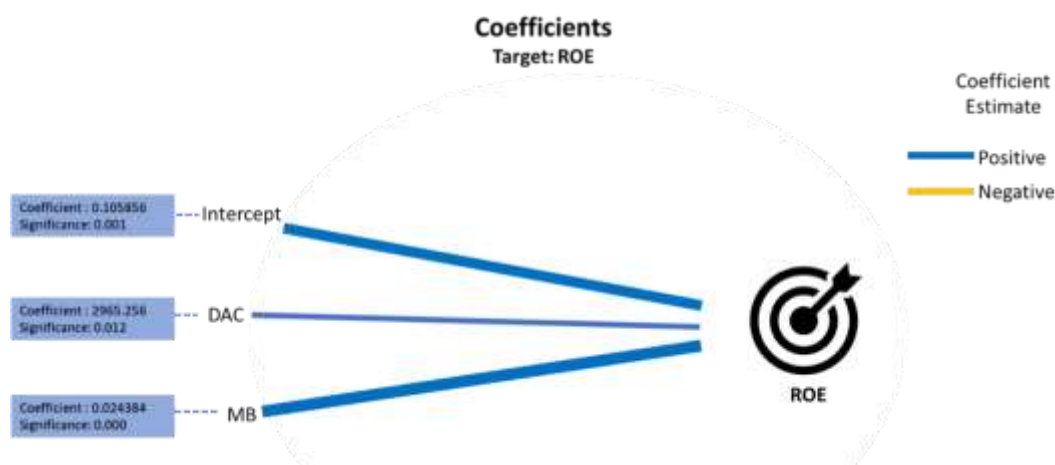
Figure 1   Coefficient of Model One

3 Data and Methodology
3.1 Methods of diagnostics tests
This chapter is going to describe the main finding of the data analysis. First, this study represents the descriptive statistics related to all variables which consist of the independent, dependent, control and mediator variables. Second, the results of diagnostics tests regarding the test of each hypothesis will be explained. The following diagnostic tests have been applied to test the hypothesis; VIF test has been used to examine multicollinearity, F-Limer test has been applied to choose pooled or panel model, Hausman test determines which model should be used if the result in last test (F-Limer) is panel data.

There are two options (Fixed effects & Random effects). In this step base on the fixed or random effects, the further tests will be changed. If the random effects are selected as results of the Hausman test so, if the random effects have been chosen, the Breusch and Pagan Lagrangian multiplier test should be applied to find out the pooled or random effects which will be selected. In this step, if random effects have been selected same as fixed effect model, it must check heteroskedasticity& autocorrelation of the variables for each model. In the end, the final model of each hypothesis will be tested to find out the coefficient of each variable on the model. The below diagrams explain the analysis steps.

3.2 Discussing model two
Hypothesis: Corporate governance activities have a practical effect on the relationship among earning management and ROE inside the listed companies in Bursa Malaysia.

$$ROE_{it} = \alpha_0 + B_1 DAC_{it} + B_2 CEOD_{it} + B_3 DS_{it} + B_4 SBS_{it} + B_5 BM_{it} + B_6 SBM_{it} + B_7 ID_{it} + B_8 NID_{it} + B_9 FO_{it} + B_{10} SX_{it} + B_{11} WB_{it} + B_{12} AMG_{it} + B_{13} NRCM_{it} + B_{14} LEV_{it} + B_{15} LMV_{it} + B_{16} MB_{it} + u_{it}$$

Where
– α_i (i=1…n) is the unknown intercept for each entity (n entity-specific intercepts).
– ROE_{it} represents Return on equity as dependent variable (DV) where i = entity and t = time.
– DAC_{it} represents Earning Management as moderator variable (IV),
– $CEOD_{it}$ represents CEO Duality as moderator variable (MV),
– DS_{it} represents Board size as moderator variable (MV),
– SBS_{it} represents Supervisory Board Size as moderator variable (MV),
– BM_{it} represents Board Meetings as moderator variable (MV),
– SBM_{it} represents Supervisory Board Meetings as moderator variable (MV),
– ID_{it} represents %Independent Directors as moderator variable (MV),
– NID_{it} represents % Non-independent Directors as moderator variable (MV),
– SX_{it} represents % Shares Executives as moderator variable (MV),
– FO_{it} represents % Foreign Ownership as moderator variable (MV),
– WB_{it} represents women on board as moderator variable (MV),
– AMG_{it} represents Annual general meeting as moderator variable (MV),
– $NRCM_{it}$ represents Nomination and remuneration committee meeting as moderator variable (MV),
– LEV_{it} represents Leverage as control variable (CV),
– LMV_{it} represents Log Market Value as control variable (CV),
– MB_{it} represents Market-to-Book Value as control variable (CV),
– $\beta 1$ is the coefficient for that IV,

– uit is the error term

4 Results
4.1 VIF test

Variance inflation factors range from 1 upwards. The numerical value for VIF tells (in decimal form) what percentage the variance (i.e., the standard error squared) is inflating for each coefficient(O'brien, 2007). For example, a VIF of 1.9 tells that the variation of a coefficient is 90% bigger than what would expect if there was no multicollinearity — if there was no correlation with other predictors.

A rule of thumb for interpreting the variance inflation factor:

1 = not correlated.

Between 1 and 5 = moderately correlated.

More significant than 5 = highly correlated.

Exactly how large a VIF has to be before it causes issues is a subject of debate. What is known is that the more VIF increases, the less reliable regression results are going to be. In general, a VIF above 10 indicates high correlation and is cause for concern. Some authors suggest a more conservative level of 2.5 or above.

Sometimes a high VIF is no cause for concern at all(O'brien, 2007). For example, it can get a high VIF by including products or powers from other variables in the regression, like x and x2. If it has high VIFs for dummy variables representing nominal variables with three or more categories, those are usually not a problem. The result of the VIF test and tolerance for each model(hypothesis) has been calculated in Stata 12.1.

Table 2   VIF Test for Model Two

Variable	VIF	1/VIF
LMV	1.97	0.507805
MB	1.64	0.61079
DS	1.64	0.611579
NID	1.63	0.613165
SX	1.61	0.622948
ID	1.45	0.690814
FO	1.43	0.701569
NRCM	1.42	0.705456
BM	1.4	0.713265
SBS	1.35	0.740577
WB	1.34	0.744531
LEV	1.3	0.770247
SBM	1.29	0.773634
AGM	1.22	0.816675
CEOD	1.19	0.841098
DAC	1.16	0.862764
Mean VIF	1.44	

4.2 F-limer test

First of all to test the model must be tested to determine we have to continue as pool or panel data(Ebrahimi& Aghaei Chadegani, 2011). The flimer test has been done, and the prob 0.0000 shows that the H0 which represent pool method will be rejected because the prob is less than 0.05 further test to determine that we must continue base on the fixed effect or random effect, it will be done by Hausmantest in continue for this hypothesis.

Table 3   F-limer Test for Model Two

Fixed-effects (within) regression				Number of obs	=	295
Group variable: cross				Number of groups	=	59
R-sq: within = 0.6782				Obs per group: min	=	5
between = 0.8416				avg	=	5
overall = 0.8031				max	=	5
				F(16,220)	=	28.98
corr(u_i, Xb) = 0.0310				Prob> F	=	0

ROE	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
DAC	789.3054	1407.036	0.56	0.575	-1983.69	3562.299
CEOD	0.055215	0.107587	0.51	0.608	-0.15682	0.267247
DS	-0.01189	0.005266	-2.26	0.025	-0.02226	-0.00151
SBS	0.012384	0.015882	0.78	0.436	-0.01892	0.043684
BM	0.003639	0.003918	0.93	0.354	-0.00408	0.011361
SBM	0.002596	0.008846	0.29	0.769	-0.01484	0.020029
ID	-0.01642	0.06344	-0.26	0.796	-0.14145	0.108605
NID	-0.0595	0.093977	-0.63	0.527	-0.24471	0.125707
FO	0.008997	0.295727	0.03	0.976	-0.57382	0.591817
SX	-0.27461	0.150218	-1.83	0.069	-0.57066	0.02144
WB	-0.01307	0.024232	-0.54	0.59	-0.06083	0.034683
AGM	0.018646	0.018894	0.99	0.325	-0.01859	0.055881
NRCM	-0.00405	0.019702	-0.21	0.837	-0.04288	0.034778
LEV	-0.09055	0.033695	-2.69	0.008	-0.15696	-0.02414
LMV	-0.10841	0.036977	-2.93	0.004	-0.18128	-0.03553
MB	0.047623	0.002322	20.51	0	0.043047	0.052198
_cons	1.146737	0.376954	3.04	0.003	0.403835	1.88964

sigma_u | .10388408
sigma_e | .09425876
        rho | .54846333   (fraction of variance due to u_i)
F test that all u_i=0:   F(58, 220) =   2.04   Prob> F = 0.0001

4.3 Hausman test

In continue to find out which model is proper for this hypothesis after the result of F-Limer test which shows that the panel model is suitable to test this hypothesis now it turns to select between the random or fixed effect, to reach this purpose the Hausman test has been done(Hausman& Taylor, 1981). The result shows the prob-value which represents 0.8257, and this value is more than 0.05, so the H0(random effects) will not be rejected, and random effect has been chosen. In the case of p-value, less than 0.05 the null hypothesis will be rejected, and H1(fixed effects) is the proper way of analyzing the final model. For further tests, the result of this step will determine which method of analysis will be selected to test heteroskedasticity, but the test auto-correlation Wooldridge test has been applied for both assumption (fixed and random), which the result could be quite same.

Table 4   Hausman Test for Model Two

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
DAC	789.3054	302.1201	487.1853	1333.387
CEOD	0.055215	-0.02369	0.078901	0.106067
DS	-0.01189	-0.00051	-0.01138	0.00393
SBS	0.012384	-0.00251	0.014895	0.015171

Continual Table 4

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag(V_b-V_B))
	fe	re	Difference	S.E.
BM	0.003639	0.000923	0.002716	0.002825
SBM	0.002596	-0.00401	0.006609	0.00783
ID	-0.01642	0.018442	-0.03486	0.042583
NID	-0.0595	0.003282	-0.06278	0.083189
FO	0.008997	0.14846	-0.13946	0.257136
SX	-0.27461	-0.17109	-0.10352	0.126305
WB	-0.01307	0.003315	-0.01639	0.022601
AGM	0.018646	0.004588	0.014058	0.010112
NRCM	-0.00405	0.00035	-0.0044	0.018867
LEV	-0.09055	-0.05946	-0.03108	0.01846
LMV	-0.10841	-0.04341	-0.065	0.032314
MB	0.047623	0.050366	-0.00274	0.001742

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.38
Prob>chi2 =   0.8257

4.4 Breusch and pagan lagrangian multiplier test

In statistics, the Breusch–Pagan test, developed in 1979 by Trevor Breusch and Adrian Pagan, [1] is used to test for heteroskedasticity in a linear regression model(Breusch& Pagan, 1980). It was independently suggested with some extension by R. Dennis Cook and Sanford Weisberg in 1983. [2] It tests whether the variance of the errors from a regression is dependent on the values of the independent variables. In that case, heteroskedasticity is present. (White, 1980)

This is the basis of the Breusch–Pagan test. It is a chi-squared test: the test statistic is distributed $n\chi^2$ with k degrees of freedom. If the test statistic has a p-value below an appropriate threshold (e.g., $p<0.05$) then the null hypothesis of homoskedasticity is rejected, and heteroskedasticity assumed.

If the Breusch–Pagan test shows that there is conditional heteroskedasticity, one could either use weighted least squares (if the source of heteroskedasticity is known) or use heteroscedasticity-consistent standard errors.(Breusch & Pagan, 1980)

The result of this test will determine between pool method or random effect which one is proper because the p-value less than 0.05 will reject the null hypothesis which is pool method but the value of more than 0.05 will proof that the null hypothesis is proved

Table 5   Breusch and Pagan Lagrangian Multiplier Test for Model Two

ROE[cross,t] = Xb + u[cross] + e[cross,t]

Estimated results:

| | Varsd = sqrt(Var) |

---------+----------------------------

| ROE | .0877692   .2962586 |

| e | .0088847   .0942588 |

| u | .0016563   .0406971 |

Test: Var(u) = 0

chibar2(01) =   5.91

Prob> chibar2 =   0.0075

4.5 Heteroscedasticity test result

In statistics, maximum likelihood estimation (MLE) is a method of estimating the parameters of a statistical model, given observations. MLE attempts to find the parameter values that maximize the likelihood function, given the observations(White, 1982). The resulting estimate is called a maximum likelihood estimate, which is also abbreviated as MLE.

The method of maximum likelihood is used with a wide range of statistical analyses. As an example, suppose that we are interested in the heights of adult female penguins, but are unable to measure the height of every penguin in a population (due to cost or time constraints). Assuming that the heights are normally distributed with some unknown mean and variance, the mean and variance can be estimated with MLE while only knowing the heights of some sample of the overall population. MLE would accomplish that by taking the mean and variance as parameters and finding particular parametric values that make the observed results the most probable given the normal model(White, 1982).

From Bayesian inference, MLE is a particular case of maximum posterior estimation (MAP) that assumes a uniform prior distribution of the parameters. In frequentist inference, MLE is one of several methods to get estimates of parameters without using prior distributions. Priors are avoided by not making probability statements about the parameters, but only about their estimation, whose properties are entirely defined by the observations and the statistical model. The results of this tests for this hypothesis present Lagrange Multiplier LM Test p-value of 0.000, Likelihood Ratio LR Test p-value of 0.000 and Wald test p-value of 0. 000.(Vuong, 1989)in all these tests H0 has been rejected which represents Panel Homoscedasticity, so the model has Panel GroupWise Heteroscedasticity.

Table 6   Panel Group Wise Heteroscedasticity Test for Model Two

* Panel GroupWise Heteroscedasticity Tests		
Ho: Panel Homoscedasticity - Ha: Panel GroupWise Heteroscedasticity		
- Lagrange Multiplier LM Test	= 2.88e+05	P-Value > Chi2(58) 0.0000
- Likelihood Ratio LR Test	= 423.7543	P-Value > Chi2(58) 0.0000
- Wald Test	= 8.89e+07	P-Value > Chi2(59) 0.0000

4.6 Wooldridge test

Because serial correlation in linear panel-data models biases the standard errors and causes the results to be less efficient, researchers need to identify serial correlation in the idiosyncratic error term in a panel-data model. While some tests for serial correlation in panel-data models have been proposed, a new test discussed by Wooldridge (2002) is desirable because it requires relatively few assumptions and is easy to implement(Drukker, 2003). This article presents the results of a size and power simulation study of this new Wooldridge test. Because the test is flexible, simulations must be performed for some different cases. This paper presents results from simulations for both fixed and random-effects designs, with and without conditional homoscedasticity in the idiosyncratic error term, with balanced data, and with unbalanced data with and without gaps in the individual series. The power simulations include both autoregressive and moving-average alternatives. The test is found to have good size and power properties with samples of moderate size. The result of this test presents p-value 0.0000 which causes to reject H0(no first-order autocorrelation), so this hypothesis has an autocorrelation.

Table 7   Wooldridge Test for Model Two

Wooldridge test for autocorrelation in panel data		
H0: no first-order autocorrelation		
F(1,	58) =	0.556
Prob> F =	0.4589	

4.7 GLS test result

To find out the final model for each hypothesis the Cross-sectional time-series FGLS regression It has been applied in this study(Hoechle, 2007). In previous steps of diagnostic test, the Heteroskedacityand serial correlation in this step based on the result of the above tests, the final model has considered to fixed these issues. The following analysis presents the coefficient of independent, control and moderator variables on the target variable based on the current hypothesis.

Table 8   Cross-Sectional Time-Series FGLS Regression for Model Two

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares

Panels: heteroskedastic

Correlation: no autocorrelation

Estimated covariances	=	59	Number of obs	=	295
Estimated autocorrelations =		0	Number of groups	=	59
Estimated coefficients	=	17	Time periods	=	5
			Wald chi2(16)	=	1663.59
			Prob> chi2	=	0

ROE	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
DAC	407.5176	478.5105	0.85	0.394	-530.346	1345.381
CEOD	-0.01579	0.004782	-3.3	0.001	-0.02516	-0.00641
DS	0.001687	0.000858	1.97	0.049	5.18E-06	0.003368
SBS	-0.0045	0.00091	-4.94	0.000	-0.00628	-0.00271
BM	-0.00022	0.000478	-0.45	0.652	-0.00115	0.000721
SBM	-0.00497	0.001189	-4.18	0.000	-0.0073	-0.00264
ID	0.018226	0.011575	1.57	0.115	-0.00446	0.040912
NID	-0.00035	0.009428	-0.04	0.971	-0.01883	0.018131
FO	0.093474	0.028741	3.25	0.001	0.037141	0.149806
SX	-0.03851	0.032	-1.2	0.229	-0.10123	0.024204
WB	0.003175	0.002236	1.42	0.156	-0.00121	0.007556
AGM	0.002922	0.004486	0.65	0.515	-0.00587	0.011714
NRCM	0.003635	0.001706	2.13	0.033	0.000291	0.006979
LEV	-0.00793	0.012287	-0.65	0.519	-0.03201	0.016156
LMV	-0.02167	0.005345	-4.05	0.000	-0.03215	-0.0112
MB	0.046513	0.001489	31.23	0.000	0.043594	0.049432
_cons	0.21848	0.05636	3.88	0.000	0.108017	0.328942
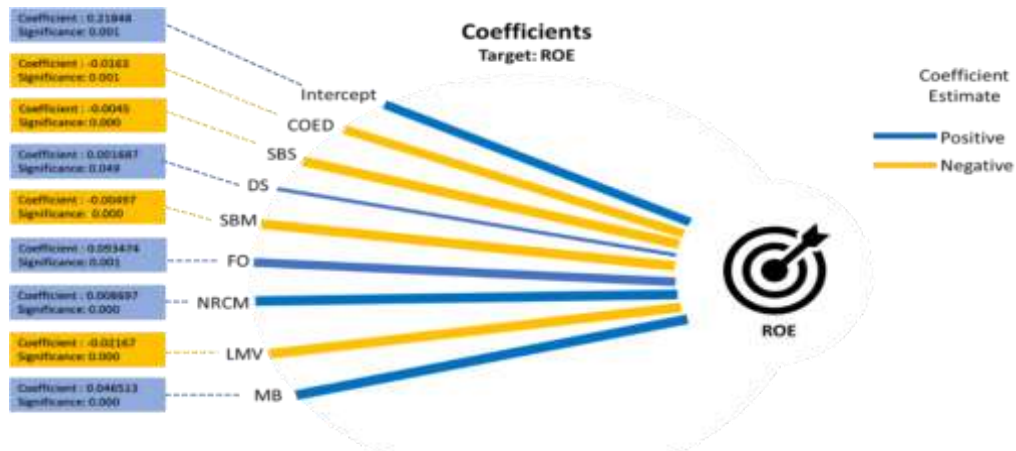
Figure 2   Coefficient of Model Two

5 Conclusion

By refer to the result of tests it has been found that the earning managements activities has negative effects on firm performance, but in second model whenever the corporate governance variables have played the role of moderating variables the effects of earning management activities have been covered and it has been changed to neutral. In conclusion this study has found that by applying the corporate governance strategies, it is possible to prevent managements to abusing the firm performance.

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Financial Literacy and SMEs Performances: Moderating Role of Financial Resource Availability

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Abstract: Financial literacy is considered as one of the key indicators of entrepreneurial conduct. Understanding the role of financial literacy will empower the researchers to investigate the progression of entrepreneurial venture creation process. In the complicated and competitive business setting, financial literacy helped entrepreneurs through improving the skills to manage financial resources productively over the business life cycle while effectively connecting with financial products and services. However, determinants of performances of small and medium enterprises (SMEs) and the influence of financial resource availability on SMEs performances are limited in the literature. In this knowledge gap, the objective of this research paper is to propose a conceptual model to explain the impact of financial literacy and financial resource availability on the SMEs performances. Findings of this study revealed the positive relationship among financial literacy, financial resource availability and SMEs performances. Further, results show that the relationship between financial literacy and SMEs performances positively moderate by the financial resource availability. This article makes novel contribution to the existing literatured by bringing financial resource availability in the context of SMEs performances. Further, the model can be empirically tested in future research.
Key words: Entrepreneurship; Financial literacy; Financial resources; SMEs performances

1 Introduction

The emerging significance of financial literacy is well documented in recent literature. Financial literacy is vital for entrepreneurs to make financial decisions. It helps to empower and educate entrepreneurs on finance and to use that knowledge for evaluating and making decisions on financial issues in their businesses. Further, it is expected that financial literacy would help to deal with challenges in cutting edge credit markets.   Moreover, financial literacy enables entrepreneurs to manage risks through the strategies such as maintaining financial reserves, diversifying investment portfolio and buying insurance policies.

Xiao, Tang and Shim (2009) defined financial literacy as the knowledge on behaviors that are pertinent and applicable in financial management which deliberate the knowledge of income, money management, saving and investing, and spending and credit. Further, financial literary has been defined as the knowledge and cognitive capabilities entail to manage and to make effective decisions on finance such as budgeting, bookkeeping, bills and utilities payments, loan acquisition and payments and other financial decisions (Adomako, Danso, & Ofori Damoah, 2016). Accordingly, in this complicated and competitive business setting, financial literacy helps entrepreneurs through improving the skills to manage financial resources productively over the business life cycle while effectively connecting with financial products and services.

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). Formation of SMEs is crucial for the establishment of a solid industrial base (Smallbone, Welter, Voytovich, & Egorov, 2010). Though SMEs are instrumentals in the economic development of developing countries that has enormous potential for the growth of this industry, it has not yet been able to fully realize its potentials. Inadequate financial literacy among entrepreneurs has been one of the main barriers for SMEs to realize its full potentials. Empirical studies reveal the existence of low level of financial literacy among entrepreneurs. Atkinson and Messy (2012) identified financial literacy as a common problem among SME owners and it affects to start and develop their businesses. Kim (2000) observed the lack of financial literacy among entrepreneurs as the major reason to increase the failure rate of SMEs.

Eniola, Entebang and Sakariyau (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 financial landscape, availability of financial resources remains as a fascinating issue in both developed and developing economies. Financial resources are essential to start, operate and growth of a business (Bygrave & Zacharakis, 2008). SMEs tend to experience difficulties in accessing finance to facilitate business operations. Thus, finance is an important but scarce resource for SMEs and it is important to manage available financial resources efficiently and effectively.

This study was designed by considering the importance of financial literacy in SMEs context, and aiming at the prevailing research gaps on financial literacy and SMEs performances. Further, this research adopts the RBV theories to describe the importance of financial resource availability in SMEs context. The main research question in this study is: How does financial literacy and financial resource availability impact on SME performances? Further, this study aims to contribute the entrepreneurship literature by investigating the moderating effect of financial resource availability to the relationship between financial literacy and SMEs performance.

2 Literature Review and Hypotheses

Various theoretical perspectives such as exchange theory, transaction cost theory, prospect theory and resource-based theories tried to establish the relationship between financial literacy and performances of the organizations. According to exchange theory higher interaction among interpersonal, interactional, procedural and informational factors cause to improve the literacy level of the individuals. Transaction cost theory explains the influence of transaction cost to the performances. Accordingly, financial literacy enables entrepreneurs to identify profitable transactions which improve the organizational performances. According to prospect theory, financial literacy improves the decision-making capacity of entrepreneurs and hence enhances the organizational performances. Resource based theories explained organizational resources and capabilities as the prominent determinants of organizational performances and the necessity of higher level of financial literacy to use those assets in order to improve the organizational performances.

The impact of financial literacy on firm performances rigorously studied in the literature and revealed the positive relationship among them (Huston, 2010). Further, the importance of effective financial management for SMEs performance and success is also highlighted in the literature (Fatoki, 2014). Wise (Wise, 2013) revealed the importance of financial literacy for the survival of SMEs in both developed and developing countries. Low level of financial literacy caused to poor financial management practices and to commit frequent financial mistakes (Lusardi, 2012). Moreover, Huston (Huston, 2010) pointed out the importance of financial literacy to cope with rapid economic changes. Thus, financial literacy is conceived to positively effect to the SMEs performance. Accordingly, first hypothesis of this study is developed as follows.

H1: Financial literacy positively effects to the SMEs performance.

Financial resources can be defined as funds receive from the family in business, network relations, and financial institutions like banks or as equity (Coleman, 2007). Further, these sources can be categorized as internal and external financial sources. However, it is difficult for SMEs to acquire all required funds from internal sources. Thus, they often seek for external financial sources which are difficult to access for most SMEs. Researchers have identified lack of financial resources as the major obstacle for the SMEs development (Ihua, 2009). Higher interest rate charged by bankers and unavailability or incomplete financial statements, insufficient collaterals and SMEs managerial skills constrained the financial resource availability for SMEs (Bosri, 2016).

Financial literacy level of SME owners' affects to business performances as it helps them to manage financial issues effectively (Siekei, Wagoki, & Kalio, 2013). However, mere financial literacy of entrepreneurs is not sufficient to SMEs performances as financial resources are essential to operate businesses (Danso & Adomako, 2014). Chowdhury, Alam and Arif (2013) observed insufficient financial resources affects to acquisition of fixed assets and to business operations while hindering SMEs performances. Further, inadequate financial resources limit the innovations and competitiveness in the market. In contrast, organizations rich with financial resources can easily obtain loan facilities from financial institutions by fulfilling collateral requirements. Financial resource availability is, therefore, vital for the SMEs performances. Thus, financial resource availability strengthens the relationship between financial literacy and SMEs performance. Accordingly, relationship between

financial literacy and SMEs performances is expected to be positively moderate through financial resource availability. Consequently, the second and third hypotheses of this study can be stated as follows.

H2: Financial resource availability positively effects to the SMEs performance.

H3: Financial resource availability positively moderates the relationship between financial literacy and SMEs performances.
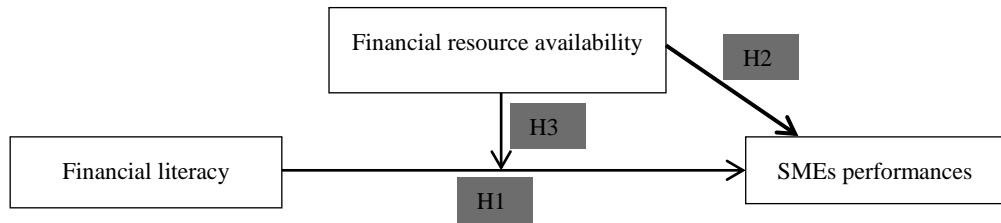
Figure 1   Conceptual Model

3 Methodology

The population of this study was comprised with Small and Medium Scale Enterprises (SMEs) in Sri Lanka. However, 150 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 four main sections; Section 1- Demographic factors, Section 2- Financial literacy, Section3- Financial resource availability and Section 4- SMEs Performances. Further, firm size and age used as controllable variables as both variables have an impact on firms' performances. The descriptive statistics and tabulation techniques were used to describe the results. Further, three hierarchical multiple 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
Financial literacy	4	Dahmen and Rodr ǵuez (2014)
Financial resource availability	5	Shepherd and Wiklund (2005)
SMEs performances	6	Kropp, Lindsay and Shoham (2006)

4 Analysis and Discussion

A total of 150 completed questionnaires by SMEs owner managers were subjected to analysis. Majority of the sample (72%) is comprised with male entrepreneurs. Age distribution of the sample includes five age categories and the highest number of entrepreneurs is represented by 40 – 49 years age group and as a percentage it was 39 percent. Furthermore, most of the entrepreneurs had completed education up to GCE Advanced Level (42 %). The outcome of the research further showed that 30 percent of entrepreneurs have diplomas and 17 percent of entrepreneurs belong to the category of graduates. Also, 54 percent of the sample had no previous experience before starting their business, and 68 percent of the respondents had a family with an entrepreneurial background.

Table 2   Correlation Matrix

	Mean	SD	FL	LA	LS	FRA	FP
Financial literacy (FL)	2.431	0.231	1				
Log age (LA)	0.532	0.412	0.396**	1			
Log size (LS)	0.491	0.296	0.381**	0.219*	1		
Financial resource availability (FRA)	1.711	1.235	0.614*	0.214**	0.316**	1	
SME performances (FP)	2.683	0.961	0.612**	0.312	0.296**	0.813*	1

Note: The symbols (**) and (*) indicates the statistical significance at 99% and 95% level respectively.

Table 2 portrays the descriptive statistics and correlation matrix of financial literacy, firm's age,

size, financial resource availability and SME performance. Accordingly, the mean value of FL is 2.431 and it shows the low level of financial literacy among SMEs. It denotes that the most of these SMEs are not maintaining financial records thus creating barriers to access into financial resources as most of banks and financial institutes heavily rely on the quality of financial records when lending for SMEs. The mean value of 1.711 depict that the average SMEs have low financial resource availability. This causes to create survival and growth-related issues for SMEs while hindering the economic contribution of this sector. Moreover, financial resource availability positively correlated with FL, LA and LS while SMEs performances positively correlated with FL, LS and FRA. These findings congruent with the literature (Ngek, 2016) and it further supports to the positive correlation between SME performances and financial literacy.

Table 3   Results of the Moderating Effect of Financial Resource Availability

Factors	Model 1		Model 2		Model 3	
	Beta	T value	Beta	T value	Beta	T value
Constant		13.23**		15.38**		11.31**
Log age	-0.04	-0.34	-0.04	-0.41	-0.7	-0.95
Log size	0.23	1.53	0.03	0.73	0.01	0.36
Financial literacy (FL)	0.41	6.71**	0.23	2.51**	0.41	4.32**
Financial resource availability (FRA)			0.59	10.37**	0.97	9.83**
FL x FRA					0.53	4.76**
R^2	0.27		0.57		0.64	
Adjusted R^2	0.29		0.54		0.61	
F value	26.57**		56.72**		54.74*	
R^2 change			0.30		0.07	
F change			85.42**		25.89*	

Note: The symbols (**) and (*) indicates the statistical significance at 99% and 95% level respectively.

To test the hypothesis that the higher financial literacy and financial resource availability increase the SMEs performances, and more specifically whether financial resource availability moderate the relationship between financial literacy and SMEs performances, a hierarchical multiple regression analysis was conducted. The result of the moderating effect of financial resource availability is depicted in table 3. In model 1, firm age, size and financial literacy were included. These variables accounted for a significant amount of variance in SMEs Performances, R^2= .27, F= 26.57, p < .001. Further, it was observed the positive relationship between financial literacy and firm performances. Results are accordance with the previous studies (Huston, 2010; Lusardi, Mitchell, & Curto, 2010). Thus, the first hypothesis of the study was accepted.

In the model 2, moderating variable (financial resource availability) was included and results were accounted for a significant amount of variance in SMEs performances, R^2= .57, F= 56.72, p < .001. Addition of financial resource availability variable significantly affected to the model while increasing the predicting power of the model (R^2 change= .30, F change= 85.42, p< .001). Further, results revealed the positive relationship between financial resource availability and SMEs performances. Hence, second hypothesis also accepted. Moreover, results imply the significance of SMEs accessibility to financial resources in order to increase the firm performances.

In the model 3, interaction variable (FL x FRA) was included into the model. The probability of F value showed that the overall model is significant (R^2= .64, F= 54.74, p < .05), and hence suitable for predict SMEs performances. Further, addition of interaction variable to the model significantly increases the predictability of the model (F change= 25.89). However, variation explained by the model is increased only by 7 percent. These results showed that the financial resource availability positively moderate the relationship between financial literacy and SMEs performances. Accordingly, third hypothesis was accepted.

5 Conclusion

The aim of this study was to explain the appropriateness of financial literacy and financial resource availability in understanding SMEs performances. Firstly, it showed the direct relationship between financial literacy, financial resource availability and SMEs performances. Secondly, it showed financial resource availability as the moderator in the relationship between financial literacy and SMEs performances. This research has implications for both future research and practice. The identified positive influence of financial literacy on SMEs performances is further highlighted the importance of the

financial literacy. However, financial literacy has not been widely recognized in developing economies as one of the key competencies that could significantly enhance SMEs performances. From theoretical perspective, there is a need for researchers in developing economies to examine the relationship between financial literacy and SMEs performances. Also, the concept of financial literacy is still in the early stage of investigations. As a result, there is no valid measurement scale in order to measure the concept of financial literacy. Thus, future research needs to develop a valid and reliable measurement scale to measure financial literacy. From 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 financial literacy skills of entrepreneurs. Further, policies should be introduced to solve financial accessibility barriers of the entrepreneurs. Moreover, while the direct effect of financial literacy on SMEs performances is very important, this study indicates that financial literacy should not be treated in isolation when examining aspects of SMEs Performances.

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The Effect of Strategic Orientations on Organizational Performance of SMEs: Empirical Evidence from Pakistan

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Abstract: Strategic orientations like Market orientation (MO) and Learning orientation (LO) play critical role in improving the performance of both large and small scale businesses. This paper investigate the relationship between LO and organizational performance with MO as moderator. The current study reports the findings of two hundred and seven owners or managers of Small and Medium Sized Enterprises (SMEs) in Pakistan. The findings of the study indicate a positive relationship between LO and organizational performance. Mo was found to have moderated the direct relationship between LO and organizational performance. This study is among the few attempts made to systematically examine the interplay among MO, LO and organizational performance in SMEs operating in Pakistan.
Key words: Strategic orientation; Pakistan; Organizational performance; learning orientation; Market orientation

1 Introduction

Enhancing the productivity and competitiveness of the organizations has been an issue for both small and large organizations around the globe. In this context, organizations needs to deliver products with superior value in order to meet the changing needs and expectations of the customers (Beneke, Blampied, Dewar, Soriano, & Deacon, 2016). Prior studies in the strategy literature have suggested that business organizations must adopt those strategies that help them to effectively respond to the changing market demands (Hilman & Kaliappen, 2014), and compete successfully in the dynamic business environment (Altinay, Madanoglu, De Vita, Arasli, & Ekinci, 2016; Jogaratnam, 2017). Research scholars have highlighted that both small and large organizations need to deploy strategic orientations (e.g. MO and LO) in order to survive and grow in the competitive business environment (Jabeen & Mahmood, 2015).

Prior studies focusing on strategic orientation have suggested that the adoption and implementation of two strategic orientations namely Market orientation (MO) and learning orientation (LO) help both small and large organizations to enhance their core competitiveness, satisfy the current and latent needs of the customers and achieve improved organizational performance (Choi, 2014; Lin, Peng, & Kao, 2008; Mokoena & Dhurup, 2016). MO reflects the organizational behavior to understand the changing buying pattern of present and potential customer as well as keeping vigilant eye on the competitors' move in the marketplace to deliver superior value to customers (Narver & Slater, 1990). LO on the other hand reflects an organization ability to generate and share the market related information across the organization and facilitates the superior value creation (Sinkula, Baker, & Noordewier, 1997). Review of the extant literature in the subject area has highlighted that the complimentary effects of both MO and LO enable the organizations to respond effectively to changing market demands, gain competitive advantage and enhance the organizational performance (Slater & Narver, 1995).

Notably, the strategy literature has highlighted that most of the prior researches have attempted to associate organizational performance with a single orientation, like LO and MO (Frank, Kessler, Mitterer, & Weismeier-Sammer, 2012; Hilman & Kaliappen, 2014). However, recently researches argue that the adoption and implementation of a single orientation may prove less effective to achieve improved organizational performance (Baker & Sinkula, 2009; Hakala, 2011), and suggested that organizations need to build their strategies based on multiple orientations together in order to survive and grow in today's challenging business environment (Laukkanen, Nagy, Hirvonen, Reijonen, & Pasanen, 2013). Prior researches argued that organizations that deploy multiple strategic orientations are in better position to respond effectively to the changes posed by business environment and exploit the business opportunities (Choi, 2014; Deutscher, Zapkau, Schwens, Baum, & Kabst, 2016; Farrell & Oczkowski, 2002). In the light of the aforementioned arguments, the present study takes an integrated approach and investigates that how MO and LO together influence that organizational performance of

SMEs.

Nevertheless, majority of the studies on strategic orientations have been conducted in developed economies and in large organizational settings. However, prior studies argue the researchers should not assume the interplay between strategic orientation and performance as homogenous in all contexts due to low sampling variance and suggested the inclusion of moderator in the relationship according to the context of the study (Rauch, Wiklund, Lumpkin, & Frese, 2009). The researchers more recently called for further attention to investigate the interplay between LO and MO in developing countries like Pakistan (Hussain, Rahman, & Shah, 2016), the research area which has been paid less attention by the research scholars.

The present study fills the gap in the literature by taking a configuration approach to examine that whether MO moderates the LO-organizational Performance link in the context of SMEs operating in Pakistan. We suggest that firms can achieve improved organizational performance by deploying effectively their strategic orientations like LO and MO simultaneously.

2 Literature Review

2.1 Learning orientation

LO of an organization demonstrate its ability to develop a mechanism where market related knowledge is created and shared among the members across the organization for attaining the competitive advantage and superior performance (Calisir, Gumussoy, & Guzelsoy, 2013). This mechanism include observing changes in the market, intelligence generation and sharing regarding preferences and taste of the customers, keeping a vigilant eye on competitors actions and developing/ and adopting new technologies to exploit the business opportunities in those markets where the competitors have not yet reached (Sikora, Nybakk, & Panwar, 2016). A learning oriented organization is capable to generate and utilize market related information by exhibiting strong commitment to learn with in and out the organization, open mindedness in questionaing and challenging its current ways of doing things and developing new ways to learn about its customers and competitors to deliver superior customer value (Kaya & Patton, 2011; Sinkula, et al., 1997). Shared vision demonstrates the value   an organization gives to the learning process (Calantone, Cavusgil, & Zhao, 2002), to transform the organizational learning acquired into action by its members (Calisir, et al., 2013; Sinkula, et al., 1997). Concentrating on these dimensions of LO enable organizations to be sensitive to market changes, generate market related information and respond to the changing market demands effectively that ultimately results in gaining competitive advantage and greater performance.

2.2 Market orientation

MO reflects the ability of a firm to create superior customer value by displaying its strong commitment towards delivering superior customer value, satisfying its customer, maintaining long term customer relationships, sharing and responding to competitors related information and exploiting the business opportunities based on market related information (Attia, 2013; Slater & Narver, 2000). Narver and Slater (Narver and Slater, 1990) conceptualised MO as a three dimensions   construct explaining the machanism under which a firm understand its target customers (customer orientation), observe movement of its competitors and discussing their strategies (competitor orientation) and sharing these information across the organization (interfunctional coordination) getting input from them, devising strategies and delivering superior value to its customers. Market oriented organizations are in better position to identify needs and wants of the customers and get closer to them to fulfill them   which ultimately results in creating and deleievering better customer value enabling organizations to be on more competitive position (Baker & Sinkula, 2009; Hilman & Kaliappen, 2014).

2.3 Learning orientation and organizational performance

Review of the previous literature on strategic orientation has highlighted that LO facilitates   and enables both large and small businesses to acquire and develop knowledge by understanding the changing needs of the market and thereby fulfilling the needs of the customers (Hakala, 2013; Maes & Sels, 2014). Prior studies have reported the significant influence of LO on organizational performance. For example, a study conducted by Calantone et al. (Calantone et al., 2002) reported a significant and positive impact on organizational performance. These researchers further reported that LO has indirect influence on organizational performance through competitive advantage. A recent study conducted by Rhee, Park & Lee (Rhee, Park & Lee, 2010) in small technology innovative firms in South Korea opined that an organization that simultaneously deploys both strategic orientations (MO & LO) would be in a better position to improve its overall performance. They further added that focusing LO strategy

more compare to MO can enable an organization to bring innovation and will results in greater competitive advantage. A more recent study conducted by Maes and Sels (Maes and Sels, 2014) support the notion that the implementation of LO strategy with other strategies can facilitate the organization in attainment of its predetermined goals. More recently, Kharabsheh, Ensour, &Bogolybov(Kharabsheh, Ensour, & Bogolybov, 2017) conducted their study on 190 senior managers working in manufacturing organizations in Jordan and concluded that LO helps organizations in improving their organizational performance. Hence, on the basis of the extant literature, the following is predicted.

H1: Learning orientation is positively associated with the organizational performance of SMEs in Pakistan.

2.4 Moderation by market orientation

Prior studies in strategic management have reported that MO facilitates nurturing of LO in organizations because of its responsiveness to the external environment in terms of learning from outside the organization (Slater and Narver, 1995; Fang et al., 2014). The same view is supported by Matsuno, Mentzer, &Ozsomer(2002) that high market orientation of an organization leads to its high LO. Moreover, Dickson (1996) argues that LO provides a fertile environment to all other strategic orientations in an organization for the reason that of its ability to constantly enhance the market information generation process. Other studies suggested that an organization must deploy MO and LO together for improved organizational performance (Baker & Sinkula, 2002; Dada & Fogg, 2016). In the same line, a more recent study by Deutscher et al. (Deutscher et al., 2016) argue that implementation of both high level of LO and MO together results in greater organizational performance.

Notably, the few existing studies that consider both MO and LO simultaneously investigated 1) the direct effects of these orientations on performance (Baker & Sinkula, 1999; Santos-Vijande, Sanzo-Perez, Alvarez-Gonzalez, & Vazquez-Casielles, 2005), 2) investigated the mediating role of LO (Keskin, 2006; Yeni, Hastini, & Hasti, 2017), or moderating effect of LO (Beneke, et al., 2016; Fang, Chang, Ou, & Chou, 2014) on the relationship of MO and performance. Moreover, majority of these studies have been conducted in large organization settings in developed countries. Nevertheless, scholars argue that the results obtained from large organization may not be applicable to small organization because SMEs use small portion of marketing research and encounter greater financial pressure(Lonial & Carter, 2015). Moreover, SMEs in developing countries operate in poor state of infrastructure, having limited access to finance and underdeveloped institutional environment as compared to large organizations (Roxas, Ashill, & Chadee, 2016; Zayed & Alawad, 2017). Therefore, this study attempts to address the gaps in the strategy literature and investigate the possible moderating effects of MO on LO and organizational performance relationship in the context of SMEs operating in a developing country like Pakistan. Hence, we hypothesized the following.

H2: Market orientation moderates the association between learning orientation and organizational performance of SMEs in Pakistan.

3 Research Methods

3.1 Study context and sample

The context of the current study is Pakistan. SMEs play a critical role in promoting the economic growth, raising standard of living and improving the industrial development of both the developed and developing countries (Dar, Ahmed, & Raziq, 2017). In developing economies SMEs contribute positively to the creation of employment opportunities, reduction in poverty, development of entrepreneurship (Hosseininia & Ramezani, 2016).SME sector in Pakistan contributes 30% to Gross Domestic Products (GDP), though this sector constitutes 93% of the overall businesses in Pakistan (Mirani & Shah, 2012). The challenges these SMEs face include; lack of education and training, difficulty in access to finance and modern technology and, entrepreneurial skills which may have somehow negative impacts on health of these SMEs (Hussain, Abbas, & Khan, 2017; Jaffari et al., 2011). Though, the respective share of this sector into national economy is low compared to the large organizations, however, the importance of this sector cannot be ignored in the economic and social development process of the country. It is argued that the development of this sector is one of the prerequisites for ensuring economic and social development in any country (Dobrovic, Lambovska, Gallo, & Timkova, 2018) . Keeping in view the increasing importance of this sector, the current study highlights the important role these strategic orientations can play in development of this sector and making it more competitive, since this sector has the potential to promote social and economic development.

The data were collected from owners or managers of SMEs registered with either SMEDA or chamber of commerce, with less than 250 employees as per the criteria of Small and Medium Enterprises Authority (SMEDA) Pakistan for definition of SMEs. This study concentrated on two big cities of Pakistan namely Islamabad and Peshawar for data collection. For this purpose, 400 questionnaires were randomly distributed among the respondents, of which 225 were received back, of which some were discarded due to missing information. The usable responses were calculated to be 207, resulted in a response rate of 52%.

3.2 Measurement

This study used quantitative research methodology to collect the primary data. MO was measured through 15-items scale, adapted from Narver& Slater (Narver& Slater, 1990). LO was measured through 15-items scale adapted from Sinkula et al. (Sinkula et al.,1997) and validated by Nasution et al. (Nasution et al., 2011). MO and LO were measured on five-point Likert scales, ranging from 1 = "strongly disagree" to 5 = "strongly agree". The organisational performance as dependent variable was subjectively measured through 3- items namely market share, sales growth and overall performance on a five-point Likert scale ranging from 1 = "poor" to 5 = "excellent", where the by asking the respondent. The respondents were asked to assess the results of their companies against the competitors over the past three years.

3.3 Data analysis

To ascertain the reliability, pilot testing of the developed instrument was performed. The Cronbach alpha reliability statistics were used to measure the reliability of the variables of the study. The alpha reliability for MO and LO and organizational performance was checked and found to be 0.68 and 0.68 respectively. The alpha reliability results for the dimensions of MO and LO are as follows; competitor orientation (0.67), customer orientation (0.70), inter-functional coordination (0.66), commitment to learning (0.80), shared vision (0.79) and open mindedness (0.77). The alpha values of the main variable and their sub-dimensions were found to be above 0.60 (Hair, Babin, Money, & Samouel, 2003), and thus indicated that the instrument is reliable. Descriptive statistics i.e. skewness and kurtosis were used as indicators of the deviation which have been suggested by Meyer, Becker, & Van Dick (2006) to confirm that whether the data is normal. The values derived for both skewness and kurtosis were within acceptable range indicating the data was normal. Inferential statistics were used to test the hypotheses of the study. Pearson correlation was used to confirm the correlation among the variables of the study. Linear regression analysis was conducted to check the significant influences of LO on organizational performance. The moderating effect of MO on LO-organizational performance link was also checked using Baron and Kenny (Baron and Kenny, 1986) approach. Other assumptions like homoscedasticity, multicollinearity were satisfied before the regression analysis was performed.

4 Findings

The results of linear regression analysis derived from testing H1 are given in Table 1. The results indicated that LO has a significant (F=155.006, p=0.000) and positive impact on organizational performance (standardized β = .656). Therefore, H1 of the study is supported.

Table 1   Coefficients for H1

Hypothesis	Mean	Standardized beta	F	Sig
H1	Learning Orientation	0.656	155.066	0.000

Note: Dependent variable: organizational performance

The results of moderating effects of MO on LO and OP relationship using three steps Baron and Kenny (1986) method of moderation are reported in Table 2. The results of linear regression have already been reported in Table 1, where LO has significant and positive impact on organizational performance (Step 1). In step 2 of the Table 2, MO was added as moderator with LO. The results indicated that the addition of MO showed the increase of 02 per cent R-square i.e. 0.433-0.431=0.355 (change of F-value= 81.198, p <0.05). In step 3 of Table 2, after adding the interaction term of MO and LO (LO*MO) with step 2, the explanation power of the model increased to 77.1 per cent (R^2 = 0.771; p <0.001). The results reported that interaction term resulted in significant increase of 33.8 in explaining the variance in OP (change in F-value = 227.713, p <0.001). The results demonstrate that adoption and implementation of high level of MO practices in organizations strengthen the LO-OP relationship. Thus, hypothesis H2 is supported.

Table 2   Model Coefficients and Summary for H2

Step		Standardized beta	R	R^2	F Change	Sig. F Change
1	LO	0.656	0.656	0.431	155.066	0.000
2	LO	0.617	0.666	0.433	81.198	0.000
	MO	0.119				
3	LO	-.594	0.878	0.771	227.713	0.000
	MO	-.118				
	IT	1.424				

* LO (Learning orientation), MO (Market orientation), IT (Interaction Term).
Note: Dependent variable: Organizational Performance

5 Discussion

The objective of the present study was to investigate the role of LO and MO for improving organizational performance of SMEs in Pakistan. The current study also examined the moderating effect of MO on organizational performance. To examine how LO strategy is critical for improving the organizational performance; we tested our first hypothesis (H1) to check the effects of LO on organizational performance. The results demonstrated that there is positive and significant influence of LO on organizational performance and support the previous studies indicating that LO positively influence firm performance (Keskin, 2006; Wang, 2008). To examine the moderating effect of MO on the LO-organizational performance relationship, we tested our second hypothesis (H2), the results of which revealed that MO moderates the link between LO and organizational performance. The results support the work of Baker and Sinkula (Baker and Sinkula, 1999) that both MO and LO enable organizations to deliver superior customer value and leverage the market opportunities by serving with innovative products. Voola, Casimir, Carlson, &Anushree(Voola, Casimir, Carlson, & Anushree, 2012) also support the notion that organizations deploying multiple orientation simultaneously are better able to serve the customers and compete in the dynamic market successfully.

6 Conclusion

This research has several limitations. Subjective performance measures were used in light of the previous studies of Narver and Slater (Narver and Slater 1990) and Roxas et al. (Roxas et al., 2016). However, objective performance measures such as financial data would be valuable to be employed and the results should be compared with the current study for more insights on the subject matter. Moreover, this study relied on subjective performance measures, so on the survey design of the current study. This study provided an integrated approach and investigated the relationship between MO, LO and organizational performance, it is proposed that future research may take the sub dimensions of these orientations and their relationships with organizational performance may be examined. This study was conducted in SMEs operating in two cities of Pakistan; future studies concentrating on other industrial hubs of the country are proposed to be conducted for gaining more insights on the behaviour of these orientations.

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Entrepreneurial Leadership and Innovation: The Mediating Role of Employee Voice Behavior

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Abstract: This study uses a systematic quantitative research approach to identify the relationship between entrepreneurial leadership (EL) and innovation through the moderating effect of employee voice behavior (EVB). This study focuses on employees of Pakistani medium and large enterprises and implies that there is a positive and significant relation between EL and innovation and similarly between EL and EVB. Current study concludes that EVB also partially mediate the relationship between EL and innovation, which means that there are other factors mediating their relationship about which further research needs to be done. It can be concluded from this paper that the firms having entrepreneurial leadership ability in their employees and having EVB in organizational culture are usually good at innovation.
Key words: Entrepreneurial leadership; Employee voice behavior; Innovation; Organizational culture

1 Introduction

Over the past couple of decades, the business environment has changed dramatically due to rapid globalization and technological advancements. The only way of survival for businesses is innovation, which is now regarded as the key success factor and pinnacle for growth and survival in the modern business era (Rajapathirana & Hui, 2017). Recent developments in the theory of economic growth have highlighted the importance of innovation for sustainability in output and growth in productivity for firms specifically in developing countries (Wadho & Chaudhry, 2018). A number of studies have reported a positive relationship between innovation and labour productivity, profitability, firm growth, openness, and other firm-level outcomes (Wadho & Chaudhry, 2018). Innovation has been defined in a number of ways, one important definition is that Innovation is an outcome, process and mindset at the same time, which facilitates an organization to search and get maximum out of opportunities (Kahn, 2018). An important feature of innovation is that it should be implemented (EUROSTAT/OECD, 2005).

Firm's innovational ability is affected by many factors, and one main factor that influences innovation is leadership. The 21st century is especially focusing on a new type of leadership i.e. entrepreneurial leadership (Mishra & Misra, 2017). To innovate regularly, the firm must internalize entrepreneurial behaviors and attitudes that increase innovativeness ability of the firm (Avanti Fontana, 2017).

This study focuses on studying the relationship between EL and innovation through mediating effect of EVB which is believed to have a strong relationship with entrepreneurial leadership and innovation (Chen & Hou, 2016). This study is done focusing Pakistan medium and large enterprises who are struggling to compete with the multinational firms despite having financial and other resources (Aslam, Zulqarnain, Shoaib, & Akram, 2014).

The systematic quantitative approach is used in this study. Questionnaires from previous studies were selected and modified for the present study. Data was collected from the top and middle-level managerial employees of Medium and large-scale Pakistani enterprises both from manufacturing and service sector.

This study is significant in several ways; first, it has deliberated innovation from a different perspective i.e. from a perspective of entrepreneurial leadership. Secondly, EVB has been introduced as a moderator in the relationship between EL and innovation. EVB is a behavior if managed carefully can contribute significantly in encouraging both EL and innovation. Thirdly, this study has opened new directions for future research in the area of leadership, innovation, and employee behavior. Lastly, this study was done focusing Pakistani medium and large-scale enterprises, who are facing severe problems to complete in the era of globalization and technological advancement, and for them, innovation in the only option for survival. This study has provided some useful learning for managers of Pakistani firms on how they can improve their innovative capability and competitiveness by focusing on EL and encouraging EVB.

2 Literature Review

Term innovation has always attracted lots of attention from researchers in the management field; however, still, there is a lot of debate about the true definition of the term. This confusion about the definition of term innovation is created by the difference of opinion available in the literature. It should be noted that innovation is combination of three different things i.e. (1) innovation is an outcome, which encompasses what is sought by the innovation like product innovation, process innovation, business model innovation and market innovation, (2) innovation is continuous process and lastly (3) innovation is a mindset which tries to internalize the innovation in the individuals of the organization (Kahn, 2018). A more commonly used definition of innovation by business sector is provided by paragraphs 146 and 150 of Oslo Manual (Guidelines for Collecting and Interpreting Innovation Data) also cited by (Gault, 2018), which states that "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations". According to Oslo Manual, another important feature of innovation is implementation i.e. "A common feature of an innovation is that it must have been implemented (EUROSTAT/OECD, 2005).

As the business environment is becoming increasingly competitive, leadership is gaining importance, especially where risks are increasing, forecasting becoming difficult, industries are converging (Bettis, 1995). To cope with the challenges of modern-day business environment the 21st century has shifted its focus on EL to cope with the challenges posed by rapid globalization and innovation (Mishra & Misra, 2017). EL is a combination of entrepreneurial orientation, entrepreneurship, leadership abilities and entrepreneurial management and could be defined as a process which brings together unique innovation and complete package of resources to reap the organizational opportunities (Avanti Fontana, 2017).

More recently, it has been identified that entrepreneurial leadership influence employees innovative work behavior that ultimately influences organizational innovation. (Newman, Tse, Schwarz, & Nielsen, 2018). Entrepreneurial leadership has a dual character, one as an entrepreneurial accelerator and other is entrepreneurial doers (Newman et al., 2018).

EVB is a constructive behavior which is defined as a challenge-oriented behavior directed towards the improvement of the situation.(LePine & Van Dyne, 1998). It is considered that voice behavior has a strong influence on the creativity and innovativeness of the employees (Chen & Hou, 2016).

3 Research Framework

Based on the literature review and gaps identified, following research framework is developed for the current study (Figure 1).
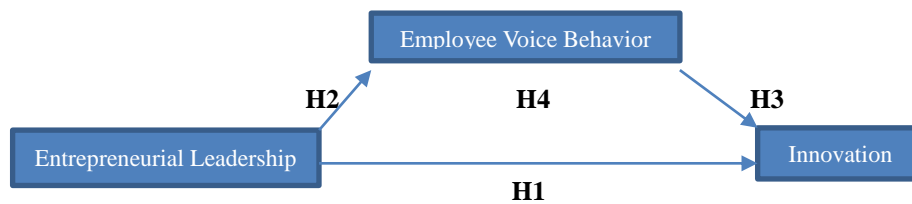
Figure 1   Research Framework

3.1 Hypothesis development

Following hypothesis are formed based on the research framework, **H1:** Entrepreneurial Leadership positively influences innovation. **H2:** Entrepreneurial Leadership (EL) positively influence employee voice behavior. **H3:** Employee Voice behavior positively influences innovation. **H4:** Employee voice behavior mediates the relationship between EL and innovation.

4 Methodology

4.1 Participants and procedure

Data were collected from middle and senior level employees of medium and large-scale Pakistani enterprises from both manufacturing and service sector on a cross-sectional timeframe through convenience sampling technique using both faces to face and online survey methods. Convenience sampling technique was used keeping in view the availability of respondents, as all of them are busy professionals. 350 Questionnaire were sent, out of which 310 were got back, out of them, 22 were

discarded due to missing data and other problems and 288 questionnaires were included in final analysis which yields 82% response rate. Total 36 medium and large-scale organizations from six major cities of Pakistan Lahore, Karachi, Islamabad, Rawalpindi, Faisalabad, and Gujranwala participated ipn the study. 53% of organizations participated in this study are from the service sector and 47% are from the manufacturing sector. Demographic analysis of the respondents reveals that majority (74.3%) of the respondents are males, which shows males dominancy in professional sector of Pakistan. As far as Age distribution of respondents are concerned, 13.2% belongs to age bracket of 25~30, 13.9% ranges between 31~35 and 17.4% of the respondents fall within the age of 36~40, 17% to 41~45, 20% to 45~50 and 18.4 % to 50 and more respectively, which depicts that data set is relatively evenly distributed as far as age is concerned. 51 % of the respondents hold master's degree (16 years of education), 16% are undergraduate, and 28.8% holds graduation (12 years of education). Only 12 (4.2%) hold MPhil (18 years of education) and only one respondent (0.3%) holds PhD Degree. Respondents are also relatively evenly distributed as far as the number of years of experience is concerned, 16% of the respondents have 1~5 years of professional experience, 21% falls within the 6~10-year category, 18% within 11~15, 20% within 16~20 and 24% within 21 and more year's category respectively.

4.2 Measure used

To ensure the reliability and content validity, this study has adopted measures from previous studies.

4.2.1 Entrepreneurial Leadership

The measure for Entrepreneurial Leadership is adopted from (Avanti Fontana, 2017) which consist of 4 dimensions namely (1) Strategic Dimension having 10 items (2) Communicative dimension having 5 items (3) Motivational Dimension having 5 items (4) Personal / Organizational Dimension having 4 items. All items are measured on 5 points Likert scale (1 = strongly disagree and 5 = strongly agree). Reliability was assessed according to the guidelines of (Hair, Black, Babin, & Anderson, 2010). Cronbach's Alpha for Entrepreneurial Leadership is (α = .918).

4.2.2 Employee Voice Behavior

An instrument for employee voice behavior is adopted from (LePine & Van Dyne, 1998) which consist of 6 items. All items are measured on 5 points Likert scale 1 = strongly disagree and 5 = strongly agree) (Cronbach's α = .826)

4.2.3 Innovation

An instrument for outcome variable i.e. Innovation is adopted from INNOSCALE developed by (Vicente, Abrantes, & Teixeria, 2015) which consist of 13 items. It consists of four dimensions (1) product development capability having 4 items (2) innovativeness having 3 items (3) strategic capability having 3 items and (4) technological capability having 3 items e.g. All items are measured on 5 points Likert scale (1 = strongly disagree and 5 = strongly agree) (Cronbach's α = .724).

5 Hypothesis Testing

H1: Entrepreneurial Leadership positively influence innovation: A simple linear regression analysis was performed using SPSS version 23, taking Entrepreneurial leadership as independent variable and Innovation as an outcome or dependent variable.

Table 1   Regression Analysis Between EL (IV) and Innovation (DV)

F	Standardized Beta Coefficient	Sig (p)	Result
Model is Significant at (1,285)=20.253,p<0.01	.258	0.001	H1 is supported

H2: Entrepreneurial Leadership positively influences employee voice behavior. To test H2, again simple linear regression was performed taking entrepreneurial leadership as the independent variable and employee voice behavior as the dependent variable.

Table 2   Regression Analysis Between EL and EVB

F	Standardized Beta coefficient	Sig (p)	Result
Model is Significant at (1,285)=71.049,p<0.01	.447	0.001	H2 is supported

This result is in accordance with the finding of (Chen & Hou, 2016), who states that leaders are now concerned about their employees showing willingness and raising voice against organizational issues.

H3: Employee Voice behavior positively influences innovation. Simple linear regression analysis was performed to test the H3, taking employee voice behavior as independent variable and innovation as the dependent variable.

Table 3   Regression Analysis Between EVB and Innovation

F	Standardized Beta coefficient	Sig (p)	Result
Model is Significant at (1,286) =14.388, *p<0.01*	.219	0.001	H3 is supported

Results are in line with the finding of (Chen & Hou, 2016), who states that employee voice behavior has a strong and positive effect on creativity and innovativeness of the firm.

H4: Employee voice behavior mediates the relationship between EL and innovation.

Table 4   Mediation Analysis

	Model	Standardized Beta Coefficient	Sig (p)	Results
Direct (Without Mediator)	EL	.258	.001	
In-Direct (With Mediator)	EL Employee Voice	.201 .126	.002 .049	H4 is Partially supported

*Dependent Variable: Innovation

Analysis showed that both direct effect i.e. entrepreneurial leadership to innovation and indirect effect i.e. entrepreneurial leadership to innovation through employee voice behavior are significant, which implies that even though employee voice is mediating the relationship, however, there are some other factors that are also affecting the relationship between entrepreneurial leadership and innovation. Therefore, our findings support H4 partially. Further research needs to be done about the other factors that are affecting the relationship between entrepreneurial leadership and innovation.

6 Conclusion

In the current business environment, innovation is the key success factor for any business enterprise. With the rapid globalization and technological advancement, the enterprises who will not innovate on regular basis and will not keep pace with the changing trends of the market and business environment will soon perish. Following conclusions are drawn from the current study,

1.Entrepreneurial leadership has a strong and positive relationship with innovation, which means that firms having leaders (or managers) with entrepreneurial abilities in their cadre are more likely of better performing at innovation and vice versa.

2.Entrepreneurial leadership has a strong and positive relationship with employee voice behavior, which implies that employees will show voice that is behavior that is more constructive when they find entrepreneurial leadership guiding and supporting them and employees will raise more voice against problems within the organizational system that will ultimately increase their creativity and hence organizational innovation.

3.Employee voice behavior has a direct and positive relationship with innovation. It can be implied from this that if an employee raises their voices against problems in the organizational system and against status quo, then organizational innovation will improve.

4.Employee voice behavior also partially mediates the relationship between entrepreneurial leadership and firm's innovation, which implies that both direct effect (i.e. from entrepreneurial leadership to innovation) and indirect effect (from entrepreneurial leadership to innovation through employee voice behavior) are significant, which means that there are others factors who are influencing the relationship between entrepreneurial leadership and innovation which are not covered in this research and this require further research in this area.

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Fuzzy Comprehensive Evaluation of IPR Process Management Level on SMEs

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Abstract: The SMEs are the main force of technological innovation, and strengthening the intellectual property management of the whole life cycle is the key measure to improve their innovation abilities. Based on the Life Cycle Theory and the main content in the different stages of IPR management on SMEs, this paperconstructs an evaluation index system covering five dimensions: Basic Resources, IPR Creation, IPR Application, IPR Protection, IPR Management. And then uses fuzzy composite evaluation to carry out an empirical analysis of taking the SF Company as an example. The evaluation results show that the current IPR process management of SF Company is in the "general" level (70.037), which is mainly affected by two factors: basic resources (66.612) and intellectual property management (67.833). Meanwhile, intellectual property creation (75.768), intellectual property application (70.961) and intellectual property protection (70.106) are all in the "general" level. So, four suggestions for improvement are put forward: independently set up the IPR management department, establish IPR management information system, strengthen the comprehensive monitoring of the key nodes of the enterprise R&D projects and expand the diversification of the IPR.
Key words: IPR process management; SMEs; Fuzzy comprehensive evaluation; Life Cycle Theory

1 Introduction

SMEs are the important force for technological innovation, creating 65% of China's invention patents and 80% of new products. In the new era of full implementation of innovation-driven development strategy, the state attaches great importance to the innovation capability of SMEs, especially the construction of IPR management ability, and has promulgated the regulations on enterprise intellectual property management (GB/T29490) for standardization and guidance. In recent years, the theoretical circle also pays close attention to the research of enterprise IPR management, such as, Porter (Porter, 1997),Stewart (Stewart, 1998),Wagman(Wagman, 1999),Foley (Foley, 2012) proposed that the establishment of IPR management system plays a significant role in enhancing the sustainable development capacity of enterprises. Wu Handong (Wu Handong, 2009), Du Yun (Du Yun, 2010), Philip (Philip, 2011) believed that the core of enterprise competitiveness lies in the IPR. Wang Yuxi (Wang Yuxi, 2008), Tang Heng (Tang Heng, 2010), GuoSiyong (GuoSiyong, 2013) proposed to integrate existing management activities to improve the efficiency of enterprise IPR management. However, different from the large and medium-sized enterprises, the practice of SMEs is still lack of theoretical support and practical demonstration, especially lack of how SMEs strengthening the management of intellectual property process in different life cycles. This paper will take SF Company as an example to carry out exploratory research on the process management of IPR in SMEs from the perspective of enterprise life cycle.

2 Evaluation System Construction

2.1 The establishment of evaluation index system

Based on Life Cycle Theory, the main content of IPR management in SMEs in different life cycle stages can be divided into five dimensionalities including the Basic Resources, IPR Creation, IPR Application, IPR Protection, IPR Management. Based on this, this paper designs the evaluation index system of IPR process management level as shown in table 1.

2.2 The establishment of fuzzy comprehensive evaluation model

1) Using the evaluation index system in Table 1, the factor sets are determined as $U= \{U_1, U_2, U_3, U_4, U_5\}$, the set of factors is: $U_1 = \{u_{11}, u_{12}, u_{13}, u_{14}\}$, $U_2 = \{u_{21}, u_{22}, u_{23}, u_{24}\}$, $U_3 = \{u_{31}, u_{32}, u_{33}, u_{34}\}$, $U_4 = \{u_{41}, u_{42}, u_{43}, U_{44}\}$, $U_5 = \{u_{51}, u_{52}, u_{53}, u_{54}\}$.

2) Setting up the evaluation set $V = \{v_1, v_2, v_3, v_4, v_5\}$. The five grades are: very good, good, general, poor, very poor, and the corresponding percentage points are 90-100, 80-90, 70-80, 60-70, and below 60.

3) A single factor evaluation is carried out. According to the raw data of SF Company for nearly three years, the proportion of each evaluation grade is calculated by the initial processing of data, and the fuzzy relation matrix R is established, as shown in Table 1.

4)The weight of indicators at all levels was obtained by using AHP, as shown in Table 1.

Table 1　The SMEs IPR Management Evaluation Index System

Grade I Indexes	Grade II Indexes	Fuzzy Evaluation Matrix R				
		V_1	V_2	V_3	V_4	V_5
Basic Resource U_1（0.23）	Institutional Settings for IPR Management u_{11}(0.324)	0	0	0.6	0.3	0.1
	Special Funds for IPR u_{12}(0.157)	0	0.1	0.7	0.2	0
	IPR Management Information Platform u_{13}(0.264)	0	0	0.2	0.7	0.1
	IPR Management System and the Work Plan u_{14}(0.255)	0.1	0.3	0.4	0.2	0
IPR Creation U_2（0.21）	Research Objectives and Strategies u_{21}(0.236)	0.1	0.1	0.6	0.1	0.1
	The Investment Intensity of R&D u_{22}(0.317)	0.3	0.2	0.5	0	0
	Number of R&D Personnel u_{23}(0.275)	0.2	0.4	0.4	0	0
	The Number of Patent Applications Growth Rate u_{24}(0.172)	0.2	0.3	0.4	0.1	0
IPR Application U_3（0.16）	The Application Rate of Patent u_{31}(0.313)	0.1	0.2	0.5	0.1	0.1
	Contribution Rate of IPR for New Profit u_{32}(0.209)	0.2	0.2	0.3	0.3	0
	The Use of Standardized Procedure u_{33}(0.187)	0	0.1	0.6	0.2	0.1
	The Effectiveness of the Competition Strategy u_{34}(0.291)	0.1	0.3	0.3	0.3	0
IPR Protection U_4（0.14）	Awareness and Ability of Rights Protection u_{41}(0.184)	0	0.3	0.4	0.2	0.1
	the Rate of Criminal Cases Registered of Annual IPR Disputes u_{42}(0.295)	0	0.3	0.5	0.2	0
	Contract Management u_{43}(0.263)	0	0.1	0.7	0.2	0
	The Early Warning Mechanism of Long-term u_{44}(0.258)	0.1	0.2	0.4	0.3	0
IPR Management U_5（0.26）	Annual Income and Expenditure Plan of IPR u_{51}(0.189)	0.2	0.2	0.4	0.2	0
	IPR Licensing Rate and Transfer Rate u_{52}(0.322)	0	0	0.4	0.4	0.2
	Investment in the Introduction of IPRu_{53}(0.280)	0	0.3	0.5	0.2	0
	Profit Contribution Rate of Industrialization of IPR u_{54}(0.209)	0	0.2	0.3	0.5	0

3 Empirical Analysis

3.1 The grade interval distribution of evaluation results

$$B = A \times R = (0.23,0.21,0.16,0.14,0.26) \begin{bmatrix} 0.006 & 0.021 & 0.106 & 0.084 & 0.014 \\ 0.044 & 0.052 & 0.101 & 0.009 & 0.005 \\ 0.016 & 0.034 & 0.67 & 0.035 & 0.008 \\ 0.004 & 0.031 & 0.071 & 0.032 & 0.003 \\ 0.010 & 0.043 & 0.106 & 0.085 & 0.017 \end{bmatrix}$$

$$= (0.079,0.181,0.450,0.244,0.046)$$

Therefore, we figure out the proportion of SF Company IPR process management at the level of "very good", "good" and "general", "poor" and "very poor" is respectively 7.9%, 18.1%, 45%, 24.4% and 4.6%, among which the sum of the middle three grades is 87.5%.

3.2 Evaluation results of the comprehensive rating

$$E_1 = V * B_1^T = (90,80,70,60,50) * (0.026,0.092,0.459,0.364,0.059) = 66.612$$

$$E_2 = V * B_2^T = (90,80,70,60,50) * (0.208,0.249,0.479,0.041,0.024) = 75.768$$

$$E_3 = V * B_3^T = (90,80,70,60,50) * (0.102,0.210,0.419,0.219,0.050) = 70.961$$

$$E_4 = V * B_4^T = (90,80,70,60,50) * (0.026,0.222,0.508,0.226,0.018) = 70.106$$

$$E_5 = V * B_5^T = (90,80,70,60,50) * (0.038,0.164,0.407,0.327,0.064) = 67.833$$

$$E = V * B^T = (90,80,70,60,50) * (0.079,0.181,0.450,0.244,0.046) = 70.037$$
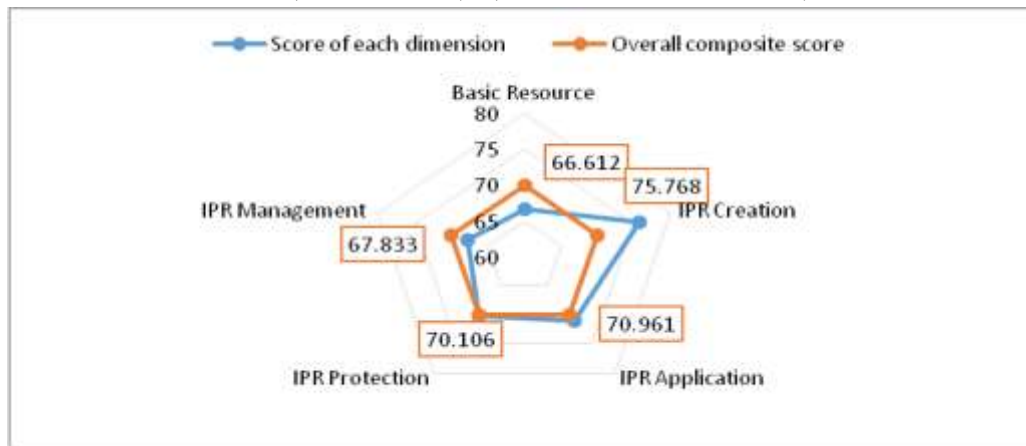
Figure 1   The Radar Map of Intellectual Property Process Management Score of SF Company

The evaluation results show that the comprehensive score of the IPR process management of SF Company is 70.037, which is at the "general" level. In particular, it is subject to two factors: Basic Resources (66.612 points) and IPR Management (67.833 points); At the same time, the three dimensions of IPR Creation (75.768), IPR Application (70.961) and IPR Protection (70.106) are also in the "general" level, as shown in the Figure 1.

4 Conclusion and Suggestion

4.1 The main conclusion

Based on the Life Cycle Theory and the main content of the different stages of IPR management in SMEs, this paper constructs an evaluation index system covering five dimensions: Basic Resources, IPR Creation, IPR Application, IPR Protection, IPR Management. And taking SF as an example, it uses fuzzy composite evaluation to carry out an empirical analysis. The evaluation result shows that the current intellectual property process management of SF is in the "general" level (70.037), which is mainly controlled by two factors such as basic resources (66.612 points) and IPR management (67.833 points). At the same time, the three dimensions of IPR creation (75.768), IPR application (70.961) and IPR protection (70.106) are all in the "general" level, with a large improvement space.

4.2 Improvement Suggestions

1) Independently set up the IPR management department. Change the IPR management group formerly attached to the R&D department to the independent IPR management department, which is fully responsible for the internal and external management of intellectual property, reports directly to the general manager, and all functional departments should cooperate fully.

2) Establish the IPR management information system. According to the basic preparation-application-authorization-maintenance-operation-management of the whole process management content of IPR, establish the corresponding intellectual property query-application-analysis-maintenance-operation-evaluation six information system, to improve enterprise internal coordination and enforcement for the management of IPR.

3) Strengthen the comprehensive monitoring of key nodes of enterprise R&D projects. We can divide enterprise research and development projects into four stages: implementation, implementation and transformation, and implement comprehensive management by designing monitoring measures of key points in each stage.

4) Expand the diversification of IPR. Using the Boston matrix to analyze and optimize the conversion of intellectual property to market value, expand the intangible asset leverage effect of intellectual property through diversified management.

Acknowledgment

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Impact of Eco-based Innovations on the Efficiency of Corporate Environmental Responsibility

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Abstract: The ultimate purpose of Corporate Environmental Responsibility (CER) is to prevent harmful influence of business activities on the environment. Each company should be obligated to adhere to it since environmental pollution is a serious threat for the future of mankind. Based on this urgent need, ecological innovation appeared. It purports to make a transition from a harmful business to a more accountable one. Hence, the contribution aims at studying how different, most developing countries, have been approaching and practicing CER to propose a more practical and general framework strategy with a qualitative methodology encompassing common accepted steps to drive improvements in the efficiency of CER and Eco-Innovation. Such a framework focuses on innovation as a key to business success aligned with CER and it is based on previous eco-based innovations in such a context. Necessary data will be collected by a survey questionnaire about several case studies.
Key words: Corporate environmental responsibility; Innovations; Environment

1 Introduction

Innovation is regarded as a core driver of the development and success of any business. It has multiple definitions, and several of the most succinct and relevant ones posit it as the implementation of a novice or significantly enhanced product, service, process, or method, whereas others underline that innovation can have continuous connotation, and mean a course of improvement (Reinlie, 2017). In Rexhepi, Kurtishi and Bexheti (Kurtishi and Bexheti, 2013) they stated, "innovation in implicit way tends to be one of the main drivers of competitiveness" (p. 540).

Innovative technologies must be safe, justified and constructive in order to become a valuable strategic tool for the company. Along with this, the value for society and accountability for the corporate performance has become a key issue in the modern business world. Diverse novice types of innovation have emerged nowadays, reflecting the aforementioned stance of harm to the environment. Eco-innovation and social innovation are among them. According to the report by the Organization for Economic Co-operation and Development (OECD), eco-innovation is defined as "innovation that reflects the concept's explicit emphasis on a reduction of environmental impact, no matter whether or not that effect is intended" (OECD,2009b). Furthermore, eco-innovation, or green innovation in other words, is targeted at decrease of resources and energy consumption "while promoting sustainable economic activity" (OECD,2012). Nevertheless, many companies focus on receiving a higher profit and neglect the harm their performance imposes on the environment. The concept of corporate environmental responsibility (hereinafter, CER) implies the accountability of each company for the society concerning its actions. To be more precise, organizations claim the duty to abstain from such types of business activity that can damage the natural environment either in direct or indirect way. As a result, the notion of eco-innovation appears implying performance that contributes to a sustainable development that creates new products and services targeted to both provide significant business value and at the same time decrease environmental damage. So, what is the actual impact of eco-based innovation on the enhancement of efficiency of CER? The present paper proposes to study relevant, credible and up-to-date literature focused on eco-based innovations outlook in the context of CER and its current approaches and practices in developing countries and provide a general methodology based on major issues identified during the secondary research and the model of efficiency criteria from the framework. A qualitative research is chosen in order to collect essential data on the issue in question. The study relies on the literature review, a number of case studies and a survey questionnaire.

2 Examples

There are several cases that illustrate how ecological innovation can presently be employed as a constructive tool of CER. For example, research on the issue of CER actualization and its potential efficiency in one of the low income countries, Bangladesh, was conducted by Belal, Cooper, and Khan

in 2015. This country is in the process of transition to middle income countries, but huge amount of costs spent on dealing with urgent environmental issues is a serious obstacle for this process (Belal, Cooper, Khan, 2015). Therefore, the initiative of CER actualization is regarded as a potential solution in the situation of Bangladesh (Belal, Cooper, Khan, 2015). It is recommended to involve NGOs to this process as an approach to the introduction of 'surrogate accountability' performed via third parties in order to contribute to the vulnerable stakeholders. As the scholars underline, such an alternative approach to the issue of corporate responsibility is expected to have more significant "potential in developing countries where NGOs might act as surrogates for victims of corporate activities and sanction the power wielders on behalf of the vulnerable with a view to redress the balance of power and hold the corporations to account" (Belal, Cooper, Khan, 2015).

Another example that is relevant to the given discussion concerns process of eco-innovation in industrial water-service systems (Levidow et al., 2016). Levidow, Lindgaard-Jorgensen, Nilsson, Skenhall, and Assimacopoulos conclude that there are many challenges in the implementation of eco-innovations in the given sphere, but the overall potential of their use is significant, and further studies of the issue in question are recommended (Levidow et al., 2016). Finally, Asfaw, Botes and Mengesha present a case of Ethiopia as a relevant sample of developing countries implementing CER (Asfaw, Botes and Mengesha, 2017). The experts also conclude that influence of NGOs in the given context will be an optimal solution (Asfaw, Botes and Mengesha, 2017). Their clearly set and constructively developed strategies are expected to contribute to formation and effective functioning of green economy in the country (Asfaw, Botes and Mengesha, 2017). The policies should be actualized via cooperation with government, media, educational institutions, and primary stakeholders (Asfaw, Botes and Mengesha, 2017).

There are five major gaps in the presented research, namely, 1) strategies of NGOs in developing countries aimed to prevent improper use of power and impact. NGOs should cooperate with governmental organizations and at the same time focus on the ultimate purpose of CER. The urgency of the given gap is confirmed by Asfaw, Botes and Mengesha (Asfaw, Botes and Mengesha, 2017); 2) there is a gap in the vision of strategy that can be adhered to and developed by NGOs in addressing the issue of CER. Actually, each developing country has similar issues in general, but peculiarities of their implementation as well as proximity to higher level of development differ. Hence, more alternatives and examples of CER implementation with all the challenges and potential outcomes should be investigated more as supported by Asfaw, Botes and Mengesha (Asfaw, Botes and Mengesha, 2017); 3) there is also a gap in addressing CER issues under circumstances of industrial efficiency. As a rule, the changes implied by CER require time, costs and efforts. Hence, it is crucial to explore more on the most optimal solutions for such transitions. It is especially relevant in developing countries where the potential is rather limited and the current environmental problems are serious. This issue was approached by Levidow, Lindgaard-Jorgensen, Nilsson, Skenhall, and Assimacopoulos superficially (Levidow et al., 2016); 4) the study of Bangladesh conducted by Belal, Cooper, and Khan reveals that there is a gap in effective and affordable strategies on financial issue for the developing countries. To be more precise, the options for acquisition of the costs for changes that are usually a deficit in developing countries should be studied as underlined by Belal, Cooper and Khan (Belal, Cooper Khan, 2015); 5) finally, the major premises of effective development of green economy in developing countries is considered to be another gap in the area of concern. Belal, Cooper, and Khan dwell on the issue of 'surrogate accountability' (Belal, Cooper, Khan, 2015).

Figure 1 presents a framework that illustrates the major aspects for ensuring efficiency of eco-based innovation in terms of CER provision. These aspects include *scalability, capacity, security, speed of installation, error handling and validation of the data*. These constituent elements of the efficiency paradigm are expected to gauge the actual positive influence of ecological innovation of CER-related organizations in developing countries. Scalability is needed to provide maximal utility of the discussed strategies. Capacity of each country is a crucial factor as far as it predetermines perspectives of use of ecological innovations and transition to CER in business sector. Security is a crucial element that prevents business from failure in financial terms and environment from actual damage. Speed of installation is also a serious issue in the given context since many businesses refuse to shift to CER since it requires not only money, but also time. Error handling is a crucial issue of the future. The stakeholders should be ready to face the errors and deal with them constructively. The potential solutions should be developed beforehand so as to respond timely. Finally, validation of the data is a step to the next level of eco-based innovation and effective CER since it presents background for further improvements and better outcomes.
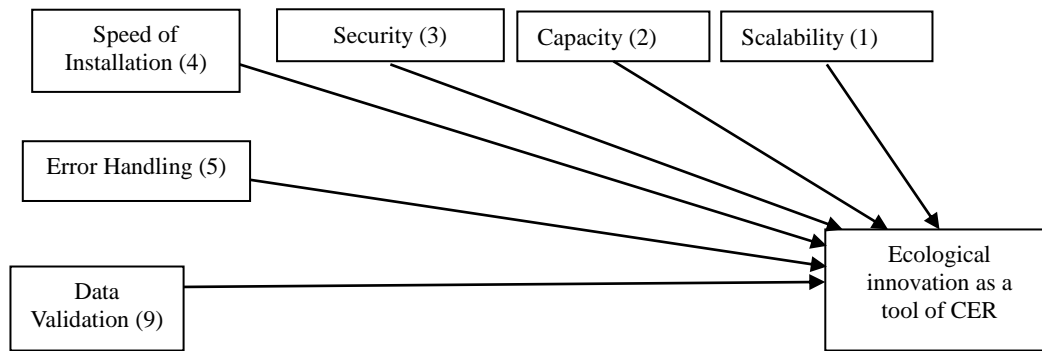
Figure 1　Framework Ensuring Efficiency of Eco-innovation in Terms of CER Provision

3 Data and Methodology

The given methodology will include, as secondary research, a literature review of credible, reliable and up-to-date sources that feature the core concepts of the research and relevant case studies in the area of interest. Primary research encompasses conducting survey and consequent analysis of the acquired responses. The results lead to the ability to identify several ideas of innovation eligible for further practical use or future, more specific exploration.

3.1 Method One

The present study adheres to the qualitative approach. The reason is that this approach aligns with the major aims of the given research, namely, to provide in-depth insight into the issue in question, analyze it from different angles and acquire as much details on the topic as possible. According to Hancock, Ockleford and Windridge, qualitative research "focuses on reports of experience or on data which cannot be adequately expressed numerically" as well as "focuses on description and interpretation and might lead to development of new concepts or theory, or to an evaluation of an organizational process" (Hancock, Ockleford, Windridge, 2009). Along with such, this type of research uses flexible, emergent and at the same time systematic research process (Hancock, Ockleford, Windridge, 2009). Hence, the given methodology for the research requirements fits impeccably.

The research question of the present study is: What is the actual impact of eco-based innovation on the enhancement of CER efficiency?

3.1.1 Discussing about Method One

The focus of the study will be narrowed by means of several case studies representing the essential data needed for conclusions and further application of research results. The study will also identify directions for further research and potential implications for practice with CER in developing countries.

3.2 Method Two

The overall quantity of the respondents necessary for the study was 100. A back-up group of 20 more people was formed in case some of the respondents declined to partake, failed to complete the survey or provided incomplete responses. Each individual received a welcome e-mail letter with basic terms, guarantees and form of informed consent. Along with this, each person was assigned to a group. The date the survey was to be distributed and time for its completion (1 week) were also mentioned in the letter. As soon as 100 of the respondents from the main group provided their consent and confirmed participation, the survey questions were approved, and the surveys were returned by the due date. Only two respondents failed to provide their feedback, so it took 10 additional days to contact the representative of the back-up group and receive their responses.

3.2.1 Discussing about Method two

Once 100 responses were collected, each aspect was analyzed and arranged into a set of inferences. Consequently, the outcomes of the primary and secondary research were compared and aligned or contrasted accordingly. Finally, a concise and comprehensive report was developed, revealing core findings, discrepancies and challenges of the issue in question. The most valuable empirical contribution of the study was a set of innovative ideas designed based on the given research course.

4 Results

The results acquired via online survey were structured in accordance with the core efficiency

criteria presented in the model. All the participants of the study confirmed that proper implementation of eco-innovative technologies impacted efficiency of CER positively. 78% of the respondents agreed that eco-innovation always requires making crucial changes, but at the same time leads to better performance outcomes and higher quality of the final product or service level. Some respondents noted in their additional comments to the survey, that CER was impossible without eco-innovation and that awareness of urgent necessity to implement CER in all countries by all companies is a key to the future with resources available and natural conditions favorable for all living things on Earth. Seven respondents claimed that CER is being implemented too slowly and such a pace does not suffice for timely changes needed to save the natural capital.   One of the participants posited that the course of implementation of eco-innovative technologies endangered the survival of many companies as far as it required much time, efforts, alterations and expenses, and, as a result, the company could face potential bankrupt since revenues could decrease or investors could pull out. This is an important aspect that should be studied further in the future studies.

4.1 Scalability

The results on the criteria of scalability were as follows: 76% of the respondents stated that eco-innovation contributed to scalability, but only in the long run. Some respondents highlighted that their business needed around two to three years to cross the line of proper scalability after the introduction of eco-innovation technologies (34%), whereas others stated that qualitative implementation of eco-innovation led to positive results in terms of scalability of the business within a year (28%). The rest of the respondents stated they had no experience with eco-innovation aligned with scalability issues.

4.2 Capacity

Capacity criterion acquired the following research outcomes: the prevailing majority of respondents (58%) stated that the primary threat to capacity of the business was eco-innovations; some respondents claimed it was of utmost importance to start eco-innovative practices only when the program aimed at CER provided transparent vision of adjusted performance that did not affect capacity, whereas others claimed it was crucial to start eco-innovative practices as soon as possible since it was hard to construct an impeccable scheme for every type of business without affecting any of the currently studied criteria of efficiency. One of the respondents expressed in the section for additional comments that capacity should be a main concern in the long run, i.e., the capacity decreased in the course of CER actualization is a logical consequence of serious transformations, and should be endured for the sake of the ultimate purpose – better capacity in the future.

4.3 Security

Security issue received most of the attention of respondents in the section of additional comments. The following aspects were addressed: according to 98% of the respondents, security was considered to be the major concern in eco-innovative practices; 44% of the participants believed that security was a key measure in constructive eco-innovation; 28% of the respondents claimed they improved security in their businesses via introduction of eco-innovation, and 3% of them stated innovative technologies were hazardous to their businesses on the initial stage of implementation. 14% of the participants also highlighted that initial plan of implementation of eco-innovative technologies should include the predictions for potential threats to security and solutions or preventive measures. Furthermore, 7% of the respondents believed that eco-innovation could become a hazard to overall security measures only in cases in which it was implemented or conducted improperly. Finally, 78% of the participants also mentioned that security was a consequence of constructive and qualitative eco-innovation and adequately functioning business.

4.4 Speed of installation

Speed of installation was the next aspect studied in the given research. 77% of the respondents stated that implementation of eco-innovation was proceeding too slowly. Some respondents commented that they had the following problems because of the low speed of installation: loss of investors because of incremental rates of decreased revenues (11%); loss of partners because of failed deadlines and terms of their partnership (18%); reduced sales (12%); and lower rates in performance in the annual report (6%). On the other hand, three respondents mentioned that the slow speed of installation could be improved through higher expenses. One of the participants also added that speed of installation in his experience directly depended on the competence of the team. Finally, 28 respondents mentioned the need for constructive, maximally detailed plan of installation as a core basis of timely implementation.

4.5 Error handling

Error handling was the most controversially perceived aspect in the context of the given research.

To be more precise, 52% of the respondents believed that it would be impossible to predict and prevent all the crucial errors in the process of implementation of eco-innovative technologies. Furthermore, the main factors contributing to effective error handling were identified as: timely detection of error, highly competent personnel, plan for prompt solution of the errors and their consequent prevention, strong security system, and maximal alignment of business capacity with requirements of eco-innovative technologies. Finally, proper error handling was considered as a significant stage of development of the company in the process of eco-innovation implementation.

4.6 Data validation

Data validation is a final criterion of efficiency used for evaluating positive contribution of eco-innovation to CER in the modern business world. According to the survey completed by those 100 participants, 79% claimed that data validation was not a problem provided all the previous stages of eco-innovation implementation were conducted properly and timely. Still, the respondents were asked to list the main challenges and drawbacks they faced in the context of data validation, and the most common responses were the following: omission or confusion of data that led to data corruption and security vulnerability; insufficient amount of data necessary for valid outcomes; and improper choice of validation method. A plurality (46%) highlighted omission or confusion of data as a major reason of unjustified validation results. 23% of the respondents claimed that such unjustified and corrupted results led to serious problems in overall business performance consequently.

5 Conclusion

Thus ecological innovation can contribute to the efficiency of CER in developing countries assumed the financial support, time and effort are provided. Furthermore, clear strategies are also needed to provide maximal efficiency. Based on the research, it is recommended to actualize eco-based innovation in business domain of developing countries with active engagement of NGOs as third parties. Moreover, a framework that encompasses main efficiency criteria was constructed. The framework includes scalability, capacity, security, speed of installation, error handling and validation of the data.

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The Effect of Innovation Through Research and Development on Economic Inclusive Growth in 35 OECD Countries

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Abstract: The main objective of this article is to analyze the effect of research and development (R&D) expenditures on economic inclusive growth in the Organization of Economic CO-cooperation and Development (OECD) countries from 2000-2016. For this reason, we constructed a multiple regression model which indicated an increase in research and development expenditure as percentage of GDP by 1% would cause an increase of real GDP growth rate to 2.83 %. This result can be useful for the policy makers, government and institutions regarding the innovation area and economic inclusive growth perspective.
Key words: Research and development; Economic growth; Innovation; OECD Countries

1 Introduction

The effect of research and development (R&D) activities on economic performance has been intensively examined both by researchers and policy makers. In the theoretical literature, economic growth models emphasize the importance of technical change and assert that technological development is the main driver of economic growth in the long run. At present, developed countries largely base their economic growth on the creation and use of knowledge that objectified in technological changes. It has become a fundamental creator of competitive advantage of companies and countries on the world market (Lucas, 1988, 1993). The study of knowledge as a key determinant of economic growth is especially present in so-called new growth theory. The two most important directions of new growth theory are endogenous growth models and evolutionary approach to presenting the complex of technological change as a source of economic growth. The common thread is their attempt to arrive at a proper answer to the question of what are the key drivers of complex technological changes.

Endogenous growth models follow Schumpeter's idea of the importance of organized knowledge creation in generating economic growth based on research and development (Schumpeter, 1942). Romer (Romer, 1986, 1987) marked a new theoretical approach to the analysis of economic growth factors, the so-called endogenous growth by formalized the idea that knowledge leads to continuous economic growth. In Romer's model, growth rests on the results of research and development, substantiated in technological changes, which companies use to maximize profit. This feature of technological progress has been particularly studied by Grossman and Helpman (Grossman & Helpman, 1991) and Aghion and Howitt (Aghion & Howitt, 1992, 1998).

The view that the complex of technological changes represents the most important source of economic growth first entered economic science when precisely promoted by the representatives of neoclassical economic thought. The neoclassical growth theory predominantly rests on Robert Solow's model, developed in the mid-1950s. (Solow, 1957) came to the conclusion that approximately 50% of historical growth in industrialized countries cannot be attributed to the growing use of physical capital and labor, but to the third factor, the so-called residual. Residual includes all growth factors of an intangible nature, such as the development of existing, and the creation of principally new, means of production, changes in education and expertise of employees, research and development, changes in organization and methods of production.

The question of relationship between the activities that drive the complex of technological changes and economic growth of individual countries in previous years can be empirically confirmed. In this regard, the activities of the country are represented by a large number of indicators that trigger technological changes. One of the indisputable indicators of such efforts is the GERD (Gross domestic expenditure on R&D) indicator. The GERD as a percentage of GDP presents research and experimental development (R&D), comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications. The research in this paper covered 35 OECD countries, observed in the time frame 2000–2016. Using the multiple regression method, except for the GERD indicator, the following have been used as control variables, relevant to the generation of economic growth: gross capital formation, government final

consumption expenditure and fertility rate. The paper will present the results obtained by the multiple regression method, based on a sample of 35 OECD countries in the period from 2000 to 2016.

2 Data and Methodology

The expression of the levels of innovation activities in national economy is an important factor in empirical research on the effect of innovation on economic growth rate. The share of research and development expenditure in GDP is the most used data on innovative activities in one country. This approach is highly acceptable because it is suitable for quantitative and qualitative analysis.

In our study, the dependent variable is the real growth rate of gross domestic product. Data on this value has been taken from the official statistics of OECD and World Bank data base. It is known that gross domestic product is a measure of economic activity in a national economy, measured by the value of output (goods and services). The main task of this study is to determine whether the research and development expenditure has an impact on economic inclusive growth in OECD countries.

Table 1 Descriptive Statistics and Names of Variables

Variable	Obs.	Mean	Std.dev.	Min	Max
Real GDP Growth Rate	275	1.891471	1.652292	-3.471759	4.089127
General Government Final Consumption Expenditure as a Percentage of GDP	275	31.25807	5.092584	23.2	39.29872
Gross Fixed Capital Formation as a Percentage of GDP R&D Expenditures as a Percentage of GDP	275	9.771874	4.760953	2.27187	17.27188
Fertility Rate	275	24.46158	5.077135	16.4	32.49569
	275	1.688235	.0600245	1.6	1.8

In our research, we use a multiple regression model with fixed effect (FE). The reason for such an approach lies in our decision to analyze the influence of selected variables that change over time. The fixed effect explores the link between, on the one hand a dependent and on the other hand independent and control variables, within each entity individually in our case, the observed countries. Each entity has its own characteristics, which determine the influence of independent and control variables on the dependent variable. Another important assumption of the FE model is that those time-invariant characteristics are unique to the entity, and should not be correlated with other entities' characteristics. Each entity is different, therefore, the entity's error term and the constant (which captures individual characteristics) should not be correlated with the others entity's error terms (Wooldridge, 2002).

3 Regression Tests and Results

We suppose that every country has some characteristics that influence real GDP growth differently. The mean is based on observations from all countries, and that could be the reason for a great standard deviation. When we use fixed effect model to get entity error, the error is correlated with other predictors in equity. Those entity errors are unobserved time invariant characteristics of every country.

First, we run a simple linear regression. The dependent variable we use is real GDP growth rate. The independent variables are government final consumption expenditure, gross fixed capital formation, R&D as a percentage of GDP, fertility rate. The regression is given in Table 2.

Table 2 Simple Linear Regression

Source	SS	df	MS	Number of obs	275
				$F_{(3,271)}$	65.82
Model	14.8945093	3	3.72362732	Prob >F	=00000
Residual	28.7756916	271	2.61597196	R-Squared	=0.3411
Total	43.6702009	274	2.91134673	Adj R-squared	0.1015
				Root MSE	=1.6174

Real GDP Growth Rate	Coef.	Std.Err	t	P>t	95% conf.interval	
General Government Final Consumption Expenditure as a Percentage of GDP	7.499429	11.50301	0.65	0.528	-17.8185	32.8173
Gross Fixed Capital Formation in %GDP	-29.90876	17.66582	-1.69	0.119	-68.7909	8.97345
R&D Expenditure Percentage of GDP	22.49319	24.53908	0.92	0.379	-31.5169	76.50334
Fertility Rate	9.621684	9.403062	1.02	0.283	-11.0743	30.3176
-cons	505.9286	447.9173	1.13	0.283	-479.93	1491.78

The value of R-squared, which is 34.11% of the variance of the dependent variable real GDP growth

rate, is explained by our regression model. We are basically interested to find it out if there is any evidence between our independent variable and a dependent variable controlling for the other variables. The conclusion arising from Table 3 is that, with the clause ceteris paribus, an increase in the share of research and development expenditure in GDP by 1% will have an impact on the real growth rate of GDP by 1.21 percentage points in the observed economies in the observed period. In order to improve the validity and applicability of the model, i.e. that the variable government final consumption expenditure as a percentage of GDP has a lower p value, but also point to the growing importance of investment in research and development for economic growth, we performed the time adjustment of our control variables. Therefore, on the basis of a number of iterative steps, we constructed a multipleregression model, in which we observed the effects of fertility rates with a one-year lag (Table 4).

Table 3   Multiple Regression Using Fixed Effect Model

Fixed-effects(within) regression Number of obs   275

R-sq: within	=0.6881		Number of groups	=35	
between	=0.3031		obs per group:min=	13	
overall	=0.4608		avg=	13.0	
			.max=	13	
			F (3,271)	82.87	
corr(u_I,Xb)	=-7.652		Prob >F	=0.000	

Real GDP Growth Rate	Coef.	Std.Err	t	P>t	95%conf.interval	
General Government Final Consumption Expenditure as a	-0.3920452	0.244743	-2.89	0.059	-6.82554	0.00219
Percentage of GDP	0.7057682	0.063786	11.75	0.002	.59391	.78125
Gross Fixed Capital Formation in %GDP	1.213281	0.595236	3.62	0.035	.14568	3.08234
R&D Expenditure Percentage of GDP	-0.09655789	0.032362	-4.35	0.001	-0.21606	-0.05792
Fertility Rate	-0.0565523	0.005635	-12.45	0.006	-0.06578	-0.0509
Dummy	0.0891454	0.056358	1.65	0.213	-0.02009	0.27229
-cons	0.03895689					
	0.02539658		(fraction of	variation	due to u_i)	
Sigma-u	0.65538660			Prob>F	=0000	
Sigma-e	(25,225)=6.52					
Rho						
F test that all						
U_i=0						

Table 4   Multiple Regression Using Fixed Effect Model Using Time Lag for One Year Fertility

Fixed-effects(within) regression			Number of obs 250		
Group variable:	country		Number of groups	=35	
R-sq:within	=0.7281		obs per group:min=	10	
between	=0.2312		avg=	10.0	
overall	=0.3685		.max=	10	
F(3,225)	92.86				
corr(u_I,Xb)	=-8.241		Prob >F	=0.000	

Real GDP Growth Rate	Coef.	Std.Err	t	P>t	95%conf.interval	
General Government Final Consumption Expenditure as a	-0.419256	0.454783	-3.26	0.062	-.785424	0.02159
Percentage of GDP	0.8125768	0.081386	12.52	0.000	.63125	.81425
Gross Fixed Capital Formation in %GDP	2.831281	0.079536	4.29	0.005	.23568	3.8524
R&D Expenditure Percentage of GDP	-0.2965789	0.052624	-5.32	0.001	-0.31506	-0.01592
Fertility Rate	-0.0654538	0.007565	-13.52	0.000	-0.07278	-0.02289
Dummy	0.2489154	0.058658	3.15	0.008	-0.03209	0.32291
-cons						
Sigma-u	0.03395687		(fraction of	variation	due to u_i)	
Sigma-e	0.03536582			Prob>F	=0000	
Rho	0.75360253					
F test that all	(25,271)=5.82					
U_i=0						

Table 4 points to the conclusion that, with the clause ceteris paribus, an increase in the share of research and development expenditure in GDP by 1% will have an impact on the growth rate of real

GDP by 2.83 percentage points. The coefficient of determination in this case is higher. We can construct one model by adding to this the fact that the F-test is a good value, we confirm that all coefficients are different from zero.

4 Conclusion

After reviewing the relevant literature and empirical studies that link the complex of research and development with economic growth, in this paper we set the research question of whether the research and development expenditure in the period from 2000 to 2016 in the OECD countries had a positive effect on economic inclusive growth. For this purpose, we constructed a multiple regression model, in which the dependent variable was the real rate of economic growth, and the independent variable the value of research and development expenditure as a percentage of GDP. The obtained results unambiguously confirmed that research and development have a positive effect on the real economic growth rate. The constructed multiple regression model with fixed effects showed that, with the application of the clause ceteris paribus, an increase in the share of research and development expenditure in GDP by 1% causes GDP growth of 2.83 % in 35 countries of the OECD in the period 2000 to 2016.

Acknowledgement

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New Management Strategy Based on Patent Analysis in FPGA Field

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Abstract: Semiconductor companies are constantly bounded by customer demands for smaller, lighter, faster and more powerful devices. They are continuously introducing new models and adding more features to enhance their devices. However, the product life-cycle curve in semiconductor devices today is shorter and steeper than ever before. With shortened life cycle, the high management executives are difficult to make a right decision which regions and technologies they need to focus more. In this article, we propose a new management strategy for semiconductor companies to compete in this smart era by using patent analysis with link mining method. We focusd on an advanced FPGA technology because this market is mainly driven by raising demand for optimization in Big Data analytics, growth of Internet of Things (IoT), huge adoption in smart-phone and held devices and growing adoption of Advanced Driver Assistance System (ADAS). We extracted the information from Classification Patent Codes (CPC) that submitted by Intel, Altera and Xilinx suppliers using link mining as the analytical method. We analyze the metadata and create a graph theory to see the degree of the nodes. The experimental results showed the technological structure and recommendation for the semiconductor management which regions they need to pay most attention. In conclusion, this patent analysis with the link mining method can help the top management predict where the business model of semiconductor industry will be shifted.
Key words: FPGA; Patent; Technology structure analysis; Link mining; Graph theory

1 Introduction

The semiconductor industry has evolved into one of the critical foundations for the global economy and this industry goes to keep up with developments in a world that is rapidly moving beyond smart. In the biggest semiconductor exhibition/conference, SEMICONWEST, the key phrase was "SMART STARTS HERE" last year, but this year is changing to "BEYOND SMART". "Beyond smart era" means all things are digital, integrated and all connected without human intervention. It also means everything are smart and intelligent like smart home, smart phone, smart machine and others by using IoT (Internet of Things), Big Data or AI. Furthermore, it means experiencing the cutting-edge of changes driving the industry forward. One example of smart-era technology is IoT, which is a network of physical devices, home appliances and other items embedded with electronics, software, sensors, actuators and network connectivity which enable these objects to connect and exchange the data. Hence, the demand for collecting a large amount of data and processing the data in real time also increase. However, the industry is not without challenges and these challenges must be addressed if we want to continue on historic growth track. One of the problems, due to short product life cycle, the top management often confused in which market and field are the most worth for them to penetrate. In addition, in term of technologies the processing performance needs to be improved on both the edge- and the cloud-sides.

A semiconductor company must decide what areas it plays in and equally, what areas it does not play in. It requires a lot of more detailed works and faith to choose the right target market and segment, and devise a compelling, hard-to-imitate value proposition, backed up by internal resources and patience. It must focus equally on strategy and execution – in all areas of its business. It requires an increase in risk appetite, a change in mindset, an ability to make sense of the environment, and agility – and that is a long change journey to undertake. The top management needs to have three fundamental aspects of marketing which are analyzing market, targeting markets and finally finding the best way to sell semiconductor products to those market. Targeting and positioning are called sources of sustainable competitive advantage. To do market analysis, there are two major aspects which are identifying and segmenting the market. The process of analyzing and targeting market can be applied by patent analysis with link mining method.

In addition, edge computing becomes an essential component of the data driven applications. Usually users install and run edge computing software in existing environments. The hardware can be

dedicated or shared with other services. In many scenarios, it is common to use the system LSI called embedded System-on-a-Chip (SoC). It satisfies reducing power consumption and improve reliability. All the sensors talk to the local edge devices which manage the connectivity with the cloud. Amazon Web Service (AWS) and Microsoft Azure are examples of device edge software. A large amount of data will be transmitted from edge devices to the cloud to server installed on the cloud side. The real time processing to transmit data is very crucial. Hence, this will definitely increase the processing power. Therefore, in addition to high-performance CPUs, high performance GPUs and large capacity memories are required to perform parallel calculation.The SoC is the core of the edge devices, but it is difficult to apply to edge devices of small production because of high price and long lead time. In addition, servers on the cloud side mainly use Intel x86, AMD and NVIDIA GPUs have a lack of flexibility to support new protocols. To solve these problems, Field Programmable Gate Array (FPGA) has been proposed. FPGA market is growing in the rapid pace. Owing to its high adoption in smart phones and handheld devices, its implementation in wireless networks for increasing the bandwidth and growing demand for electronics components in automobile industry is driving the market growth. FPGA also can be used as the SoC and no limit on how many operations can be simultaneously executed by a computer. The development period of FPGA is also much shorter because the manufacturing process is unnecessary, and it relatively has lower power consumption. This FPGA technology is very suitable for implementing CPU accelerators and user protocols.

Intel (former Altera), Xilinx, Microsemi and Quicklogic are key players and supplier of FPGA. In recent years, Xilinx adds an ARM core to its FPGA to create FPGA SoC. Intel also has released a chipset for server combining its own CPU and FPGA and reference design for fog computing.

This paper focuses on capturing and finding the technological field where FPGA suppliers focus on. We extract the information from Classification Patent Codes (CPC) submitted by these suppliers and usage of link mining method as the analysis method. It is a method of abstracting the elements and their relationships in the analysis subject into the nodes and the edges to create a graph, and search its structural features. There are several kinds of graphs such as weighted / unweighted and directed / undirected-graphs. And there are various kinds of indices which represent the structural features such as order, centrality, cluster coefficient, transitivity, density, and so forth. We analyze the metadata and create the graph theory to see the degree of the nodes. This paper also analyzes the market and identifies which markets these suppliers should focus on.

2 Related Works

This chapter describes related work on our proposed method. Many market analysis about semiconductor industry has been made so far. Introduction of Semiconductor Marketing book proposed FPGA has several attributes that provide companies competing in this space with defensible long-term positions in the market. The two main players in the FPGA area are Xilinx and Altera. The FPGA industry also benefited the foundries by helping the Taiwanese foundries take market share away from ASIC companies, primarily located outside of Taiwan."Sustaining Moore's Law Uncertainty Leading to a Certainty of IoT Revolution" by Ravi Batra is precise in his analysis that it is very important for the semiconductor industry professionals to look for new ideas to sustain a progress of Moore's Law.

Mark Bohr, a senior fellow in Intel manufacturing group, said that what started out as an observation become a guide for them that they needed to follow and if possible, they want faster than anyone else in the industry. He also doesn't think Moore's Law will end, it will evolve and change in terms of what they do. The semiconductor industry's ability to innovate and develop ICs of one sort or another will continue for a long time.Masashi Shibata et al. proposed the trend analysis of the technology development on FPGA with Machine Learning based on the public information. Thus, succeeded in revealing the companies' technological transition and their differences and cmmon points from the results of extracting the graphs' features.

In term of technology, many technical analysis methods using the patent have been made so far. They are performed for the purpose of business solution.TRIZ (TeoriyaResheniyaIzobretatelskikhZadatch) aims at performing technical development based on the structure of problem solving which appears repeatedly in the patent. Kawakami et al. propose the inconvenience idea gains support system aid of inventive problem solving theory TRIZ.Thus, many measures have been taken as having centered on the patent for a business solution.

Then, we look down about the patent analytical skills. One of the techniques of patent information analysis is the patent mapping. Kiriyama made content analyses with this method. Shide et al. performed

finding the change of the positioning for customer of research and development activities of the company using the patents analyses. Kimura proposed a technology evaluation method based on patent analysis for technology strategy planning. As for the analysis of important information derived from patent analysis, Carpenter analyzed for important cited patents. Muguruma showed the validity of the patent citation analysis to propose FCA (Forward Citation Applicant) map. Sato et al., proposed the importance calculation method of the patent document based on the citation information. Ogawa et al, proposed a basic patent extraction based on the citation information. For citations, Albert conducted a validation of citation for important patent among the industry.

In place of which were performed heuristically so far, as for the patent classification, such as category of invention and problem, Tanaka proposed method of extracting the feature automatically. Yamashita proposed a method of surveillance technology and specific method of patent classification with text mining. Yamamoto et al, proposed a method to enhance the compatibility of the search by applying the information of related patent documents in search of academic papers. Yamamoto proposed a method to find the scientific papers with a variety of further information. Kleinberg extracted the topic and description of the relationship with graph theory. Eto proposed a measure of co-citation based on structural units of the paper. Ueda proposed the technical analysis with an active mining method that focuses on the cognitive processes of the patent examiner, utilizing patent classification such as IPC (International Patent Classification), FI (File Index), and F-term (File Forming Term). Thus, with the application of the technology of intelligent informatics, knowledge extraction is performed to the patent information.

Then, it looks down about the mining technology, which is one technique of knowledge extraction. The relationship of analytical methods and technologies, technology analysis method using patent information is described.Structured technique using graph theory has been applied in various fields. For instance, chemical formula, WWW (World Wide Web), social network, statements with grammatical structure and dependency. A graph is made for expressing the structure of the object, and make it use for the analysis, finding the partial graph which occurs frequently from the set of graphs.From the results of the related work studies, the relationship is able to describe using this method. This paper is employed link mining for the patent analysis.

3 Experimental Configuration

This chapter describes the configuration of this experiment.In general, patent information consists of metadata, such as application date, applicant, classification codes, literal information and graphic information. Classification codes include those used internationally, such as IPC, CPC and those used domestically such as ECLA, USPC, FI, F-term and so on. IPC and CPC indicate the technological fields of the main topics of the patent's claims.

CPC is the classifier that began granting from 2013. It is retroactively assigned to patents which filed before 2013. It has a hierarchical structure like other classifiers. It is separated Section (Alphabet 1 character) - Class (2 digits) – Subclass (Alphabet 1 character) - Main group – Subgroup hierarchically. There are about 250 thousand groups in total. In this experiment, four alphanumeric characters up to subclass are used. Up to subclass, there are 649 categories.

Two kinds of CPCs are given to a patent. One is Head-CPC and the other is Sub-CPC. Head-CPC indicates the technology field which the patent mainly belongs. Sub-CPC indicates the technology field which is related to the patent. The number of CPC varies depending on the relevant technical field of the patent. For example, Intel's patent: 9,532,239 has 5 CPCs such as G01S 5/14; H04L 43/08; G01S 13/876; G01S 13/765; and H04W 24/02, and its Head-CPC is G01S 5/14. Here we focus on the US patent owned by FPGA suppliers: Xilinx, and Altera acquired by Intel in 2015. The analytical period is for 16 years from 2001 to 2016. The full text database of the U.S Patent and Trademark Office is used as experimental datasets. Applicant: Altera, Xilinx, and Intel are used as search keywords. As a result, 3,884, 3701, 34,316 patents are obtained respectively. Among them, filed in 2001 through 2016, 3,302, 3,113, 26,949 patents are analysed.

At first, the patents are grouped by every 6 month. Then, for representing the technological structure of a patent, a directed graph is created for each patent. CPCs given to the patent are used as nodes, and edges are drawn between Head CPC and Sub CPCs. The edge's direction is Head CPC to Sub CPCs. There is no edge between Sub CPCs. The graph is unweighted graph. Fig.1. shows an example of the graph of each patent.Then, semi-annual graphs for each supplier are created by overlaying patents' graphs in every 6 month of application. The number of link appearance is accumulated for every appearance of

the edge. Thus, the graphs are directed and weighted graphs.

In this experiment, we focus on the degree of each node of the graph. Degree represents the number of edges connected to a node. The nodes connected with more edges are considered to be core technologies at that time. In Fig.2, the size of a node indicates the number of the degree of the node. The thickness of an edge indicates the number of times, and the nodes have the relation as the Head CPC and the sub CPC. Therefore, 4 CPCs out of 11 have high degree. The graph is a directed graph. Therefore, the degree is calculated by adding inward degree and outward degree.
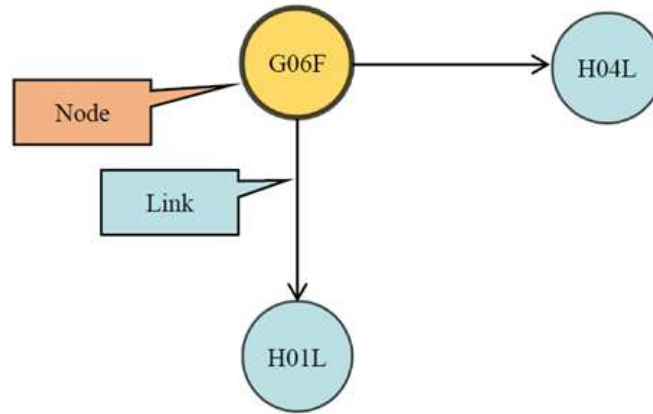
Figure 1   Directed Graph of Each Patent
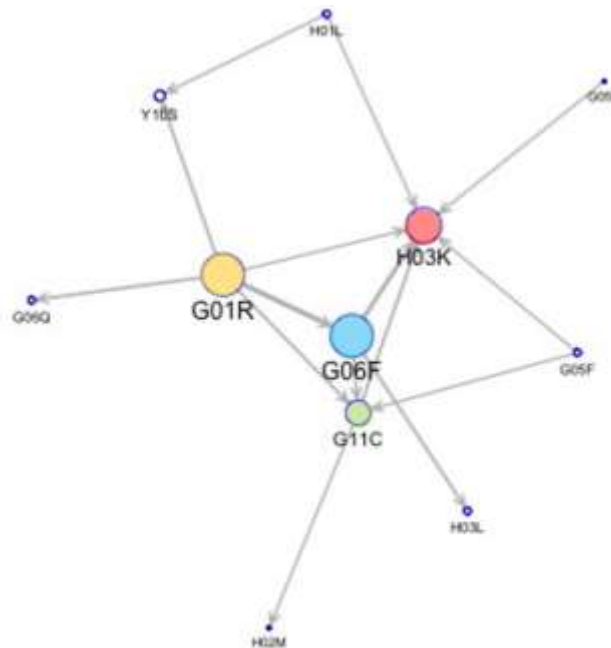
Figure 2   Semi-Annual Graph

4 Experimental Results

This chapter describes the results of the technological structure analysis. Table 1 shows the five CPCs which have the highest degree for each supplier for every 6 month. We analyze giant FPGA companies Altera, Xilinx and Intel, even though Altera is now part of Intel, we still compare their data to see where the business shift after Intel purchased Altera. All of the three companies have high degrees of G06F, H01L, and H04L throughout the period as shown in Fig. 3. This means the field of data processing, semi-conductor device, and digital data transmission continue to be important for these companies throughout the period.

Table 1　High Degree CPC List

		Altera					Xilinx					Intel				
2001	fh	G01R	G06F	H03K	G11C	Y10S	G01R	G11C	G06F	H01L	G09G	G06F	H01L	H04N	H05K	H04L
	sh	G01R	G06F	H03K	G11C	G06Q	H03K	G06F	G11C	H01L	H03L	G06F	H01L	H04N	Y02B	Y10S
2002	fh	H03K	G06F	G11C	G01R	G05F	G06F	H03K	G11C	G06N	H01L	G06F	H01L	H03K	H04N	Y10S
	sh	H03K	G06F	H01L	G01R	H03L	H03K	G06F	H03K	H04L	G11C	G06F	H01L	H05K	H04L	Y10S
2003	fh	H03K	G06F	G11C	G01R	H03M	G06F	G01R	H01L	H03K	G01B	G06F	H01L	H05K	H04L	Y10T
	sh	H03K	G01R	G06F	G11C	H01L	H03K	G06F	G01R	H03L	H01L	G06F	H01L	H05K	Y10S	Y10T
2004	fh	G06F	H03K	G01R	H01L	G11C	G06F	H03K	H01L	G01B	H03D	H01L	G06F	H05K	H04L	Y10S
	sh	H03K	G06F	G11C	H03L	G01R	H03K	G06F	G01R	H01L	H03L	G06F	H01L	H05K	Y10T	Y10S
2005	fh	G06F	H03K	G01R	G11C	H01L	G06F	H03K	G01R	H01L	H04L	H01L	G06F	Y10T	H04L	H05K
	sh	H03K	H04L	H04L	G06F	H03L	G06F	H03K	G01R	H04L	H01L	G06F	H01L	Y10S	H04L	B82Y
2006	fh	H03K	G06F	H03L	H04L	H01L	H03K	G06F	G01R	G11C	H01L	G06F	H01L	H04L	H05K	Y10T
	sh	H03K	G06F	G11C	H03L	H04L	H03K	G06F	G11C	H04L	G11C	G06F	H01L	H04L	H05K	Y02B
2007	fh	G11C	H03K	G06F	H03L	H04L	G06F	H03K	H04L	G01R	G11C	H01L	G06F	H04L	H05K	Y02B
	sh	H03K	G06F	H04L	H01L	H04J	G11C	H03K	G06F	H01L	H04L	G06F	H01L	H04L	H05K	B82Y
2008	fh	H03K	G11C	G06F	H04L	H03M	G06F	H03K	G01R	H04L	G11C	G06F	H01L	H04L	H05K	Y10T
	sh	H03K	G06F	G11C	H04L	H01L	G06F	H03K	H04L	G01R	G11C	G06F	H04L	H01L	Y02B	H04W
2009	fh	H03K	G06F	G11C	H01L	H03L	G06F	H03K	G11C	H04L	G01R	G06F	H01L	H04L	H05K	Y10T
	sh	H03K	G06F	G11C	H03L	H04L	H03K	G11C	G06F	G01R	H01L	G06F	H01L	H04L	H04W	H05K
2010	fh	H03K	G06F	H04L	H03L	G11C	G06F	H03K	H04L	H04L	G11C	G06F	H01L	H04L	H05K	Y02B
	sh	G06F	H03K	G11C	H04L	H03L	G06F	H03K	G06K	G01R	H04L	G06F	H01L	H04L	Y02B	H04W
2011	fh	H03K	G06F	G11C	H04L	H03L	G06F	H03K	G01R	G11C	G06K	G06F	H04L	H01L	H04W	Y02B
	sh	H03K	G06F	G11C	G01R	H03L	G06F	H01L	H03K	G01R	G11C	G06F	H04L	H01L	H04W	Y02B
2012	fh	G06F	H03K	H01L	H04L	G11C	G06F	H03K	H01L	H04L	H03M	G06F	H04L	H04W	Y02B	H01L
	sh	G06F	H03K	G11C	H03L	H01L	G06F	H01L	H03K	H04L	G11C	G06F	H04L	H04W	Y02B	H01L
2013	fh	H03K	G06F	H04L	H03M	H03L	G06F	H04L	H01L	H03K	H03L	G06F	H04L	H04W	H04B	Y02B
	sh	G06F	H03K	G11C	H04L	H01L	G06F	H04L	H01L	H04L	G11C	G06F	H04L	H04W	Y02B	H04B
2014	fh	G06F	H03K	H04L	G11C	H01L	G06F	H03K	H01L	H04L	Y02B	G06F	H04L	H04W	H04B	Y02B
	sh	G06F	H03K	H04L	H01L	H03L	G06F	H01L	H04L	H03M	H03K	G06F	H04L	H04B	H04W	Y02B
2015	fh	G06F	H03K	H04L	G11C	H03M	G06F	H04L	H03K	H01L	H04B	G06F	H04L	H04W	Y02B	H04B
	sh	G06F	H03K	H04L	G01R	H01L	G06F	H01K	H04L	G11C	H01L	G06F	H04L	H04B	H04W	Y02B
2016	fh	G06F	H04L	H03K	G11C	H03M	G06F	G11C	H03K	H01L	H04L	G06F	H04L	H04B	H04W	Y02B
	sh	G06F	H03K	H04L	H01L	G11C	G06F	H03K	H03M	H04B	H04L	G06F	H04L	H04B	H04W	Y02B
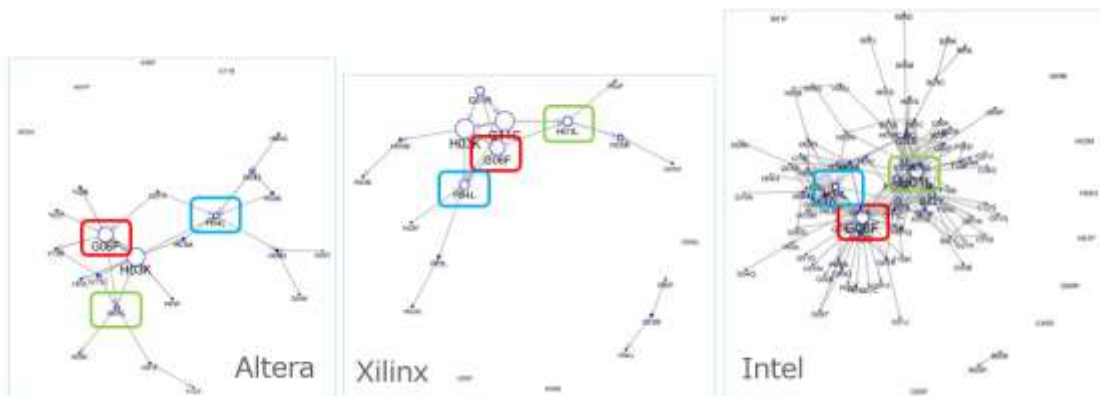
Figure 3　Technology Strucuture

Intel purchased FPGA-maker, Altera, in 2015. When we observe from high degree CPC list in Table 1, before Intel purchased Altera, the degree of H05K is high in the first half of the period which is focusing on technology development for chipset boards. During the latter half, the degree of H04B and H04W becomes high. It shows that the direction of development shifts to wireless transmission and data transmission. Comparing with Altera, the degree of H03K and G11C is high throughout the period. It shows that the fields of electric circuitry and memory are important and core business of this company. It means, that when Intel shifts their business to wireless transmission and data transmission, Intel plans to purchase Altera that are good in electric circuitry and memory. All of wireless transmission and these technologies are using FPGA that can be reprogrammed after it was made. Intel predicts FPGAs opportunity everywhere and purchased Altera because of Intel and Microsoft Azure project that required FPGA from Altera.

In term with Xilinx, the CPCs appeared are mostly common like Altera. Xilinx business focuses on electric circuitry and memory. At different points, Altera has a high degree of H03L (automation control circuit) throughout the period and Xilinx has a long period of high degree of G01R (measuring electric

variables). In addition, the degree of H04B (wireless transmission) has been increased at the end of the period.

Therefore, we collect Altera, Xilinx and Intel-CPCs to analyze the reason behind and to see where these giant FPGA suppliers shift their business model. In addition, this patent analysis with link mining method can help the top management semiconductor companies compete in competitive advantages and targets in which segment of market they need to focus based on these suppliers trend.

5 Conclusion

This paper proposes an efficient method for semiconductor management for analysing the semiconductor business model trend with machine learning. We gathered the US patent data filed by FPGA suppliers. We employed the patent classifier to make the technology structure graph. With the proposed methnod, we succeeded in extracting corporate focusing business and technology area. In addition, this method can help high management to make a right decision making by proposed the worth segment they should focus on.

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Innovation in Action: Edupreneurers' Objectives and Practices for Quality Education

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Abstract: Present study aimed to explore the mission statements of schools and intentions of edupreneurs in relation with their practices toward quality of education they are imparting. Objectives of the study were to find out the mission statements and practices of private edupreneurs and to compare it with the perceptions of parents and teachers about quality of education claimed by the schools. Qualitative research design was opted for the study and using purposive sampling technique seventeen edupreneurs running well reputed private schools in cities of Sargodha, Lahore and Gujrat were taken as sample. Teachers (N 26) from these schools and parents (N 19) as stake holders were also the part of sample. Document analysis, Semi structured Interviews of the owners and principals of schools and focus group interviews of parents were conducted to gather the data for the study. Three indicators of quality i.e. input, process and product were studied. Thematic and content analysis of data revealed that majority of the mission statements of schools had included community service, innovative ways to impart education, to increase quality of education, to develop leadership qualities among students, as their major targets. There were no defined ways established by the schools to assess the achievement of school targets. Majority of the teachers and parents reported earning money as the major focus of the school administration in contrast with the mission statements of schools which spoke of innovation and quality education as the first priority. Parents perceived high fee structure and load of foreign text books as the major indicator of quality of education. The findings indicated discrepancies between the passion and practices of edupreneures. Findings also highlighted general perception of the society where schools with high fee structures are reputed as status symbol in society and are equalized with quality education. Research findings may be implied by adding the element of accountability to check balance between the intentions and practices of edupreneurers. Future research might investigate the mission statements and practices for quality education by using mixed method research design applied to larger sample.
Key words: Edupreneurers; Private schools; Mission statement; Quality education; Stake holders

1 Introduction

Edupreneureship is comparatively a new concept in Pakistan. Edupreneur, According to the International Academy for Educational Entrepreneurship, equals educational entrepreneurship. To some other organizations edupreneurs are grouped in the category of social entrepreneurship. As a concept, Edupreneurship means enterprise of any entrepreneur in educational filed (Vivek&Upadhyaya ,2015).

The notion of Edupreneur can be best understood by locating the development of its root word entrepreneur.   Literature review reveals that Richard Cantilton, an Irish partisan economist invented the word "entrepreneur" in 1730 (Casson, 1990). Webster dictionary defines entrepreneur as, "a person who organizes and manages an enterprise with considerable risks[1]". Thus Edupreneurscan be considered as educational entrepreneurs who are able to plan, establish and effectively run educational institutions. In this endeavor edupreneurs handle lawful and unlawful obstacles with unwavering risks management skills. The enterprise created by an edupreneur can aim at earning profit or it can be of non-profit nature. But in order to get attention of people, edupreneurs keep their educational services updated. Generally, edupreneurs can be put into two categories: public and private. In literature many traits of Edupreneursare discussed: High Creativity, devotion to the purpose of education revolution; Disaster Manager, Technical knowledge; Multi-tasking;; Pedagogical Innovations; Micro level Management, Hurdle Jumper; Human Resources management, Self Guidance. Some other qualities of educational entrepreneurs affirm them as persistent, positive, creative, daring, tireless, willing to take risks, capable, independent, resourceful, and considerate.(Leisey& Charles, 2000). All the above stated traits contribute towards the build of edupreneure. However Self-motivation must be the essential desire for operating the enterprise (Vivek&Upadhyaya, 2015).   Edupreneures set their skills in action for the improvement

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[1] https://www.merriam-webster.com

of prevailing system of education.

Education is considered the solution for problems of society. Public and private institutions continuously put their efforts to contribute in making the system of education better and effective for the development of society. For education of high quality to flourish, it is believed that entrepreneurism in education is the key to identifying and implementing those changes. Establishment of every new school is taken as a step toward betterment in education system. System is established keeping in view the objectives. Objectives can be reflected in mission statement of the institution and can be achieved through the implementation of activities based on the objectives. In other words it can be said that the school practices are a reflection of the mission of the school.

In recent years, the number of private schools has been increased rapidly. These schools are a commercial reply to encounter the imperative education need of the nation by growing access to the communal children (Meril, 2014). Edupreneurial enterprises are presently experiencing considerable growth worldwide. Educators aiming at profit have the ability to provide education which meets parental expectations. They are free to change the curriculum and teaching methods they wish to propose (Farrelly, 2005).

In order to retain and contest, schools have to struggle hard. They have to identify the goals and objectives, and in order to attain these aims, they have to adopt appropriate methods. Schools have to embrace such an approach that focuses on future and is ongoing (G üven ,20011). While formulating plans, an organization makes choices between different substitutes. An organization seeks guideline from mission statement in order to adopt appropriate strategies directed towards the attainment of goals. An organization builds its structure on its mission statement. A well thought and well written mission statement reveals the exact purpose of the organization. It also outlines its range of action in terms of products and markets.

Mission statements are distinct for the organizations from each other (Ülgen&Mirze, 2004). Mission statement outlines the goals, aims, and the strategic objectives of the organization (Tutar, 2004). Din çer (2004) opines that the mission states the commonly held organizational beliefs and values, and sets the long-term goals which are distinctive and unique. Mission also defines the quality criterion. With a stronger vision, organizations can easily anticipate the future and prepare themselves for change. Visionary organization face the future with courage, can foresee changing demands, and enhance their efficiency (G üven, 2011).

The diversity of private schools can be compared by comparing the vision and mission statements they have established for them. The mission statement of schools builds on those fundamental values which they wish to promote through education. The mission statement also guides the way educational programs are conducted. The governance structure of school is also guided by their mission statements. The mission statement is also starting point for how teaching and learning occurs in schools (Boerema, 2006).

Keeping in view the importance of mission statements and their role in keeping the practices aligned towards the achievement of goals, the present study was designed. The study aimed at exploring the points of innovation in terms of their aims and practices of well reputed private schools as an endeavor toward improvement of educational system.

2 Methodology

Qualitative research design was opted to deal the in depth nature of the problem.

2.1 Sample

The sample included owners/ principals (N 17) of well reputed private schools of Sargodha, Lahore and Gujrat; teachers (26) and parents (19). Purposive and convenience sampling technique assisted the researchers to take the sample from schools where the enrollment of students was higher than five hundred and the school administration consented to participate in the study.

2.2 Research instrument

Data were collected from the principals, teachers and parents using semi structured and focus group interviews respectively. The interview Questions were pilot tested and validated through experts' opinion. Initially fifteen questions were constructed and afterwards modified to 10 questions each for all the three groups of respondents.

3 Data Analysis

The interviews were recorded and transcribed. The data were exposed to content analysis and

thematic analysis. These are powerful techniques to make sense of qualitative transcriptions by identifying pattern hidden in in the text (Hodson, 1999).. Specifically, content analysis might be used to reveal group patterns, and institutional structures in the societies. It also reveals their thought patterns (Weber, 1990, p. 9).

The following section presents the samples of answers obtained from all the three groups of the respondents:

Q1 What is the mission statement of the school?

All school leaders declared that schools have mission statements placed either on the school gate, classwork copies, in principal office, or written on the inner side of the boundary walls.

The statements included number of goals. The major school goals mentioned in the statements were service to community, provision of quality education, all round development of students, development of leadership qualities among students.

Teachers: very few teachers were aware of the mission statement. However they responded that the school was working to achieve the goals of students' high performance in exams.

Parents: only a few educated parents (3) reported that school had learning as its major goal.

Q2 what is the action plan to achieve the set goals of school?

There were no written action plans available in schools. Majority of school heads reported that they are successful in the achievement of the set goals of the schools. It seems that action plans were inherited and observed verbally. There is no defined practice of making assessment of the achievement of the goals.

Principals

Case 3: "I share my goals and action plans with my team members but I do not need to write it."

Case 5: "I have action plan in my mind to achieve goal."

Case l 6: "We have been observing the same action plan for years, and we still follow it".

Teachers

Teachers reported that there was no written action plan shared by the school. However they were given time to time instructions by the administration about their classroom teaching and other duties.

Case 7: "I don't know what is the action plan of school but I get instructions from the coordinator in staff meetings and sometimes randomly to improve my teaching and classroom discipline"

Parents

Case 9: "I am also teaching here. I think school administration wants to show outstanding results in board exams and we have to work hard in the classrooms".

Case 13: I have no idea as I am only concerned with the study of my children. They have very heavy bags and we have to pay heavy fee too. School continues to charge through the year for different purposes".

Case 2: I think school administration wants to earn at first.

Q3 what are distinguished features of school?

Principals

Principals were asked to describe the salient features of the school which make it different from other contemporary schools. All respondents claimed that their schools were performing differently with particular distinguished features.

Case 2: "We are offering clean and neat environment."

Case 1: "Sports and co-curricular activities are our distinguished feature of this institution."

Case 10: "Teachers are well educated and professionally developed."

Case 3: "Homework checking and continuous testing"

Teachers

Case 7: teachers' continuous evaluation

Case 11: discipline and co-curricular activities

Parents

Case 5: study routine of children. School engages them all the day in homework

Q4 what are the facilities and infrastructure provided?

Principals

All the respondents claimed that they are providing all possible facilities to their students, e.g. drinking water,shelter, cycle stand, canteen etc. in case of infrastructure, building was sufficient including classrooms, washrooms etc.

Case 7: "my school has all classrooms separately for all classes"

Case 9: "well, I think all facilities are at their best."

Case 5: "we have building according to education department code."
Teachers

Case 1: classrooms are big and airy
Case 6: computer lab is available
Parents
Case 3: play ground is not available in the school
Case 8: fee is high but sufficient facilities are not provided
Q5 what skills teachers possess? The selection criteria; teachers training
Teachers were selected on need bases. Tests and interviews are two selection criteria for teacher selection. No scheduled training was reported by any head teacher.
Principals
Case 2: "Teachers become skilled when they encounter with class problems."
Case 3: "No such training is conducted for teachers."
Teachers
Case 7: "Sometimes micro teaching sessions are arranged."
Case 10: "teachers discuss their teaching problem with each other and resolve it"
Case 3: "demo sessions are arranged for selection of the teachers"
Parents
Most of the parents had no idea about the teachers' selection.
Case 9: "I think interview is major tool to select the teachers"
Q9 what is the fee structure? Is it justified?
Majority of selected schools have fee structure ranging from Rs 3000 to 4500 per month. Although an amount of Rs 13000 to 20000 was taken as security and admission fee.
Case 1: "Yes, fee is little bit higher than other schools but we are providing many facilities too."
Case 3: "I think it is appropriate."
Case 6: "we are serving the community and other expenditures are too high, so fee structure is appropriate."
Teachers
Case 2: fee is charged according to the services provided
Case 18: it is expensive for the middle class but many children come from business families or land owners.
Teachers' salary is not sufficient. Fee is hardly affordable for some of the parents. But facilities should be improved to match the fee charges.
Q 10 do you think the school is successful in its practices to achieve the targets mentioned in mission statement?
Principals
Case 2: yes we practice the same as we have mentioned in our mission.
Case 4: yes sure. My team works hard and they make it possible.
Case 17: we achieved our target last year our student got outstanding position in board exam.
Teachers
Case 6: I don't know about the mission statement but we make our best in classroom.
Case 10: yes our students get position in board exam every year.
Parents
Case 3: I don't know the school targets but children have no time to do other activities. I am happy because they get busy whole day

4 Discussion

This study explored the mission statements prepared by schools to represent the ideas and hopes of what they want their school to be. The analysis provides an insight into what is the target and intentions of the people that make up and lead schools.   It is found that majority of edupreneurs had either no mission statement or it was not documented. Without a statement that reflects the intentions of the school leaders, it is difficult to understand how a mission can appear in practice. The mission statement is the necessary condition for many different individuals to pull together through numerous activities to achieve central shared purposes. (Jack Meacham 2006). Witten plans of actions were also absent and teachers were directed verbally to perform various tasks and duties. Majority of parents had no idea of

targets of school. It is usual in our society where parents are less educated.

The analysis revealed that edupreneurs had some targets in common as community service, provision of quality education, and development of students as future leaders. However the salient features which were reported by the respondents as unique, were shared by all the schools in sample.

5 Conclusion

The study concludes that there is a gap between the mission statements and the practices of schools. The obvious reason is the absence of any written and chalked out plans to put forth the objectives into actions. There was also difference in parents' response about the mission of schools. Parents reported the money making as priority of the schools as compared to the edupreneurs' statements who declared the provision of quality education at their first.

On the bases of conclusion, it is recommended to device an assessment procedure to evaluate the mission statements of the edupreneurs against their practices.

Accountability of every school business is also needed to promise the provision of appropriate facilities and services against the fee structure of the school.

Further research is needed to determine the degree to which the variety of goals expressed in the vision statements are carried out by the schools.

The future research may include all types of schools from the community to have more clear view of the problem.

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Potentials of Blockchain-based Solutions in Grants Management Process of Non-governmental Organizations

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Abstract: Grants management serves to address and to monitor the utilization of aid from international and domestic donors to beneficiaries, such as non-governmental organizations. Nowadays grants management faces many challenges, and the deployment of innovative technologies serves to prevail over them. The paper focuses on the potential effects of the implementation of blockchain technology in the grants management process. The article employs the study of literature on current problems that exist in the grants management field, and a critical assessment of the frequently exaggerated benefits and capabilities of blockchain technology. The paper also discusses the possible implications of blockchain for non-governmental organizations and processes. The paper draws a conclusion that blockchain has potentials to provide solutions to many current challenges in grants management.
Key words: Grants management; Non-government organizations; Donor organizations; Innovation management; Blockchain technology

1 Introduction

The role of non-governmental organizations (NGOs) as agents of change in providing social services and aid to people and communities in need is extremely high. The existence of challenges in grants management process, which could have negative effects on operations, management, and financial support of NGO, makes a call for research on conquering those issues.

Many scholars addressed their studies to explore and to provide some insights on existing challenges of grans management and NGO in particular (Rahman & Sawada, 2012; Bhushan & Bond, 2013; Gent, et al., 2015; Gloria, et al., 2017; Nazuk & Shabbir, 2018). Others were trying to connect the capabilities of blockchain technology in different managerial and business fields (Gebert, 2017; Beck & Müller-Bloch, 2017; Turk & Klinc, 2017). Though, there is a research gap in discovering the potentials of blockchain technology in regard to the main challenges of NGOs' grants management.

2 Grants Management in NGOs

A non-governmental organization is a non-profit, volunteers-based group, not related to the governmental institutions. NGOs are organized on local, national and international levels to serve specific purposes according to their objectives. Grants management, as a part of fundraising expenditures management (Herzer & Nunnenkamp, 2013), plays a vital role in the existence of NGOs. Grants management is defined as a process in which one agency (donor) distributes funds to other organization (grantee), in order to achieve concrete social goals (Weiss, 1973). NGOs receive grants, which generally are not refunded fundings, to implement social projects with clearly defined objectives in a specific country or region (Rus, 2015).

Figure 1 shows NGO as a grantee and its most important stakeholder groups: the donors (the general public, governments, and charities) and the recipients (governments, communities, social entrepreneurs, households) (Linders, 2013; van den Broek, et al., 2012). NGOs can gain funding that does not need to be repaid by submitting applications for grants.
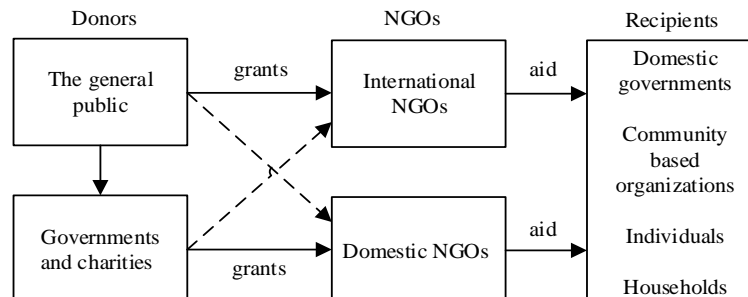
Figure 1   Overview of the Development Chain
Adapted from (van den Broek, Rijken & van Oort, 2012)

Donors initiate a call for project proposals and announce specific requirements for applicants and their projects. An applicant becomes a grantee after it has signed a grant agreement with a donor.

During the grants management process, donors and grantees face various challenges.

2.1 Challenges in grants management field

According to the Grand Bargain – A Shared Commitment report (IASC, 2016), 18 donor countries and 16 aid organizations (including UN entities, international NGOs, and the Red Cross Movement) have stated ten major priorities to address existing challenges in the non-governmental sector. Four of these priorities are related to grants management field; (1) an increase of transparency, (2) an increase of effective and efficient procedures for reporting, (3) an increase of recipients' institutional capacities, (4) a decrease of management costs.

3 Blockchain Technology

Since it was first introduced (Nakamoto, 2008), a blockchain has become one of the most trending technology in the last decade (Risius & Spohrer, 2017). Numerous projects with implementations of blockchain technology outside the financial field are still rather experimental (Kshetri, 2018). Nevertheless, due to its innovative characteristics, a blockchain technology has the potential to change existing managerial paradigms and to provide new insights into the existing issues and challenges.

Blockchain can be defined as a decentralized, encrypted, distributed database, which maintains information that cannot be reversed or corrupted (Wright & De Filippi, 2015). A Blockchain is also known as a distributed public ledger (Crosby, et al., 2016) -- a database of records of every transaction that has been happened within the network (Morabito, 2017), and shared among all participants of this network.

Some authors propose the vision that the blockchain technology introduces new ways and models of business and organizational development with virtual organizations and automatic business operations (Tapscott & Tapscott, 2017; Puschmann & Alt, 2016). Others pointed out that it is necessary to understand how organizations could benefit from the technology, and how to be sure that all stakeholders on all levels are ready to change, adapt and adopt the innovation (Beck & Müller-Bloch, 2017; Morabito, 2017). Therefore, some scholars and practitioners suggest (Beck, et al., 2017) to analyze the blockchain technology from a more critical perspective.

As a technology, blockchain is a chain of blocks which contains records and timestamps. Each block is identified by its cryptographic hash (Christidis & Devetsikiotis, 2016). Each block references the hash of the block that came before it (Fig. 2).
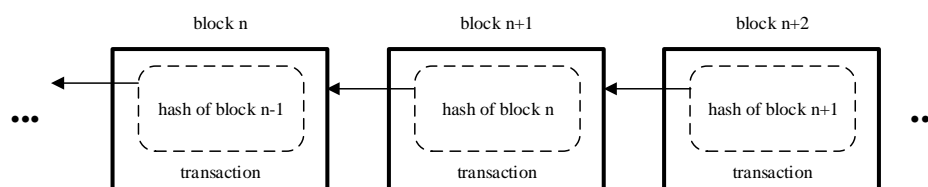
Figure 2　The Simplified Model of the Blockchain Adapted From (Christidis & Devetsikiotis, 2016)

The main technical characteristics (Christidis & Devetsikiotis, 2016; Glaser, 2017) of a blockchain technology are:

a.the entire chain is duplicated among all participants (so-called nodes of the peer-to-peer network);

b.after assigning into the chain data become irreversible;

c.the use of smart contracts, automatic execution of transactions if both exchange parties meet specific pre-defined criteria (Hinings, et al., 2018), is allowed;

d.each transaction is protected by powerful cryptographical algorithms;

e.the network is decentralized.

Due to those technical advantages, a blockchain technology provides features which correspond to the needs of grants management:

a.blockchain keeps the history of all transactions and related metadata, including time and author's information, which ensures the transparency of all operations and organizations itself;

b.decentralization of the network means that it does not require the approvement of transactions or its own legibility from the third party or centralized authority;

c.information management facilitates the peer-to-peer collaboration of companies, individuals, and other stakeholders.

3.1 Blockchain technology in the grants management field

Despite the fact that blockchain technology was invented as a tool to prevent double-spending during the cryptocurrencies transactions, it has been applied in various fields of business and management: supply chain management (Kshetri, 2018; Feng, 2016), service management (Price, 2015), healthcare (Ekblaw, et al., 2016) and others.

For now, the usage of blockchain in grants management has been limited. Some scholars state that it is still hard to find empirical evidence to illustrate the appropriate use of blockchain technology (Wang, et al., 2016). Others suggest using blockchain-based projects for crowdfunding purposes (Gebert, 2017; Glaser, 2017). Crowdfunding and grants management are both related to fundraising, however, the first one operates on an individual level, and the other one – on organizational.

Based on the Great Bargain report (IASC, 2016), donors search for innovative technologic projects that can significantly improve the operation of non-governmental organizations. Although, specific solutions on this matter are still under development.

4 Major Potentials of Leveraging Blockchain-Based Solutions to Improve Grants Management Field in NGOs

The following analysis illustrates the possible capabilities of solutions based on the blockchain technology aimed to improve grants management process of NGOs in the following aspects:

4.1 Increase of transparency

The lack of transparency, openness, and accountability of NGOs are ones of the permanent challenges of the field (Burger & Owens, 2010; Keating & Thrandardottir, 2017). Some initiatives were implemented to improve the status quo of the open data leveraging. The International Aid Transparency Initiative (IATI) was introduced to increase transparency during the grants management process. Still, the stakeholders of the IATI have some concerns in regard to its technical, financial, privacy and legal issues. (Bhushan & Bond, 2013). In the Grand Bargain report (IASC, 2016) it was proposed to deploy a joint digital platform with an implementation of open data technologies, which "provides an opportunity to publish funding moves from donors to recipients in a timely, harmonized, and transparent manner".

As it was mentioned before, due to its technical characteristics, blockchain technology provides a high level of transactional transparency (Birch & Parulava, 2018). The grantee has a possibility to publish on its organization's blockchain system transparent, harmonized and high-quality project data, which corresponds to the International Aid Transparency Initiative (IATI) standards.

As a result, donors that receive an access to the blockchain system of a grantee organization, are able to assess the cost-effectiveness of previous projects. Moreover, the system demonstrates how funding moves from donors down the transaction chain until it reaches the final responders.

4.2 Costs reduction and simplification of the reporting process

The next important issue is an effectiveness and an efficiency of the reporting procedure. Due to various reasons, donors' reporting requirements have grown significantly over the past years (IASC, 2016). However, costs of the required reporting are able to cover only organizations with strong institutional capacity. The innovative technology is able to reduce these costs through total or partial elimination of middleman services, such as annual audits.

Based on its decentralized architecture, the blockchain technology eliminates the need for the approvement of its transactions legibility by the third party or centralized authority (Morabito, 2017; Freund, 2018). It has a capability to provide an opportunity to a grant-giver to approve reliability and quality of grant-receiver project reports published on the blockchain system through personalized donor signature. In other words, after grantee has published its financial and activity reports in the system, the donor signs these reports.

Thus, if all projects' reports are verified by grant-givers, there is no need to use middleman services to prove grant-receivers' reliability.

4.3 Reduction of duplication and management costs of a donor

The international aid community and the aid recipients are diverse, and very often the presence of a large number of donors and projects overwhelms the recipient's capacity to manage and administer aid inflows efficiently (Rahman & Sawada, 2012). Thus, one of the biggest challenges in a grants management process is a reduction of duplication and management costs by donor coordination. Shared assessment of information, financial monitoring, and performance reviews among donors help to avoid duplication and to reduce management costs (IASC, 2016).

From an information managemental prospective, the peer-to-peer collaboration of all stakeholders

brings a potential for the blockchain technology to eliminate a duplication of information (Morabito, 2017; Beck, Avital, Rossi & Thatcher, 2017), and to save operational and management costs.

Hence, donors are able to use assessment information, provided by the previous grant-giver to an applicant, directly from a blockchain-based solution, without additional usage of time or finance.

4.4 The increase of the institutional capacity of a grantee

The Grand Bargain states "donors should support local and national grantees through the increase of investment in their preparedness, response and coordination capacities" (IASC, 2016).

Due to its transparency and trustworthy characteristics (Crosby, Nachiappan, Pattanayak, Verma & Kalyanaraman, 2016) blockchain technology has potential to increase the institutional capacity of grantees by decreasing operational costs of each submission process. Blockchain provides an opportunity for an applicant to publish its portfolio of projects on the blockchain-based system.

In nutshell, an organization can increase its capabilities by a decrease of its administrative costs during submission of a project proposal by minimizing expenses connected with a preparation of administrative documents, among which are references from previous donors, audit reports, public registration forms.

5 Conclusion

The study of the literature review shows that world-known donor organizations are ready to invest in innovative technological solutions for the grant management process. We conclude that the blockchain technology has potential to become an appropriate solution for addressing such challenges of grants management as (1) an increase of projects and organizations transparency, (2) a decrease or elimination of the role of audit companies as middleman services, (3) a reduction of operational and management costs, and (4) an increase of organizational capacity.

Further research should sophisticatedly consider how blockchain technology innovation is applicable in regard to each of the grant management challenges, and how all stakeholders are ready to accept it.

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Measures to Build an Innovation City in Wuhan

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Abstract: With the development and progress of science and technology, innovation has become the decisive factor in promoting regional and national economic development. After analyzing the research all over the world, this paper based on the current situation of building an innovative city in Wuhan to accelerate the pace of its constructionand improve its regional competitiveness by focusing on scientific research, carrying out all-round innovation and creating a central university innovative economic circle,in order to explore a reasonable way for Wuhan to build an innovative city.
Key words: Measure; Innovative city; Wuhan; All-round innovation

1 Introduction

Innovation is the core competitiveness of a region (Tao F Y, 2011). There is a lot of research all over the world. Cooke P, Uranga M G and Etxebarria G developed the concept of regional systems of innovation. They related it to preexisting research on national systems of innovation (Cooke P, 1998). Boschma R A researched the impact of globalization on the regional and local conditions for innovative activities and assessment of the interaction of regional and national innovation policy (Boschma R A, 2005). Uyarra E said the impact of universities on the innovative potential of regions has been the object of intense scholarly and policy interest in the last years (Uyarra E, 2008). JY Song, GE Chao-Yang and J Chen defined the connotation of original innovation in basic research, and pointed out some critical problems in evaluation of original innovation of basic research sources (JY Song, 2004). Xu Qingrui, JiaFuhui, XieZhangshu and Zheng Gang elaborated the connotation and characteristics of the all-involvement innovation based on the theoretical framework of all-round innovation (Xu Qingrui, 2003). Etzkowitz and Leydesdorff further raised the Triple Helix of University-Industry-Government Relations into a model for studying knowledge-based economies (Leydesdorff, 2013). There are many cities around the world are building innovative cities such as London, New York, Daejeon, Beijing, Shenzhen, Shanghai and Nanjing,etc.From this point of view, it is inevitable to create an innovationcity. City innovation is a kind of regional innovation,in the process of city development, innovation is the driving force, constantly integrating new ideas and concepts to promote the economic development of the city. Wuhan, as a major city of science and education in central China, it is a mission to drive innovation and development in the region of the Yangtze River Economic Belt and promote national technological innovation.

2 The Current Situation of Building an Innovative City in Wuhan

The science and education resources are abundant in Wuhan. At present, there are 84 universities and the number of colleges ranks second in China. There are 1.075 million undergraduates (including postgraduates), which is the largest number of college students in China. The scientific and technological strength is strong. It has 31 national laboratories and national key laboratories. The number of patent application and authorization shows a good growth. Figure 1 shows the trend of patent application and authorization in Wuhan in the past five years. The competitive industries of Wuhan are also outstanding, including the new generation of information technology industry, life health industry and intelligent manufacturing industry. In addition, the strategy of "promoting the rise of the central region" and the policy of "1+9" have accelerated the pace of Wuhan's construction of an innovative city. Wuhan follows the pace of building an innovative country to build an innovative city.Figure 2 shows the development of innovation in Wuhan.In 1991, Dong Hu new technology development zone became the first national high-tech zone.In 2003, Wuhan decided to create the "Wuhan City Circle" on the basis of the "Greater Wuhan City Circle" in 2002. In 2009, Dong Hu new technology development zone became the second national independent innovation demonstration area. In 2010, Wuhan was approved to carry out pilot construction of an innovative city. In 2012, Wuhan became one of the first areas in China to carry out a pilot program for integrating science and technology with finance. In 2015, Wuhan became a member of China eight comprehensive innovation and reform pilot areas and assumed the responsibility of taking the lead.
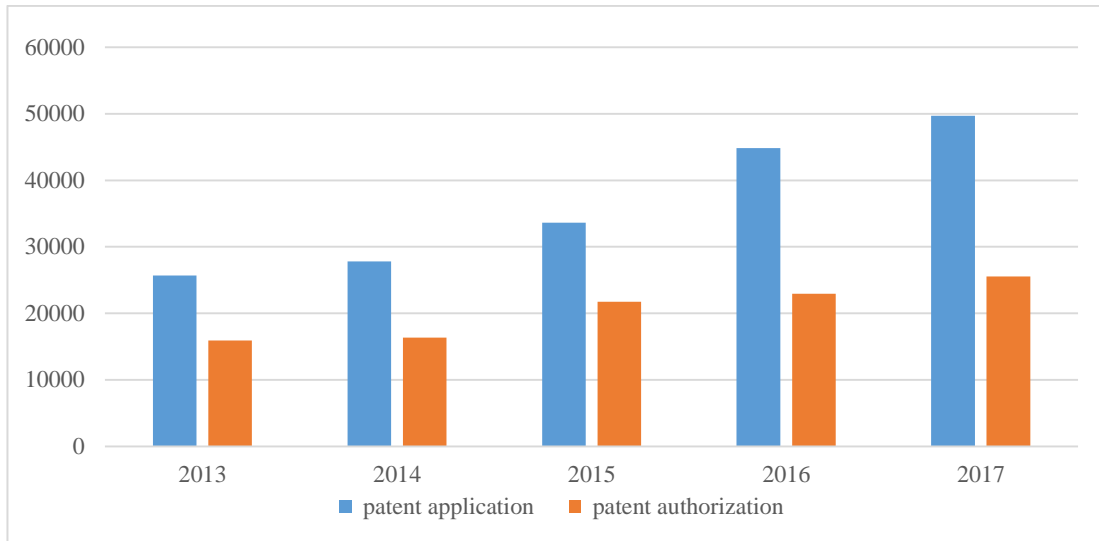
Figure 1   The Trend of Patent Application and Authorization in Wuhan
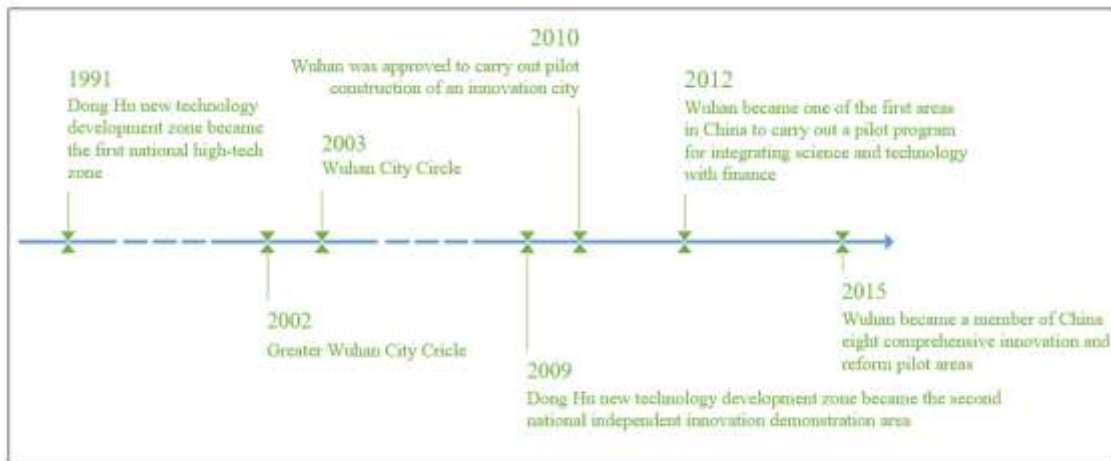
Figure 2   The Development of Innovation in Wuhan

3 Countermeasures and Suggestions for Building an Innovative City

3.1 Focus on scientific research

We are devoted to making Wuhan an innovation city where innovation activities are intensive, innovation products are enriched, and innovative enterprises are clustered bystrengthening basic research and exploring future industries.

3.1.1 Strengthen basic research

The source of innovation mainly lies in basic research (Chen Jiaer, 2005). The construction of the innovative city must strengthen basic research and strengthen the supply of innovative sources.Focusing on the strategic needs of innovation and development in Wuhan, we will focus on strengthening the application basic research of the application of electronics and communications equipment manufacturing and pharmaceutical manufacturing (as shown in Table 1),obtain a batch of significant original innovation achievements to consolidate Wuhan's leading position and influence in basic research in related fields.The research universities are the main force of basic research(Liang Tong, 2005), it is necessary to take advantage of the talents of a research university to establish a complete talent training sequence from bachelors, masters, doctors andpost doctorates to postdoctoral studies, and actively cultivate and establish high-quality research teams;making use of the subjects advantages of research universities to exert the strong discipline of each university and strengthen the frontier research in this field;Wuhan should strengthen protection of intellectual property, increase the rewards for scientific research, and encourage innovation and creation.

Table 1   The Industry and Field of Innovation

Innovation industry	Basic research field
Pharmaceutical manufacturing	Surrounding cytology, biological modeling, biomaterials, particle jet deposition, nanotechnology, gene editing, etc.
Electronics and communications equipment manufacturing	On-chip photonics and electronics seamless integration technology, micro-sodium photonics, communications, information processing and data storage technology, advanced photonics measurement and application, strategic optical materials, display technology, quantum computing and other fields.

3.1.2 Explore future industries

To seize the heights of future industries and explore future industries, there are 12 potential industries to create a city for industrial innovation, including electronic information and internet industry, financial industry, energy and resource industry, modern agriculture, advanced manufacturing, cultural industry, large health care industry, pension industry, the modern logistics industry, education industry, environmental protection industry, and large tourism industry.

(1) Competition is the competition between time and speed. We should take action early and keep an eye on the development of the industry and improve the competitiveness of Wuhan's future industry;

(2) Seize the opportunity, aim at the development direction of the unopened industries, and win the opportunity;

(3) Strong and strong alliance, combining the industry developed areas and enterprises to improve the overall capacity.

3.2 Carry out all-round innovation

The all-round innovation aims to build an innovation and entrepreneurship ecosystem through all-object innovation, all-domain innovation, all-industry-chain innovation, and all-involvement innovation.

3.2.1All-object innovation

Focusing on the products, processes, organizations, markets, and resources to promote all-object innovation in Wuhan.

Products: actively introduce advanced technologies and products, imitate innovative thinking and methods, grasp core technologies and secrets, combining the actual conditions of Wuhan to develop and improve self-innovation capabilities.

Process: using the new technology or the original technological advantages in the society to carry out process innovation underthe market demand of Wuhan.

Organizations: reduce the level of intermediate organization, build the partnership between leaders and employees, pay attention to the training of employees' knowledge skills, and strengthen the flow and sharing of information and knowledge.

Markets: explore new markets, expanding the products of Wuhan to unprecedented new markets, expand overseas and rural areas; develop new products based on consumer need and potential need.

Resources: according to the material, human, and financial resources owned by Wuhan, it provides a guarantee for innovation.

3.2.2All-domain innovation

Cultivate and build a number of innovative towns, and innovative neighborhoods to promote all-domain innovation in Wuhan. Specific measures include:

Based on the "Guidelines for the Construction of Innovative Cities" Wuhan should strengthen the achievements and experience that it has gained in the pilot construction areas of the nation's innovative cities.

Further implement the "Guiding Opinions of the Provincial People's Government on Accelerating the Planning and Construction of Featured Small Towns" and accelerate the creation of a number of innovative towns in Wuhan.

A number of innovative neighborhoods have been built in urban centers and high-density urban areas with high density crowds,convenient traffic, developed communication networks, high corporate concentration, and frequent economic activities.

3.2.3All-industry-chain innovation

Focusing on Wuhan's new generation of information technology, high-end equipment and materials, biotechnology,green and low-carbon, new energy vehicles, digital creative and other strategic emerging industries and major traditional industries, improve its industrial chain and promote Wuhan's all-industry-chain innovation.

Overall consideration, integrated development.For the major industrial chains, we will focus on the weaknesses and key links in the industry chains, promote the integration development of various industries, make up for shortcomings in industrial development, and focus on cultivating industrial advantages, product advantages, and competitive advantages with lasting competitiveness.

Diversified development, collaborative development. Using the guiding role of fiscal funds to support various innovation models in the industry, mobilize enthusiasm, participate in the development of the entire industry chain, and promote the organic convergence of all links in the industry chain and share the development results.

Clear penalties, stimulate competition. In accordance with the requirements of "openness, fairness, and fairness", we should improve the mechanisms for competition establishment, and select the best. Strengthen the management of performance appraisal, improve reward and punishment policies, strengthen the supervision of the process, and continuously increase the use of funds.

3.2.4 All-involvement innovation

All-involvement innovation is the foundation of science and technology innovation. It is an important part of the people's scientific and technological innovation work. It is an important way of bringing the enthusiasm and creativity of the general staff to Wuhan's innovation and development. Specific measures include:

Improve quality and lay a solid foundation. Efforts should be made to change the people's ideas, and set up the concept of "innovation can be done in every way and all people can do it (Ren Huijuan, 2010)"; stimulate innovation enthusiasm, foster innovation ability, and continuously improve the innovation and creation ability of the people.

Build carriers and carry out effectively. Find small problems in daily life and propose small innovations; build an information sharing carrier, create an innovative atmosphere, establish an online sharing platform for innovation results, broaden the horizon, achieve the results sharing, and facilitate communication.

Improve the mechanism and advance in an orderly way. Establish and improve the standard management mechanism and promote the standardization of activities; strengthen the incentive mechanism, fully mobilize the initiative of the people's initiative innovation, and continuous innovation.

3.3 Create a central university innovative economic circle

Improving the ability of independent innovation is the key to building an innovative country (Shang Y, 2005). High level of scientific research and technological capability is the source of independent innovation. A comprehensive research university is responsible for this policy and shoulders the important mission of building an innovative country. In order to speed up the building of an innovation city in Wuhan and achieve integration of production, innovation, city, education, and research, it is necessary to build a central university innovative economic circle, such as central university innovation economic circle of East Lake and South Lake. There are some measures to create a central university innovative economic circle:

(1) Through a variety of platforms, and expand the transverse connection and resource integration of university in economic circles, realize the resources of the library, the selection of minor courses across campuses, the opening of laboratories to integrate various universities' internal resources, in order to realize the sharing of resources;

(2) We will optimize the surrounding environment of universities, and plan bases for innovation and entrepreneurship around the universities, including innovation and entrepreneurship parks, science parks, incubators, etc.

(3) To establish the management committee of the central university innovative economic circle, which is responsible for the management, coordination, guidance and promotion of the economic circle;

(4) To establish the resource sharing mechanism of the campus, in the central university innovative economic circle, "the city is the school's city, the school is the city's school", and the people interact and share resources.

4 Conclusion

It has become a trend to build an innovation-oriented country, and it is necessary for Wuhan to build an innovative city. This paper puts forward some suggestions for the construction of the innovation city of Wuhan based on the research all over the world: focus on scientific research, carry out all-round innovation, and create a central university innovative economic circle.However, due to my limited ability and subjective ideas, I cannot put forward more comprehensively propose countermeasures. For

example, talents are very important for the construction of innovative cities. There are many universities in Wuhan, but the problem of brain drain is still serious. It is necessary to propose an effective solution to this problem, and we need further exploration and optimization.

Acknowledgement

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Research on the Mobike Business Mode Innovation under Internet Environment

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Abstract: The traditional business mode has been unable to adapt to the development of the Internet society. The business mode innovation of service companies has become the key to the sustainable development of the company. Mobikes have become the benchmark of innovation for modern service companies. The paper drew on existing research results, used factor analysis methods, and combines Mobike's innovative commercial modes to study the key elements of the business mode in the Internet environment. Simultaneously, it proposes suggestions and countermeasures for the Mobike business mode innovation.
Key words: Mobike; Business mode innovation; Key elements; Service industry

1 Introduction

With the growing global economy, the service economy will become the dominant force in world economic growth. With the rapid development of Internet technology, the traditional service industry is no longer adapted to the existing economy, and reforms are imminent. In particular, business mode innovation has become a key to the "breakthrough" of traditional service industries. Mobike is a typical case of success in the traditional service industry through business mode innovation under the Internet environment. The success of Mobike's business mode demonstrates that traditional service industries must adapt to the requirements of the Internet environment and their business modes must be compatible with this environment to be sustainable.

Extant literature has rich research on the constituent elements of the business mode. Whitehurst (Whitehurst, 2002) believes that a business mode includes four elements: customer interface, core strategy, strategic resources, and value network. Johnson and Christensen (Johnson and Christensen, 2008) proposed that business modes comprised of four elements: customer value propositions, profitability modes, key resources, and key processes. While, Osterwalder et al. (While, Osterwalder et al., 2005; 2011) revealed that a business mode contains nine essential elements: value proposition, customer segmentation, distribution channel, customer relationship, source of income (or income approach), core resources and capabilities, key business, and important Partner and cost structure. Besides, Huarng (Huarng, 2013) anticipated that the business mode consists of seven elements: innovation content, market positioning, value source, resource integration, cost, income, and profit. Alternatively, scholars like Zhang Yue and Zhao Shukuan (Zhang Yue and Zhao Shukuan, 2014) demonstrated that the business mode should consists of five elements: core product, target market, operation process, value distribution principle, and value chain structure. Further, Sheng Ya (Sheng Ya, 2015) puts forward the value proposition, value network, key resources, and profit mode as the core elements of the business mode. Most recently, Guo Shouting (Guo Shouting, 2016) proposed that the said mode encompass the value creation, value proposition, value transmission, and value realization.

2 Mobike Case Analysis

This article draws on existing research results and, through an in-depth analysis of the Mobike case, believes that the business mode consists of five key elements: value proposition, core product, customer management, operational processes, and partners. Its key performance is that these five elements have an irreplaceable role in the company's production materials in the process of enterprise creation of value, and there is a strong interaction between these five elements, and this interaction affects the relationship Value creation.
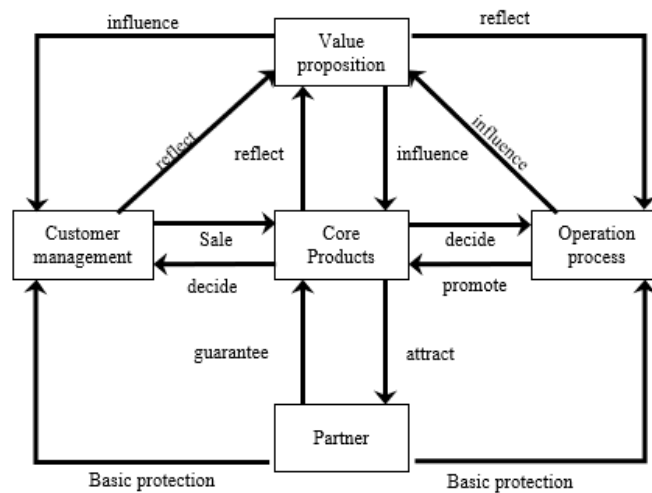
Figure 1   Business Diagram of the Key Elements of the Business Model

2.1 Value proposition

Value proposition refers to the value that a company can provide to its consumers through products and services. Broadly, it can be divided into economic value and social value. The value proposition is the dominant element of the five key elements of the business mode and serves as base for the formulation of other elements.

Mobike also reflected its value proposition in both, the economic value and the social value. In terms of economic value, the operation of Mobike conveys the concept of sharing economy, that is, "people need the value of products rather than the products themselves," and Mobike's bicycles adopt a "heavy assets and light operation" approach. In comparison to Didi and Uber which are typical "Internet+" company, Mobikes are more like service manufacturing companies, with manufacturing as their core and Internet technology. Compared with the traditional sharing economy mode, Mobi's self-supported mode is more conducive to the standardized management of products.

In terms of social value, Mobikes also have many advantages that other Internet projects do not have. One is the government's strong support and development. As a non-pollution and convenient travel mode, Mobikes not only respond to the national policy of energy conservation and emission reduction, but also protect the environment. Second, Mobikes have natural moral advantages. Different from the Internet field, such as online games, Mobike's main green travels have a natural moral advantage. Mobike cyclists explored a new blue ocean more. The Mobike cycle operation mode and the attributes of the bicycle itself are in line with the national environmental protection strategy, bringing great social value to the entire society. This has provided references for the development of other Internet companies and responded to the call of the world to protect the environment.

2.2 Core products

The core products include products and services that can effectively export to the target market and reflect the company's core capabilities. The core product is the bridge between the product platform and the platform product. It is the solidified carrier of the core competitiveness and the concrete demonstration of the value of the business platform. As the core elements of the business mode, the core product influences and restricts other factors. It is the most important carrier of value proposition and is the basis of the business mode innovation.

The concept of Mobike's product design is based on low-cost operation and environmental protection. It is an efficient use of resources and an unprecedented innovation. Transforming traditional products through new technologies and changing consumption patterns to enhance consumer experience. Mobike's bicycles are based on "Mobike shared bicycles" and are based on mobile apps and smart hardware. Mobike's first smart shared bicycle mode in the world, its patented smart lock developed in-house integrates GPS and communication modules, and uses a new generation of Internet of Things technology to enable users to locate and use the nearest Mobike bikes anywhere, anytime through smartphone apps. When the bicycle reaches the destination, it is parked in the right area near the roadside. At the same time, Mobike's APP has accumulated a huge amount of user data. In the future, the core competitiveness of the development of artificial intelligence is data competition. Whoever can

master large amounts of data will have strong competitiveness, that is, it will enter the IT age of the Internet. In the DT era, Mobike bicycles are undoubtedly competitive.

2.3 Customer management

Customer management is divided into two aspects: the division of the target market and the management of customer relationships. Customer segmentation refers to the group of consumers targeted by the company after market segmentation. The customer relationship, that is, clarifying the relationship established between the company and its customers, is mainly information communication feedback. Customer management is the basis of the business mode. Other elements are formulated according to different customer management. The value proposition guides the overall requirements of the customer. At the same time, the customer's choice also embodies the value proposition. The target customers are divided according to the core products and promote the improvement of the core products. Mobikes are mainly for first-tier cities. The high mobility, population density, and urban functional zoning of first-tier cities have brought a huge demand for commuting. Mobikes mainly cater to short-distance users within 3 kilometers and users who have temporary car needs. Mobike vehicles parked without fixed car piles, which gives users a great freedom of travel, but also attracted many users with temporary car demand.

2.4 Operation process

The operation process of an enterprise includes the organizational structure, business process, and the implementation and management of business activities. It is a prerequisite for the smooth development of an enterprise. The operation process meets the requirements of the value proposition, and at the same time, the core products are diversified according to different customer management.

Mobike's innovations also lie in the migration of mobile Internet technologies to traditional public bicycle rental businesses. The entire use process is implemented through the Internet. Users do not have to go to the offline service point to apply for a car rental card. They only need to download the "Mobike" APP to register and pay a deposit of 299 Yuan and carry out real name certification. From finding a car, approximating a car, driving a car, using a car, locking a car, and paying for the last payment can all be done on one app. This is in line with people's habits in the mobile Internet era, which greatly simplifies the circulation and reduces the usage threshold.

2.5 Partners

Partners refer to the value chain structure of an enterprise, including upstream and downstream partnerships, customer relationships, internal value chain structure, and external cooperation relationships. Partners are the strong guarantees and support for the smooth implementation of other key elements. The integration of upstream and downstream resources and internal and external resources will promote the smooth development of the entire business mode.

In cooperation with upstream and downstream, Mobike will integrate upstream and downstream resources. To the upper reaches, Mobike bicycles will use bicycles to modify and upgrade traditional bikes with new technologies, and become Mobikes that meet the standards. This will reduce the excess capacity to some extent. As a result of pressure from manufacturing companies to "destock", the market's bargaining power of enterprises has been greatly enhanced, and the development of manufacturing companies has been promoted from the side. At the same time, "de-capacity, clear inventory" has also become an important goal of national strategic development. The leasing industry can use excess production capacity for rental, and use the new consumer industry to revitalize inventory, which has become an important force for capacity reduction. To the downstream, the user is given the right to choose their own right. The user can select the location of the car, the location of the transfer, the time of the car, etc., while saving the user the cost of buying a car, repairing the car, and depreciating, saving the user time. And integrate these demand users into the APP, forming a huge data network, and gaining advantages for further development.

In cooperation with financing providers, Mobike developed rapidly and completed multiple rounds of financing within one year: In 2015, Yueyue Capital completed a multi-million dollars A round; in late-2016, Panda Capital led the investment, and Pleasant Capital invested tens of millions of dollars; B After the round, Mobai quickly gained B+ investment in innovation workshops; in January 2017, it received D-round financing of US$215 million led by Tencent and Warburg Pincus. After the financing of 215 million U.S. dollars was completed, the status of Mobike was basically locked in from the perspective of capital, and Mobike became the leader in the field of shared bicycles.

In cooperation with the government, Mobike responded positively to the national environmental strategy and was committed to reducing carbon emissions and traffic congestion. It has received strong support from the country, and Mobikeshave cooperated with the government to make fun of the "prohibition of

electricity and electricity restrictions" policy introduced by many municipal governments. A good mode, won the support of the community.

3 Discussion on Innovation and Improvement of Mobike Business Mode
3.1 Improve the credit mechanism
The lack of a credit system is undoubtedly the biggest obstacle to the current sharing of bicycles. In order to regulate the use of bicycles by users, after launching the "Credit Points" mechanism, Mobike's bicycles have also entered into cooperation with Qianhai Credit Co., which means that Mobicycle's user credit data will be included in the personal credit system of Qianhai Credit. Become part of personal credit. It can be described as a small step forward for Mobike to improve its credit mechanism. In the future, Mobike's credit scoring system can be considered linked to the government-promoted social credit system and other financial systems to cultivate the awareness and habits of users of civilized vehicles. On the one hand, information asymmetry can be reduced by sharing personal credit data with government regulators; on the other hand, the increase in default costs - the violation of the use of Mobike's actions on credit records may lead to individuals being unable to access finance. Services will have a stronger binding on users. By promoting the establishment of the entire social credit system and economic order, it will be able to provide a better soil for the continued operation of the sharing economy enterprises such as Mobike [11].

3.2 Government-enterprise cooperation supply mode
Mobike use private capital to enter the public transport field. They try to solve the problems of urban public bicycle development based on technological and organizational changes and market forces. However, under the purely private supply mode, the company is responsible for its own profits and losses and the risk is too great. In contrast, the pattern of government-enterprise cooperation allows companies to obtain preferential policies. There are two forms of government-enterprise cooperation that can be referred to. The first is government subsidies. This is how Wuhan public bike projects take this approach. However, in addition to the direct investment of a small part of the financial subsidies, the government also grants the operator the right to operate advertising and other projects, and the company obtains funds for public bicycle projects through self-employment to realize balance of revenue and expenditure. Second, PPP mode of contractual contracting system, that is, government-funded purchase of enterprise services, the company responsible for the specific operations, the government mainly assumes policy leadership, support functions and supervision of its daily capital expenditures, in accordance with the evaluation of the quality of business services in accordance with the contract payment operations cost.

3.3 Explore diversified profit modes
Drawing on the experience of current shared bicycle projects that have already been completed at home and abroad, the future commercialization of Mobike can proceed from the following points. One is advertising revenue. At present, the main source of income for public bicycles is the rental of parking pile advertisements. For Mobike bicycles without a fixed vehicle pile, profit can be increased by transferring the advertising rights of the advertising media of the car body or implanting advertisements in the APP. In the APP, the form of pushing ads to realize cash is more diversified, such as pushing the surrounding restaurant discount information to the commuters during noon riding. The second is the development of derivative products and services. The rental of bicycles has obvious "tide effect". As Internet software, Mobike can use its platform scale to develop some derivative products and services to fill the gaps in operations outside peak hours and ensure the stickiness of the platform. The riding data accumulated by the user on the APP can also be entered into the deep service of the fitness field through monitoring, collection and analysis.

4 Conclusion
Business mode innovation is an important guarantee for the vitality of traditional service companies. The five basic elements of the business mode have their own status and roles, and they are mutually constrained and influenced. The innovation of the Mobike bicycle business mode has brought a lot of experience and inspiration to traditional service companies. It should be based on core products, launched around value proposition, and carry out all-round business mode innovation with the support of partners.

Mobike was born in the soil of the sharing economy and the development of the Internet, which has played a vital role in improving the efficiency of public transportation. The innovative business mode of

mobike ushered in the "no-pile" era of public bicycle rental. Mobike has solved the pain points of travel through technology and market forces, and promoted the green cycling culture. At the same time, it is a new practice of the sharing economy in society. The concept of sharing bicycles needs to be carried out with the integrity and public morality of users, while mobike also needs to combine public welfare and business to achieve its sustainable operation.

Acknowledgement

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Research on the Value Proposition Innovation of Two-sided Market Enterprises

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Abstract: The importance of two-sided market enterprises continues to be highlighted in the current economic environment.Based on the bilateral market theory and the two-sided market model, this paper compared and analyzed the value propositions of value chain enterprises and two-sided market enterprises.After summing up the value elements of the two-sided market enterprises, this paper drew the value curve of two-sided market enterprises by drawing on the four actions framework in the *Blue Ocean Strategy*, and then compared with the original value curve. Finally, it provided ideas and methods for value proposition innovation of two-sided market enterprises, enriched the business model innovation theory.

Key words: Two-sided market; Value proposition; Four actions framework;Value curve

1 Introduction

The rise of the Internet economy and the development of information technology have spawned a frontier theory- the theory of bilateral markets.The bilateral market involves two distinct types of users. Each type of user gains value by interacting with another through a common platform (Wright, 2004).Rochet and Tirole first defined the bilateral market from the perspective of platform pricing in 2004, and then Armstrong redefined the bilateral market from the perspective of network externalities in 2006.As an enterprise form of bilateral market in the era of network economy, two-sided market enterprise plays a very important role in economy.Enterprises are not only concerned with providing value to customers, but also paying attention to providing value to merchants. At this time, enterprises are facing two customer groups (Tse, 2012). These platforms which are operating in two-sided market clearly differ significantly from those in the unilateral market and therefore require different business models. In recent years, business model innovation is a topic of concern for enterprise value innovation, while value proposition is the foundation and source of business model innovation, and it runs through the innovation of business model. Therefore, it is very necessary to research the value proposition innovation of two-sided market enterprises.

Business model innovation focuses on defining value propositions for customers, merchants, and partners (Casadesus-Masanell and Zhu, 2013). In value proposition design, unlike the traditional business model, the value proposition design of the Internet business model pays more attention to driving the customer's pain points (Osterwalder, 2015).However, at present, there are few achievements in the study of value proposition innovation of two-sided market enterprises, and it does not clearly indicate how two-sided market enterprises should conduct value proposition innovation.Therefore, this paper based on the bilateral market theory and two-sided market model, drew lessons from the four actions framework and the value curve of the *Blue Ocean Strategy* (Kim and Mauborgne, 2005) to conduct an innovative research on the value proposition of the two-sided market enterprises.

2 The Value Propositions of Two Types Enterprises

2.1 The value proposition of value chain enterprises

In the value chain model, the core of enterprise concern is how to expand its product market.Therefore, the enterprise adopting value chain business model mainly implement the strategy of product centralization.Value chain enterprises pay more attention to customer's value proposition with the view of traditional vertical value chain, to create more value for customers and satisfy customer's value demands, but may be less concerned about the value proposition of upstream suppliers.

2.2 The value proposition of two-sided market enterprises

Conceptually, the two-sided market is very similar to the bilateral market.The basic structure and research foundation of two-sided market model are basically consistent with that of bilateral market theory. From the perspective of the economic model, they are essentially indistinguishable.The core of the two-sided market business model concerns the desires and abilities of the customers in two sides, and combines the resources and capabilities of one side to another, in order to satisfy the desire of the

other side. Therefore, the two-sided market model far exceeds the value chain model in understanding of customers.In the two-sided market model, customers mean not only the objects of the enterprise selling products or services,but all members of the supporting enterprise ecosystem.Two-sided market enterprises not only focus on providing value to customers, but also providing value to merchants and other stakeholders in the ecosystem (Chen Weiru, 2013).The two-sided market realizes mutual interaction through platform companies and achieves two-way positive feedback. As a result, the amount of resources and customers on two sides rises.Enterprises adopting two-sided market business model implement customer-centric strategy, as shown in Figure 1.This paper focuses on the research of business model innovation, which belongs to management science. Therefore,it uses the two-sided market model proposed by Professor Tse instead of the bilateral market.

Figure 1   Two-sided Market Model

3 The Value Proposition Elements of Two-sided Market Enterprises
3.1 Customer value proposition elements

The customer value proposition of two-sided market enterprises has different elements from the traditional value chain enterprises.Great value propositions focus on the pain points and benefits of customers and help them eliminate pain points (i.e. unwanted results, problems and features, obstacles, risks) (Osterwalder, 2015).The value proposition of two-sided market enterprises needs to reduce the pain points of customers, and put forward a plan to relief their pain points, or create customer benefits.Customers expect low price and high quality products with a wide range of products to choose from.Customization is also a very important value factor, especially in two-sided market enterprises, which is unique (Fran ça et al., 2016), and is achieved by the network effects in two-sided market.In addition, the convenience of payment and purchase, the availability of distribution logistics, and the safety of customers' information are all included in customer value proposition elements.

3.2 Merchant value proposition elements

According to the stakeholder theory, the survival and development of enterprises does not only depend on capital investment, but also on the input of stakeholders such as corporate managers, consumers and suppliers.Therefore, apart from focusing on traditional customer value propositions, two-sided market enterprises also need to consider the value proposition of merchants.And because of the existence of network effects in two-sided market enterprises, it is particularly important to consider the value proposition of merchants.Merchants expect higher revenues and reduce spending, also expect an efficient flow of information to capture user behavior and consumption trajectories so that they can accurately capture and use inventory levels, orders, production, and delivery of information in the supply chain, which can reduce uncertainty in the supply chain.At the same time, merchants expect that the platform will provide them with professional technical guidance and support, such as CRM, and lower the entry threshold.

3.3 Network effects

Network effects are the biggest difference between platform business model and traditional business model.The value of a platform to one user group often depends on the number of users of the other party, while a platform is valuable only if the relevant user group exists at the same time (Zhang Xiaoning, 2015).The network effects in two-sided market enterprises are divided into two parts:same-side network effects and cross-side network effects.Same-side network effects are more obvious on the customer side. When more customers purchase, more customers will be attracted. The utility of the customer will increase with the number of customers using the product.Cross-side network effects are the precondition for the establishment and operation of platform model. Moreover, cross-side network effects can reduce the marginal cost of two sides, which are represented as the decrease of cost in the merchant side and the decrease of price in the customer side.

Due to the network effects, the merchant's value proposition and the customer's value proposition should meet.Some business models only work when multiple value propositions are combined with a customer base.In two-sided market enterprises, higher value creation provided by the merchant side will attract more customers, and more customers, in turn, will attract more suppliers, thereby further creating

value and enhancing the value proposition on two sides. Therefore, the value elements brought by the network effects include the market information and professional technical support required by the merchant; the customer's expected price comparison function, distribution logistics, customization, and information security.

In summary, the value elements of the customer, merchant, and network effects of two-sided market enterprises can be summarized as Table 1.And they can be divided into positive and negative value elements.The positive value elements can be expressed in the figure as the higher the value element point, the higher the value (for example, the more convenient of the customer to pay, the higher the value for it); The negative value elements show that the lower the value element point, the higher the value (for example, the lower the price paid by the customer, the higher the value for it).

Table 1   Summary of Value Elements

Value elements	Customer side	Merchant side	Network effects
Positive	Payment convenience		Technical Support
	Product type		Market information
	Service		Customization
	Purchase convenience		Price comparison
			Distribution logistics
Negative	Price	Barriers to entry	Information security
		Inventory	
		Store	
		Cost	

4 The Ideas and Methods of Value Creation in Two-sided Market Enterprises

4.1 The ideas of value creation in two-sided market enterprises

There are three principles of value innovation in the *Blue Ocean Strategy*: focus, divergence and compelling tagline, which also apply to two-sided market enterprises.In addition, there is a unique principle of two-sided market enterprises that is the prominent network effects.Network effects can bring value elements for two-sided market enterprises that traditional value chain enterprises lack, such as providing market information for merchants, giving them professional technical support (such as CRM, etc.), providing customers with parity functions, distribution logistics services and satisfying customization demand.And in the innovative two-sided market enterprises, the value of the value elements brought by the network effects are obviously higher than the general two-sided market enterprises.

Based on customer and merchant claims, this paper combines the four actions framework to change the both customer and merchant's value proposition elements to determine the value proposition elements of the two-sided market enterprises, as shown in Table 2. These value elements are plotted in the figure and connected to form the value curve.

Table 2   ERRC Grid of Two-sided Market Enterprises

	Merchant side	Customer side
Eliminate	Store; Barriers to entry	
Reduce	Inventory; Cost	Price; Information security
Raise	Market information	Service; Product type; Payment convenience; Purchase convenience
Create	Technical support	Distribution logistics; Customization; Price comparison function

4.2 The methods of value creation in two-sided market enterprises

This paper uses the four actions framework based on the drawing of the value curve proposed in the *Blue Ocean Strategy*, and cites and innovates it to design a value curve which is suitable for two-sided market enterprises.Extending the original coordinates will highlight the bilateral relations in two-sided market enterprises.

In this paper, Taobao, supermarket and vendor are selected for comparison, only for example (as

shown in Figure 2).The first two are two-sided market enterprises, the latter can be seen as traditional enterprise.The value elements of the three are analyzed and plotted on the figure. Finally, the element points are connected to form a value curve.
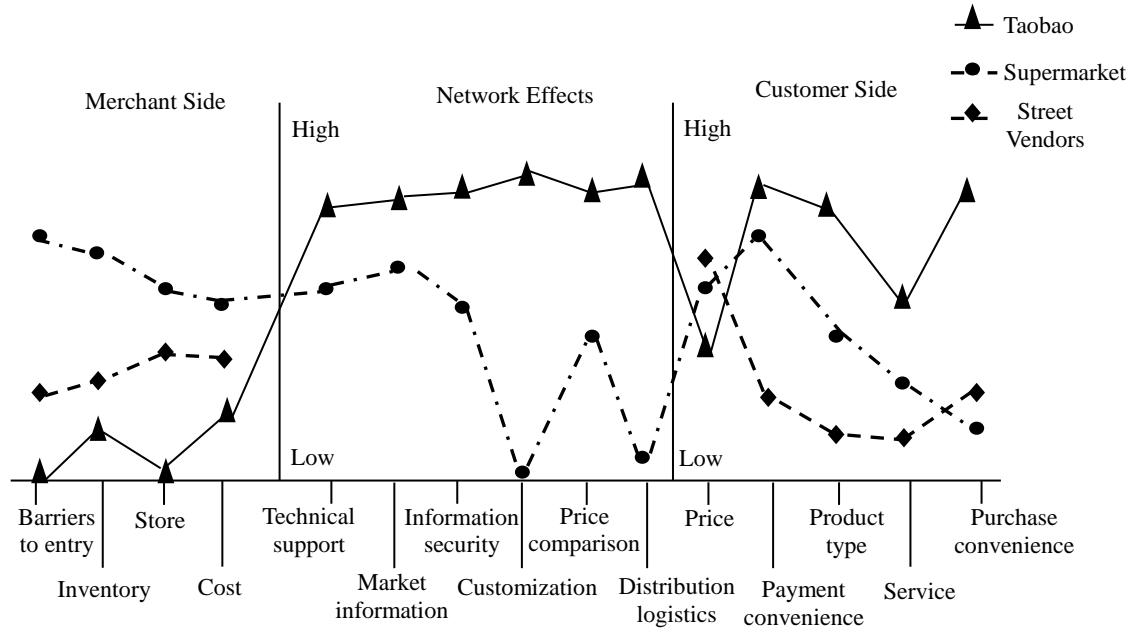
Figure 2   Two-sided Market Enterprises Value Curve

From the Figure 2, it can be clearly seen that two-sided market enterprises have distinct advantages over traditional enterprises: the value elements such as market information and technical support in merchant side, and the value elements of distribution logistics, price comparison, and customization in customer side have significant advantages.These value elements are brought about by the unique network effects of two-sided market enterprises. But at the same time, there are problems with information security. Therefore, two-sided market enterprises should focus on how to ensure customer's information security.

In addition, innovative two-sided market enterprise (such as Taobao) has its advantages in the value curve compared with the general two-sided market enterprise (such as supermarket).Two-sided market enterprises can determine the value elements of merchants and customers based on their own situation, and sort them according to the actual situation, and finally connect the value elements to form a value curve.And compare it with other related enterprises to find value propositions that meet the three principles of focus, divergence and compelling tagline, and have network effects is more importantly.

5 Conclusion

On the basis of reviewing a number of literatures, this paper compared the value propositions of two-sided market enterprises with value chain enterprises,summarized and analyzed the value elements and used four actions framework to innovate and design, finally it was concluded the two-sided market enterprises value curve.The innovative value curve has the following advantages:First of all, in the shape, the new value curve breaks the shackles of the existing industry value curve, trying to distinguish and highlight the proportion of various factors. Secondly, it extends the original value curve, extending from the original focus on the customer to the attention of both the customer and the merchant, and is more applicable for the two-sided market enterprises. The new value curve creates value innovations for customer's pain points, and at the same time pays attention to merchant's propositions and values.

However, due to my lack of practical experience, the practice of the value proposition innovation methods proposed by the two-sided market enterprises remains to be proved.Therefore, practical verification is needed in future research. Moreover, the extraction and measurement of value proposition elements of two-sided market enterprises can be researched in further study. In addition, the ideas and methods of value proposition innovation research may also be used for reference by other industries or enterprises to transform.

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Research on Developing Strategies to Improve the Core Competence of the Theme Park: A Case of Hubei Province of China

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Abstract: In current years, the development and construction of regional theme parks has been booming in China with the overall development of tourism industry. Since the competition among regional tourism markets has become increasingly fierce, how to enhance the core competence of regional tourist attractions' theme has become one of critical issues of researching tourism strategic development and macro decisions. This article applies literature retrieval of the concept of core competence, and also utilizes statistical analysis and empirical analysis to conclude current status and problems of tourist attractions involved in Hubei Province of China, and then to proposes effective strategies for improving the core competence of theme parks in Hubei, and finally overall which will be the beneficial revelations to other provinces or cities in China.
Key words: The core competence; The theme park; Strategies; Hubei province

1 Introduction

With China's rapid economic development and continuous improvement of living standards, the last 40 years have witnessed great development of tourism industry according to the policy of economic reform and Open Door. China has become a veritable tourist destination. And also, more and more attention has been paid for tourism's industrial status and function. Especially for recent years, tourism economy has become an important part of national development strategies. The main function of developing tourism industry is not only to gain exchange revenue or financial reward, but also to serve social life, to enhance the vitality of market economy, to meet the growing consumers' demand, to promote international exchange and cooperation, to improve the image of the state which have shown that development of tourism in China has entered into a new historical stage.

While, the year of 2016 is the key year to implement the "Twelfth Five-Year Plan" and the year of 2017 is the important year to conclude "Twelfth Five-Year Plan" and prepare "Thirteenth Five-Year Plan" in China. Furthermore, the year of 2018 is a key milestone of the policy of "Open Door" and "Supply Side Reform". Many researchers have taken more attention and hot debates to the next new round of reform of tourism industry in Chin, such as tourism industry in China should focus on solving problems of changing the way of tourism economy growth, improving operational performance, reforming tourism products supplying, optimizing structure of internet+ supply and demand, improving satisfaction have been involved in current research.

Moreover, this paper pointed out that aspect of improving the core competence of the theme parks in central cities of China have become a very important part to promote the supply side reform of tourism industry in China since the developing and constructing regional tourist attractions has been booming in recent years. For the central regional districts in China, more and more market suppliers have been planning special theme parks to attract tourists. Since the number of regional tourist theme parks has ever increased, the competition among regional tourism markets has become increasingly fierce. Therefore, how to enhance the core competence of regional tourist theme parks and avoid duplicate construction has become one of the critical issues of researching tourism strategic development and macro decision.

2 Current Developing Status and Problems of Theme Park in Hubei Province

2.1 Current developing status

During the last ten years, the tourism industry in Hubei Province has experienced rapid development with the great support and emphasis from government. Total tourism revenue, numbers of inbound and outbound tourists, and tourism attractions' construction have gain rapid growth in Hubei. In 2017 tourism comprehensive strength of Hubei ranked as the 13th in China. Hubei province owns unique tourism resources, such as beautiful natural sceneries, rich cultural landscapes and magnificent modern architectures. Hubei has formed a group of well-known cultural tourist attractions as the theme

of the "Three Gorges" and "Three Kingdoms" through years of development. According to the statistics of Hubei Provincial Tourism Bureau, till the year of 2017, Hubei had total 368 A-level tourist attractions. Respectively, there were 10 AAAAA tourist attractions, 124 AAAA tourist attractions, 177 AAA tourist attractions, 55 AA tourist attractions and 2 A tourist attractions. While, there were also 85 theme parks involved in. Furthermore, 12 National Excellent Tourism City were listed in Hubei (Hubei Tourism Bureau, 2011-2017).
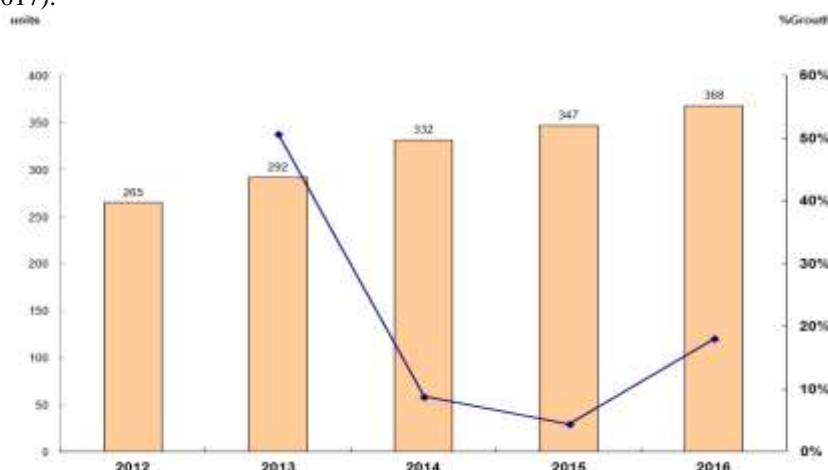
Figure 1   Hubei A-level Tourist Attractions Volume 2012-2016

However, Hubei is not a strong province among competition of national tourist theme parks while it has long been a major tourism resources' province. There is a huge gap between Hubei and other developed regions in tourism industry and tourist attractions. For the quantitative area of tourist attractions' developing and constructing, as Figure 1 show following, A-level tourist attractions and industrial and agricultural demonstration sites in Hubei increased steadily in recent 5 years. But, the average growth rate was rather less, and also Hubei had been lagged behind other developed regional tourist attractions.

While, for the qualitative area of tourist attractions' developing and constructing, as Table 1 shows, Hubei lacks of beyond AAAAA tourist attractions and national-level industrial and agricultural demonstration sites, and they developed particular slowly in recent years. Huibe only owned 10 AAAAA tourist attractions, and beyond AAAA tourist attractions in Hubei just accounted for 2.7% of national total in 2016 (National Tourism Administration of the People's Republic of China, 2008-2010), which shows that the core competence of Hubei tourist attractions has been so poor and the conflict between the quantity and the quality of tourist attractions in Hubei has been serious.

Furthermore, there was none accurate statistics for the theme park involved in tourist attractions developing database. It is only to get probable data according to certain booking website of tourist attractions. There were about 85 theme parks until 2017 in Hubei Province and none of one has been involved in AAAAA tourist attractions.

Table 1   Classified Statistics of Different A Levels Tourist Attractions in Hubei

Level Year	5A	4A	3A	2A	1A	General industrial and agricultural tourism demonstration sites	National industrial and agricultural tourism demonstration sites
2012	7	95	110	50	3	67	23
2013	8	100	133	48	3	73	23
2014	9	115	139	66	3	73	23
2015	10	117	156	61	3	/	/
2016	10	124	177	55	2	/	/

Moreover, for the area of scenic tours' income, as shown in Table 2, Hubei gained steady growth year by year. Although in the year of 2012, the income of Hubei scenic tours increased particularly, the development and construction of tourist attractions hadn't contributed too much for the total tourism

income in Hubei. For the composition of domestic tourism income and inbound tourism foreign income, compared with long-distance transport, ticket sales, accommodation, catering, entertainment, shopping and other income factors, domestic scenic tours and inbound scenic tours respectively average share less of the total, which showed that the economic benefits of tourist attractions in Hubei should be further improved.

Table 2   Total Tourism Income of Hubei 2012-2016

Year	Total income (100 million Yuan)	±%
2012	2629.54	31.95
2013	3205.61	21.9
2014	3752.11	17.05
2015	4308.76	14.84
2016	4888.51	13.45

2.2 Current developing problems

2.2.1 Overall market structure has been in "small, weak, poor and disordered" status

Although tourism resources, regional features and historical culture in Hubei are rich and various, the conflict of "small, weak, and disordered" is obvious. In addition to some individual theme parks in Hubei have reached certain scale strengths, most of others have been in the status of "small" (small scale, less large corporation groups, less cross-joint), "weak" (weak capital, weak comprehensive strength, weak competitiveness), "poor" (decentralized operation, fuzzy target, poor infrastructure construction), "disordered" (poor management, poor site selection, poor service, poor economic efficiency).

2.2.2 The characteristics, cultural level and popularity of theme parks have not been so high

For the natural resources, although some theme parks in Hubei have obvious advantages like beautiful natural environment, peculiar geological features and rich historical and cultural connotations, many excellent background resources and scenic products could not become the true goods that tourists can accept and love resulted from the unclear tourism theme, less attraction, less geographical and cultural characteristics and without clear travel purposes. Furthermore, for aspect of the artificial construction, certain theme parks such as the famous "Wanda Film Park" which located in the central city of Hubei only operated for one year finally according to the problems of recognition, popularity and management.   Therefore, the recognition, cultural level and popularity of theme me park in Hubei have always been so poor nationwide.

2.2.3 Poor public facilities and service provided

A number of top grade service facilities are basic conditions for developing tourism industry, especially for the operation of theme parks. Although the quantity of development and construction of theme parks have gained too much progress in Hubei, the improvements of public tourism facilities are so poor, such as high star-level hotels involved in theme park, restaurants, tourist rest centers, public parking areas, souvenir shops, wastes disposal stations and emergency medical treatment sites are needed to be developed in most of Hubei theme parks in the following years. Problems of peak travel congestion, non- standardized supporting and management, dirty & chaotic & poor tourist spots directly lead to greatly reduce the enthusiasm of tourists; and also, negatively influence the quality of service and business satisfaction of Hubei theme parks. Furthermore, developing important hardware environment and monitoring service quality during reception facilities' construction have been backward in Hubei. Moreover, the internal quality of employees and managers of the theme parks needed to be further improved, especially for introducing and training numbers of professional and technical personnel, excellent management personnel.

2.2.4 Insufficient marketing

As market competition intensifies, a variety of marketing activities have become an important approach for theme parks' competing. But, most of the theme parks in Hubei haven't made clear awareness of the nature of themselves and also the value for marketing. Because of less input and oversimplified marketing methods, topic concepts and theme image of Hubei theme parks have always not been clear and obvious, which result in Hubei usually lacks of creative marketing tipping points and idea to attract tourists. And many theme parks had the same themes. Meanwhile, the marketing channels of Hubei theme parks are relatively dispersed. Therefore, distinct theme, seasonal, powerful, high-impact marketing needed to be delivered.

2.2.5 Poor internet+ technology applied

Widespread application of internet+ technology will play an important role to develop modern tourism industry. Many theme parks only apply internet+ technology on the area of tickets booking. But, for the aspect of applying the depth and effect of internet+ technology, there is very few theme parks in Hubei applies such information technology and therefore the popularity has been so low. The networking system among tourist attractions and travel agents, hotel, transportation system and other related departments related to theme parks' daily operation has been underdeveloped. Also, sufficient contact with tremendous impacting computer systems, the networking of Hubei theme parks is only just in beginning. There are reasons for their own area and also for industrial relations and macro systems which lead to above problems. For instance, online price is always not transparent; it's hard to balance expected return and actual revenue; which seriously affect the enhancement of the core competence of Hubei theme parks and the sustainable development of the whole tourism industry in Hubei Province (Chen Hui, 2013).

2.2.6 Inadequate enthusiasm to innovate products of theme parks

Since the low level of market concentration and conflict of "small, weak, poor and disordered" is obvious, many theme parks in Hubei always tend to focus on the immediate advantages and benefits, but not to concern with the long-range development and continued innovation of new products related to theme parks. While the medium and small theme parks always have no ability and strength to carry out product exploring and innovating, they preferred to operate traditional products and to achieve benefits by conduct low-price strategy when competing with large theme parks. In addition, there have no any powerful systems and laws to protect intangible assets such as innovation of theme parks' deuterorgenic products. Therefore, most of theme parks have not adequate enthusiasm to innovate products of tourists' attractions since researching, developing and protecting new tourism products are so difficult.

2.2.7 Lack of top-grade brand

Hubei is not a strong province among national tourism industry while it has long been a major tourism province, lacking of top-grade tourist attractions is one of reasons. For the theme parks, it also involved in this problem. When summarizing successful experiences of tourism developed provinces, it usually could list some top-grade tourist attractions and theme parks with world-renowned reputation and high social recognition. To develop tourism destination based on the top-grade tourist attractions, and thus form a complete industrial chain of regional tourism industry to support sustainable development of regional tourism economy. Most operators of Hubei theme parks often pay more attention to economic benefits, but neglect to enhance the quality and grade of tourist attractions, which result in Hubei not only lacks of top-grade theme parks, but also a huge gap existed between Hubei and other tourism industry developed regions.

2.2.8 Inappropriate locating of theme parks

The theme park is a tourism investing project with large investment and high risk. Scientific and reasonable location is the key to the success of theme parks' investment. And the factors influencing the theme parks' location are related to the market, the investment environment, the natural conditions, convenient transportation and cultural factors. Since the theme parks have been popular in recent years in China, companies flocked in to build theme parks in Hubei without appropriated consideration and research on location of theme parks, which resulted in the repeated theme of tourism parks concentrated on a certain district or long-distance theme parks located in a rather remote place.

3 Definition of the Core Competence of the Theme Park
3.1 Definition of the core competence

The earliest study on the core competence of the corporation could be traced back 60 years before. Kenneth Andrews thought that corporate strategies defined business areas that corporate would participate in, and also would focus the company's resources to transfer variety abilities into competitive advantage (Li Yijing, 2004). In 1990, two American strategic management experts named Prahalad, C.K. and Hamel G firstly pointed out the concept of the core competence of the corporation by publishing the paper titled as "The Competence of The Corporation" on Harvard Business Review (HBR). Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies. The core competence is the source and foundation of gaining sustainable competitive advantages, which mainly determined by its characteristics.

Firstly, a core competence should make a significant contribution to the perceived customer

benefits of the end product. Second, a core competence should be difficult for competitors to be imitated, replaced and surpassed; and it will be constructed difficultly if it is a complex harmonization of individual technologies and production skills. Third, a core competence could be extendable; it provides potential access to a wide variety of markets. Fourthly, a core competence is interrelated. It is a collection of skills and technologies, rather than scattering individual skills or technologies. Fifthly, a core competence is obtained by accumulated studying. Lastly, a core competence is dynamic, which means that it is not fixed, and it needs to be timely protected and innovated by the changing external environment (Prahalad, C.K., Hamel G, 1990).

3.2 The core competence of theme parks

According to "Report of Development and Operation Pattern & Investment Opportunity on China Tourist Attraction (2018-2023), till the year of 2015, there have been over 7000 A-level tourist attractions, key national scenic areas such as 4A and 5A tourist attractions have been over 1500 (National Tourism Administration of the People's Republic of China, 2018-2023). Tourist attractions have been formed the half of China's tourism industry. At present, tour of tourist attractions has been the major advantaged constructing projects of tourism industry in China. And it will also focus on developing new tourism products such as leisure tour, exhibition, family & children's tour and ecological tour to enrich the domestic tourism market. Therefore, the competition among regional tourist attractions will become increasingly fierce.

According to the definition of the core competence of corporate and characteristics of tourist attractions, the core competence of theme parks could be defined as the unique competitiveness that formed by long-term development and finally blended into the endoplasm of tourist destination to support their competitive advantages which could help theme parks to gain sustainable development during fierce competition. The core competence of theme parks must be able to achieve the core value that tourists valued. And for the way of competition, it should be difficult to be imitated, replaced and surpassed compared with other competitors. For the perspective of theme parks' further development, it should be extendable, which means the extended process of "the core competencies- the core technologies- the core products - the final products" exits. Furthermore, it should be interrelated and could be obtained by accumulated studying. Moreover, these kinds of core competencies will be timely protected and innovated by the changing external environment rather than to be fixed. In addition, the core competencies of theme parks are the sustainable development abilities that tourist destinations could obtain by integrating various business managing operating methods, such as strategic planning, decision making, brand building, applying modern information technology, effectively allocating human resources and establishing a corporate culture (Zhang Yuqiang, 2010).

4 Strategies of Improving the Core Competence of the Theme Parks in Hubei

As the current status and problems discussed above, it could be conducted by following five strategic approaches to enhance the core competence of theme parks in Hubei.

4.1 Re-integrating tourist destinations' resources and facilities within the framework of Hubei Province

Although Hubei has rich tourism resources and great potential for developing theme parks, constraining factors such as unbalanced developing steps in the south, central and north, and traffic connecting & parking problems have limited the quick development of Hubei theme parks for a long time. Also, enterprises operating theme parks with small, weak, poor and disordered made theme parks cannot achieve benign connectivity and extensibility within the framework of total Hubei Province, which resulted in the phenomenon of fragmented nature of local government and local tourist destinations. Therefore, Hubei needs to effectively integrate current tourist destinations' resources and facilities within its scope, to rationally distribute the space of provincial tourist destinations, to form large-scale regional tourist destinations, to perfect physical environment and conditions of tourist destinations' sustainable development, and to play effect of capital accumulating by re-organizing large-scale tourism groups operating theme parks, and to construct some theme parks with top-grade brand which are symbols of Hubei; then it could enhance an overall competitiveness of Hubei theme parks.

4.2 Enhancing the core value of traditional theme parks while constructing high recognized theme parks

Tourism resources are the core of tourist destinations to attract tourists. It should focus on exploring the unique and unmatched characteristics of tourism resources when developing tourist attractions.

Therefore, Hubei should enhance and extend the core value of rational tourist attractions (such as Three Gorges and Shenlong jia) while develop a number of theme parks with unique characteristics to attract tourists (such as leisure tourism and ecological tourism).   And then to form certain scale of top-grade theme parks to achieve coordinated development of Hubei tourist attractions within areas of the quality and the quantity. Furthermore, the aspects of tourists demand-driven from time to time, providing professional tourism services, timely introducing innovative theme parks' related products and reasonable pricing are also important to enhance the core competence of Hubei theme parks (Zeng jianmin, Wu Zongjian, 2011).

4.3 Building and marketing top-grade brands of theme parks in Hubei

Brands reflect the core competencies of theme parks during information age. Brands are powerful approaches strengthening differentiation of tourism products, and also the key link to achieve competitive advantages.   Creative, clear, attractive and stable tourism image and theme will promote rapid development of theme parks. However, the problems of indistinct theme image and poor marketing of theme parks have resulted in poor comprehensive competitiveness and weak fame of Hubei theme parks, which restricts long-term development of Hubei theme parks. Therefore, it needs to further build advantaged top-grade theme parks that could represent Hubei based on strengthening re-integrating resources of tourist destinations and forming unique top-grade brand of Hubei theme parks (Hou Liyuan, 2013). Furthermore, it also needs to conduct tourism marketing around top-grade theme parks and to apply network marketing strategies to improve multiple effect of marketing theme parks' products, to attract social attention and capital investment, and then to explore high added-value tourism products around the brands to improve the competitive advantages of core tourist destinations (Ding Xiaonan, 2013).

4.4 Revolting management systems of operating the theme parks

Managing theme parks is an extremely complex and important process. Good tourist destinations' resources must be supported by a comprehensive management system be operated by excellent managers and good employees. It should be improved by creative management philosophy, which then could further enhance the core competence of theme parks. Therefore, Theme parks in Hubei should revolting current management systems, especially for introducing and employing excellent employees, applying scientific management modes, building corporate culture and innovating investment and financing channels (RT Rust, VA Zeithaml, AKN Lemon, 2013).

4.5 Establishing dynamic alliance of the theme parks

With consuming concepts of tourists have tended to be diversified and personalized, the uncertainty of market demand increases greatly which requires corporations of tourist attractions should have the flexibility and strong market adaptability. Model of competition & cooperation is the right choice for operating theme parks. One theme park usually has one or more business advantages, but it could form a more advantaged value chain if number of theme parks integrating their different advantages and then forming complementary alliance to re-construct value chains of individual, which then will create unique competitive advantages for alliance theme parks (Chen Hui, 2013). Therefore, Hubei should break the traditional concept of competition, to establish awareness of "win-win" cooperative competition, to use of modern network technology and to breakthrough limited boundaries between tourist attractions to combine all the competitive advantages itself and other tourist attractions in addition to pure competition, and finally to form a limited alliance organizations which could extend and integrate individual function and advantages to enhance core competencies of both individual and overall Hubei theme parks (S Çifci ,Y Ekinci, 2016).

5 Conclusion

With the revolution and reform of Supply-side in China, great challenges and opportunities have taken place in tourism industry. Although tourists have great enthusiasm to enjoy their leisure time, satisfied tourism destinations have been rather less. The theme Park is one of the key parts of regional tourist destinations. Since the competition among regional tourism markets has become increasingly fierce, how to enhance the core competence of regional tourist attractions' theme has become one of critical issues of researching tourism strategic development and macro decisions. This paper takes Hubei province as the case to study the concept of core competence of tourist attractions, and also proposes strategies for improving the core competence of theme parks in Hubei through analyzing its current status and problems involved in.

Acknowledgment

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Research on Business Mode Innovation of Mobile Internet: A Case of Mobike Bicycle-sharing

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Abstract: Business mode has a significant role in promoting corporate performance, enhancing market position and strengthening competitive advantages. The business mode innovation has gradually become an important source of enterprises to improve performance and gain competitive advantages, so more and more enterprises conduct business mode innovation in the era of mobile internet. This paper adopts a case study of "Mobike bicycle-sharing" based on the perspective of mobile internet, the paper includes four major parts. Firstly, the paper reviews and comments on the main types of modes based on the domestic and foreign literatures from 1996 to 2018. Secondly, it elaborates the characteristics of mobile internet business mode and describes the factors which influence business mode innovation. Thirdly, it introduces the mobile internet business mode innovation practice of Mobike and summarize the work experience. At last, it proposes to the countermeasures about the business mode innovation for Mobike.
Key words: Mobile internet; Business mode; Business mode innovation; Mobike

1 Introduction

The concept of business mode was proposed as early as the 1950s, but its rise was due to the rapid development of the internet economy (Yang Xia, Wang Liangliang,2015). Peter F. Drucke said, "The competition among enterprises today is not the competition between products and services, but the competition between business modes. The business mode is not just how businesses make money, how to get income and profits." (Yunus M., Moingeon B., Lehmann-Ortega L.,2010). In the era of mobile internet, the design, reengineering and innovation of business models are science and art that must be mastered by the enterprises. It effectively solves the fundamental problems of the survival, development and growth of the enterprise via the business mode innovation. In recent years, the domestic and foreign scholars generate a lot of valuable research achievements. Foreign scholars not only define the definition, types and characteristics of business mode, but also put forward the implement ways of business mode innovation strategies. In this part the paper introduces basic concepts of business mode and business mode innovation based on the inductions and reviews of current researches.

1.1 Research on the definition of business mode

Some scholars count a number of published academic and non-academic articles from 1975 to 2009, people's concern for business modes started at 1995 (Zott C., Amit R., Massa L., 2011). There is no uniform definition of business mode, most of the scholars abstract the definitions based on the specific perspective, these definitions can be divided into five types which reflect the different emphasis.

1)Business mode is the specific ways and means of how an enterprise engages in business. (Amit R., Zott C., 2001)

2)Business mode is various trading relationships and links among stakeholders, it emphasizes the trading mechanism. (Amit R., Zott C., 2001)

3)Business mode is a summary that an enterprise obtains and maintains revenue. (Stewartal, 2000)

4)Business mode is a series of ideas for how an enterprise can serve its customers and all participants who maintain the normal operation of enterprise by creating value. (Magretta J., Stone N., 2002)

5)Business mode is a multi-factor system, it is a framework for products, services and information flow. (Paul T., 1998)

1.2 Research on the constituent factors of business mode

Nowadays, system-based views have become the mainstream of business mode concept research. The following three modes are widely recognized among the many views. (Cheng Wen, Wang Yingjun, 2014).

1)This mode includes nine factors of core competencies, resource allocation, value propositions, distribution channels, target customers, partnerships, customer relationships, cost structures and profitability pattern. (Osterwalder A., 2004)

2)This mode includes four factors of core strategy, strategic resources, customer interface and value

network, every factor included subfactors. (Hamel G., 2000)

3)Business mode is considered as a business activity system that describes how companies "do business" with customers, partners, and suppliers. (Amit R., Zott C., 2012)

1.3 Research on the mobile internet business mode innovation

Business mode innovation refers to the activities of designing a new business mode, such as creation, implementation, and verification activities. Business mode innovation is not only the innovation of products and processes, but also the innovation of the business mode structure, the process of creating value and gaining value for stakeholders through the search for new business logic and methods (Amit R.,Zott C., 2012).Business mode innovation is refers to innovation in value creation, value proposition, and value acquisition(Clauss T., 2017).Some scholars propose business mode innovation includes industrial mode innovation ,revenue mode innovation and enterprise mode innovation. Some scholars propose business mode innovation includes progressive innovation and breakthrough innovation. Some scholars propose the path based on constituent factors, the path based on process and the path based on value chain. Organizational inertia, thinking mode and identity trap are the barriers to business mode innovation (Tian Qing Feng, Zhang Yinyin, 2018). There is no uniform definition of business mode, scholars define the business mode based on path, operations, profit, strategic positioning and system theory. Some scholars divide the constituent factors of business mode. The current researches play a fundamental role enriching the business mode theories through the analysis of above literatures, but the researches on practice of business mode innovation are rare. Thus, this paper puts forward suggestions for business mode innovation of Mobike with literature research and case analysis.

2 The Characteristics of Mobile Internet Business Model

There are big differences between internet business mode and traditional business mode. For one thing, internet business mode brings innovation to the communication channels of enterprise. For another thing, internet business mode caters to the consumption patterns of consumers.

With the emergence of internet technologies such as big data, traditional enterprises are facing big challenges, so it is particularly important for enterprises to adapt themselves to the current development trend in the new environment. For one thing, the network and mobile communication technologies are changing the life style of human beings in all directions, the consumption demand shows changes in individualization, autonomy and complexity, so it objectively requires enterprises to adapt to the new situation of diversified and personalized consumption. For another thing, the development of e-commerce and social platforms provide multiple ways for businesses to innovate in business modes, many enterprises can obtain competitive advantages via innovative business mode. Mobile internet represents a new economic form that bringing about changes in the production and consumption patterns of traditional industries. The mobile internet business mode refers to a new business operation and organizational structure mode with high innovation, high value, high profitability and high risk. The characteristics of the mobile internet business mode are reflected in the following aspects:

1)Mobile internet business mode is based on the internet. Platform economy is the main theme of mobile internet, the winners of both the internet rookie and traditional enterprise transformation are platform-based, such as Alibaba, Tencent, Xiaomi, Jingdong, the internet becomes the primary source of information. Mobile internet business mode uses the internet as a medium and integrates traditional business types and connects various commercial channels.

2)Nowadays, data has become an important production factor with physical assets, technology, and human capital. Big data refers to massive, high growth rates and diversified information assets with stronger decision-making power, insight and process optimization capabilities. Mobile internet business mode regards big data (volume, velocity, variety, value, veracity) as the core production factor, so big data processing and analysis capabilities become the enterprises 'score capabilities.

3)The focus of business is shifting from material to human, the driving force is changing from flow to relationship, the measure of business is changing from value to value concept. With the penetration of mobile internet in various industries, the cross-over competition barriers of enterprises have been greatly reduced. The cross-over and cross-over integration are self-revolution for the enterprise.

4)For one thing, the development and application of mobile internet technology can create a highly detailed market, accurately identify the individual needs of users, adjust products and services to meet these needs. For another thing, the development and application of mobile internet technology, the consumption patterns that are generated by one-way flow of information quietly changed. Consumer can

participate in the value creation process of the company through various ways, the consumer no longer a passive end-consumer but a proactive searcher.

3 Case Selection and Case Analysis
3.1 Case selection and introduction

Bicycles-Sharing is a new type of bicycle rental business, it refers to the sharing of bicycles on campus, subway stations, bus stops, residential areas, commercial areas, public service areas, etc. Bike-sharing has grown into a massive phenomenon in China over the past two years, and over 30enterprises offer colorful bicycles. Mobike starts its business in Shanghai in 2016 and spread to over 180 major Chinese cities, as well as Singapore, United Kingdom, Italy, Japan, Thailand, Malaysia, United States and South Korea, with 7 million bicycles worldwide. Mobike becomes the world's largest intelligent shared bicycle operating platform and mobile internet platform. Mobike creates the world's first smart shared bike mode, the users can locate a bike use an app and it only costs 2RMB per hour, the users can leave the bike anywhere they want without having to return it to a specific location.

This paper chose the typical case of Chinese Bike-sharing industry to conduct research. The enterprise is selected to meet the following three conditions: Firstly, the enterprise must have a good brand reputation, high market share in Chinese Bike-sharing industry. Secondly, the enterprise's business mode innovation is effective. Thirdly, there are some problems in enterprises business mode innovation and there is room for further expansion. The introduction of Mobike is shown in Table1.

Table 1   Profile of Mobike

Enterprise Name	Beijing Mobike Technology Co., Ltd		
Founding time	2015	Location of Formation	Beijing City
Service User	Over 2Billion people	Service Area	Over 180 cities,9 countries
Brand Name	Mobike	Business Scope	Smart Shared Bicycle Service
Honors	Earth Guardian Award Sustainable Urban Transport Special Award The China's 50 Most Influential Brands in 2017 The 50 companies that are changing the world in 2017 The China's Most Innovative Enterprise in 2016		

Data Sources: https://mobike.com/cn/

3.2 Analysis on business mode innovation of Mobike

1) Accurate target market segmentation. The main target market of Mobike consists of three parts. One is office worker, the other is urban resident, and the other is university student. In big cities, traffic congestion has always been a huge pain point, so the short-distance travel is absolutely rigid and high frequency demand. Mobike forms effective complementarity with subways, buses, taxis, and Uber express. The Statistics show the scale of Chinese bicycle-sharing market exceeded 10 billion RMB in 2017, and it is estimated that the bicycle-sharing market in China will exceed 17 billion RMB in 2018. Chinese bicycle-sharing market order over 50 million units per day, and the orders of Mobike over 20 million units per day Mobike is committed to solving the "last mile problem" for users, in fact, Mobike does it. The Market Situation of Chinese Bicycle - Sharing is shown in Table2.

Table 2   Market Situation of Chinese Bicycle - Sharing

	Mobike	OfO	Hellobike
Market Share	56.56%	29.77%	8.66%
Orders Units per Day	over 21 million	over 10 million	over 3.2 million

Data Sources: 《Domestic Bicycle-Sharing Market Research Report for the First Quarter of 2017》 The Sootoo Institute

2) Significant technological advantages. Mobike uses new design, materials and manufacturing processes with over 30 patents than traditional bicycle. Firstly, the weight of the body and wheels of new product are greatly reduced in order to make riding easier and more efficient. Mobike makes seats for new bikes easier to adjust in order to increase comfort. Secondly, Mobike also makes significant progress at the safety level, the new product is used a new high-performance, long-life braking system which greatly improves safety performance. Thirdly, Mobike independently researchs and developes the world's first smart pileless bicycle-sharing with smart lock. PS enabled Mobike allow users to locate the

bikes on the map and help to navigate their path to the exact location of the bike. Chinese mobile phone users can scan the QR (Quick Response) code on the Mobike bicycle of bike-lending service on a road. Can you always know where the nearest Mobike is on the phone? Mobike can ensure that the actual positioning error does not exceed 30cm.

3) Unique Profit mode. The profit mode refers to the income structure, cost structure and corresponding target profit of the company divided by stakeholders. Firstly, the app requires real-name registration with phone number, ID card and a deposit like other apps, but the deposit varies from 299 RMB for Mobike, 199 RMBfor Xiaoming Bike and 99 RMB for OfO. Mobike receives a large number of deposits. Mobike can receive 80 million non-risk interest income from deposits in one year and form a huge "fund pool" through deposit rules (ZhaiYEhu, LiuTian, 2017). Secondly, Mobike earns income through bikes rentals. Xiaoming Bike's cheapest price is 0.1 RMB for 30 minutes. OfO 's cheapest price is 1 RMB per hour, but offers a discounted rate of 0.5 RMB per hour for students. Mobike is the most expensive at 1RMB for 30 minutes. Mobike's average daily usage time has approached 11 million minutes. Thirdly, Mobike promotes economies of scale by creating huge volume and reducing production costs of bicycles, creating cost and price advantages.

4) Ambitious vision and mission. Mobike provides smart bicycle-sharing services at affordable prices for everyone, and makes people more convenient to complete short-distance travel in the city. Mobike help reduces traffic congestion, reduces environmental pollution and makes our life better. The vision and mission reflect the value proposition of Mobike.it includes low price, energy saving and environmental protection, sharing and development.

5) Harmonious relationship among important partners. The government, bicycle manufacturers and financial companies are important partners to Mobike. Firstly, Mobike explores various cooperation ways with government, communities and partners to solve industry bottlenecks with innovative technologies. Mobike utilizes its own technology bases and advantages to set smart Mobike preferred location (SMPL), Mobike's work wins support and appreciation from governments in Beijing, Shanghai, Guangzhou, Shenzhen. Chinese Premier Li Keqiang praises Mobike as a spring breeze in 2017.Secondly, as an innovative leader in the smart bicycle-sharing industry, Mobike attaches great importance to the selection and management of members of manufacturing industry chain. The Foxconn Group, The TSRC company, MERIDR, XDS, HANGERY, BATTLE are important suppliers to Mobike. Thirdly, as a growth company, Mobike needs a lot of money to maintain the company's operations and development., it cannot be the ultimate winner without strong capitals as support. In the past three years, Mobike wins many rounds of investment which establish the foundation for the company's continuous innovation and rapid development.

4 Comments and Suggestions

1)Mobike should serve more market segments which rely on technological research and development capabilities. Firstly, it must have a clear comparatively competitive advantage in comparison with similar companies, so it is necessary to provide different types of service according to the needs of different customers. Such as add Chinese and English switching in app for foreigners, add temporary lock function, add daily rent function, the reserved bicycles should be marked in the app. Secondly, the number of vehicles and the efficiency of dispatch are the two most important factors for the users. Mobike should further reduce body weight and improve customer riding experience.

2)In order to consolidate and increase market share in the fierce bicycle-sharing market, Mobike needs sufficient funds for bicycle production and market operations, so investors become important partners in the development of Mobike. Mobike raises over US\$ 1 Million in series of financing round from 2015 to 2018.The introduction of capitals strengthen the power of the enterprise and is conducive to the expansion of the enterprise, but it also leads to the weakening of the decision-making power and control of the company's executives. Mobike must strengthen relationship with many investors and seek financial assistance from government.

3)Mobike faces a series of non-market problems that increase urban management difficulties, such as bicycles destroyed, bicycles stealed and uncivilized parking (arbitrary parking, arbitrary abandon, arbitrary cross the road, escape payments). Mobike should further strengthen cooperation with the government to reduce the damage to bicycles. Such as improves credit management system, introduces industry regulations, strengthens public education and improves penalties.

4) Firstly, Scale is an important factor in the leasing market competition, Mobike launches a huge bicycle in order to ensure the market position, but the cost of each Mobike bicycle is more than

2000RMB, so the investment cost is alarming. Secondly, Mobike charges 1RMB for 30 minutes and it is hard to realize profitability with low prices, so advertising and data mining are the main source of future profit. For one thing, Mobike bicycles are also a mobile advertising medium like buses and subways, the advertising revenue will be very sizable with the large number of bicycles and a wide distribution. For other thingummies should make full use of data mining to analyze users' travel time and behavior habits and recommend matching products for users.

5 Conclusion

This article uses literature research and case studies to describe and analyze the internet mobile business mode innovation of Mobike. The paper reviews and comments on the main types of modes based on the domestic and foreign literatures from 1996 to 2018.The paper elaborates the characteristics of mobile internet business mode and describes the factors that influence business mode innovation. The research shows features of its business mode include accurate target market segmentation, significant technological advantages, unique profit mode, ambitious vision and mission, harmonious relationship among important partners. Although Mobike integrates internet of things, mobile internet and electronic payment technologies which meet the needs of the "last mile" in people's travel, but the current business mode still needs to be further optimized, such as serve more market segments through product innovation and service innovation, further strengthen relationship with many investors and seek financial assistance from government, further strengthen cooperation with the government to reduce the damage to bicycles, advertising and data mining are the main source of profit.

Through case study, it was found that technical factors, product factors, organization factors, and market factors played an important role in the business mode innovation process of Mobike. The business mode innovation of Mobike is a radical innovation compared with traditional business modes, but the process of innovation is continuous. This article analyzes the mobile internet business mode by using exploratory research with a single case, the next step of research work can be carried out from the comparative analysis of multiple cases, and it can also be started from the perspective of exploring the mechanism.

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Measurement of the Status and Its Influencing Factors on China's Service Industry in Global Value Chain

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Abstract: In this paper, we describe the status quo of Chinese service trade, estimates sophistication of Chinese service exports on the basis of data from 20 economies during the period from 2004 to 2015, and then measures the specialization position of Chinese service industry in global value chain (GVC). We find that Chinese service exports play an increasingly important role in the world as well as its sophistication index is growing, but the technical content of exports is relatively lower and Chinese service industry is still at the low end of GVC. Finally, we analyze the factors affecting the status of service industry in GVC and propose the suggestions to promote the value chain upgrading of Chinese service industry.

Key words: Service industry; Global value chain; Export sophistication; Influencing factors

1 Introduction

As Chinese service exports are enjoying an explosive growth, China has become the 5th largest exporter of service products in the world in 2016. A growing number of literature has begun to study on the status of China's service industry in GVC. The concept of sophistication was proposed in 2003 and usedto reflect the technological structure of a country's export commodities. The export sophistication can reflect the position of a country's certain industry in international division of GVC(Hausmann, 2003).Based on export sophistication measurement of manufacturing by Hausmann et al. (Hausmann et al.，2007), Mishra et al. (Mishra et al.， 2011) proposed a method for measuring the technical complexity of service exports. At home, the index was firstly employed to measure technological sophistication of China's service exports (Dai Xiang, 2012). It is discovered that the export sophistication of China's service industry is in the low-end of GVC(Yin Weihua, 2015; Li Huijuan and Cai Weihong, 2016; Meng Dongmei et al, 2017). The sophistication of Chinese service exports is constantly increasing, promoted by human capital, openness of service trade, per capita GDP, R&D expenditure, FDI utilization, foreign service intermediates and institutional quality(Yin Zhongming and Gong Jing, 2014; Zhang Yu and Dai Xiang, 2015;Li Huijuan and Cai Weihong, 2017).

In this paper, according to the Extended Balance of Payments Service classification(EBOPS2002), the service industry is divided into 11 categories, namely transportation, travel, communication services, construction services, insurance services, financial services, computer and information services, royalties and license fees, other business services, personal, cultural and recreational services and government services.

2 Status Quo of Chinese Service Trade

From the viewpoint of trade scale, according to the United Nations trade statistics, the China's total service trade rose from $66.43 billion in 2000 to $635.11 billion in 2016, an increase of nearly 10 times. Particularly, the total value of China's service exports rose from $30.43 billion in 2000 to $184.66 billion in 2016, with a6-fold increase. From the viewpoint of trade structure, China's exports mainly concentrate on travel, transportation and other business services, which accounted for 92 percent of total exports in services in 2016.On the whole, China's service trade is on the rise, with an increasing growth rate. Meanwhile, the export structure of China's service trade has gradually changed from traditional labor-intensive service exports to modern knowledge and technology-intensive ones. In the global value chain, the technological level of China's service trade lags behind developed countries, and its trade status remains to be improved.

3 Specialization Status Measurement of China's Service Industry in GVC

3.1 Construction of export sophistication

The export sophistication is used to analyze a country's export structure, and reflects technology content and the status in international labor division of export goods or services. The research applied the export sophistication based on Mishra (Mishra，2011) model to analyze the technology content and

the specialization position of China's service industry in GVC.

Firstly, the export sophistication in sub-service industry level is calculated as below.

$$PRODY_i = \sum_j \frac{x_{ij}/X_j}{\sum_j x_{ij}/X_j} Y_j$$

$PRODY_i$ is the export sophistication of sub-service industry i. It is a weighted average of the per capita GDPs of countries exporting a given sub-service industry. x_{ij} represents export value of sub-service industry i in country j. Y_j means GDP per capita of country j. The total service exports of country j equals $X_j = \sum_i x_{ij}$.

Secondly, the export sophistication of a country's service industry is calculated as followed.

$$EXPY_j = \sum_i \frac{x_{ij}}{X_j} PRODY_i$$

$EXPY_j$ represents export sophistication of the service industry in country j. It is a weighted average of the $PRODY$ for that country, where the weights are the value shares of the sub-service products in the country's total service exports. The EXPY index reflects technology competitiveness and status of industrial division of a country's service industry in GVC.

3.2 Data source

In view of data availability, based on Mishra (Mishra, 2011) model, among the world's top 25 economies in service exports in 2016, data of service exports in 20 countries or regions during the period between 2004and 2015 is chosen to measure export sophistication in the research. According to the data of UN conference on trade and development (UNCTAD),total service exports of 20 countries or regions contributed more than 62% to world's exports. Thus, the sample data is representative. Trade flow data of the service and sub-service industries in 20 economies is obtained from the United Nations trade statistics database(UNCOMTRADE) and GDP per capita is from the world bank database(DATABANK).The GDP per capita is in U.S. Dollar on the base year of 2004.

3.3 Result analysis

3.3.1 The export sophistication of China's service industry

Table 1 shows the sophistication of China's service industry is rising from $29812 in 2004 to $31532 in 2015in a fluctuating way, peaking at $37111 in 2011. The index is increasing with an average growth rate of 0.74% per year, reaching the highest growth rate of 8.78% in 2007.It is growing during the period between 2004 and 2008, and waving after financial crisis. A big decline occurred in the year of 2009 and 2012, which was caused by the financial crisis shock in 2008 and world trade slowdown in 2012.

Table 1   Sophistication Change of China's Service Industry from 2004 to 2015   Unit: US $

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
29812	30820	32088	34906	36839	33038	34578	37111	35967	36444	36096	31532

Data source: calculated based on data from UNCOMTRADE.

3.3.2 International comparison on sophistication of service industry from various countries

The export sophistication of service industry from China, main developed and developing countries is showed in Table 2 to measure the status of China's service industry in the GVC.

Table 2   International Comparison on Sophistication of Service Industry   Unit: US $

Country/Region	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
China	29812	30820	32088	34906	36839	33038	34578	37111	35967	36444	36096	31532
U.S. A	34267	35278	36767	40380	42234	38646	40948	43820	42364	40403	39628	35696
Germany	31522	32406	33769	37086	38981	35593	40884	42130	38568	37211	36675	34643
France	30311	31538	32608	35627	37836	34450	34833	41150	36303	36516	37482	33980

Continual Table 2

Country/Region	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Japan	32502	33533	35113	37779	39152	35559	37049	39836	38694	38783	38829	35053
Singapore	32599	33899	35437	39535	41053	37320	37866	40700	39214	39549	39686	35638
Ireland	34003	34353	35805	39235	40222	35822	36469	38999	35129	35454	35904	32640
Hong Kong	32975	33913	35954	39620	41481	37439	38269	40740	39033	39384	39278	35715
Luxembourg	45716	46959	49220	55473	56684	50520	49464	52792	50223	50511	50931	46579
Korea	30697	31996	33345	36605	37880	33454	35505	37697	36153	36168	35866	32506
Australia	28977	30399	32029	35174	36682	32472	34322	37184	36333	36716	36277	31708
Russia	30122	31233	32380	35690	37652	33862	35636	37967	36657	36939	36649	32681
India	28061	28937	29924	34739	34174	30471	31380	34742	33528	34646	35085	30875
Poland	28968	30307	31418	34449	36801	32874	33672	36457	35000	35266	34493	30708

Data source: calculated based on data from UNCOMTRADE.

The technological sophistication of service exports in China and developed countries shows a fluctuated rising trend, which is affected by the world economy. In the year of 2009 and 2015, the global demand is insufficient due to the financial crisis and the decline of the world economy. The economic and technological development is slowing down, which has seriously affected world servicestrade, directly led to a decline in sophistication of service exports in various countries.

The four developing countries show a fluctuated rise in service export sophistication, with China's index lower than that of Russia, but far higher than that of Poland and India. With abundant oil and gas resources, Russia has a strength in the military industry and science and technology, thus led to higher index than China.I ndia's computer and information service industry are well developed, with its exports accounting for an average percentage of 48% to the total service exports from 2004 to 2015.But India's service exports and GDP per capita are lower than China's, thus with the lower index.

In general, China's service exports are increasing rapidly, however, its export sophistication ranked 17th in 20 sample countries or regions. Therefore, In the fierce competition of international service market, China's service trade is in the low-end and downstream position in GVC.

3.3.3 The average sophistication of sub-service exports in 20 economies and China's service industry's status

Based on the first formula, the average export sophistication of 11 sub-item services in 20 economies from 2004 to 2015can be calculated. By comparison of 11 sub-service industries' indexes, modern sub-service industries with high added value such as financial services, insurance services, personal, cultural and recreational services, royalties and license fees have high export technical level, ranked top four. The traditional sub-service industries such as transportation, travel, construction services have low technological level of the exports. Meanwhile, the high-end services with high added value, high capital and technical intensity, can promote the export sophistication and the status of national service industry in GVC. Therefore, it's necessary for a country to speed up the development of high-end services to improve technological level of service exports and its GVC status.

Table 3   Export Share Change of Chinese Sub-service Industries from 2004 to 2015

Sub-service industry	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	mean
Transportation	0.186	0.207	0.228	0.256	0.261	0.182	0.211	0.191	0.203	0.205	0.182	0.147	0.205
Travel	0.397	0.394	0.369	0.305	0.278	0.306	0.283	0.261	0.261	0.281	0.270	0.435	0.320
Communications services	0.008	0.007	0.008	0.010	0.011	0.009	0.008	0.009	0.009				0.009
Construction services	0.023	0.035	0.030	0.044	0.070	0.073	0.089	0.079	0.064	0.058	0.073	0.063	0.058
Insurance services	0.006	0.007	0.006	0.007	0.009	0.012	0.011	0.016	0.017	0.022	0.022	0.019	0.013
Financial services	0.001	0.002	0.002	0.002	0.002	0.003	0.008	0.005	0.010	0.017	0.022	0.009	0.007

Continual Table 3

Sub-service industry	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	mean
Computer and information services	0.025	0.025	0.032	0.036	0.042	0.050	0.057	0.065	0.076	0.093	0.096	0.093	0.058
Royalties and license fees	0.004	0.002	0.002	0.003	0.004	0.003	0.005	0.004	0.005	0.005	0.003	0.004	0.004
Other business services	0.344	0.313	0.315	0.331	0.315	0.352	0.322	0.365	0.348	0.311	0.327	0.222	0.322
Personal, cultural, and recreational services	0.001	0.002	0.001	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.003	0.001
Government services	0.006	0.007	0.006	0.005	0.005	0.007	0.006	0.004	0.005	0.007	0.005	0.004	0.005

Data source: calculated based on data from UNCOMTRADE.

Table 3 shows the top three China's sub-service industries in average export share are other business services (32.2%), travel (32%) and transportation (20.5%). The last four sectors are personal, cultural, and recreational services (0.1%), royalties and license fees (0.4%), government (0.5%) and financial services (0.7%). In 2015, travel, other business and transportation services accounted for 80.4% of China's total service exports, while financial services, government services, royalties and license fees, personal, cultural, and recreational services, accounted for only 2.0%. Therefore, China's traditional sub-service exports with low technological level account for a major part of total service trade. However, modern sub-service exports with high added value and technology intensity account for a small proportion, thus led to the low technological level of China's service trade and its low position in GVC.

4 Influencing Factors of Status of China's Service Industry in GVC

The status of Chinese service industry in GVC is mainly influenced by following factors.

4.1 Human capital

China's service trade is dominated by the labor-intensive traditional service industries. The development of moderrn service industries, with knowledge, technology and capital intensity, are relatively backward. Human capital can be vigorously developed and used to transform export structure from traditional service industries into modern ones. On one hand, human capital helps to increase service output and service exports. On the other hand, human capital promotes technological innovation in service industry, expanding the types and channels of service trade, and optimizing the technical structure of service exports. To some extent, human capital represents the accumulation and abundance of knowledge and technology in a country, and determines the sophistication and technical level of service exports.

4.2 Scientific and technological level

The improvement of scientific and technological level, on one hand, enables enterprises to provide better service with less labor; on the other hand, helps to improve the quality and skills of workers, which enhances labor efficiency, thus reducing operating cost and increasing service outputs. In addition, the technology upgrading will refine social division of labor and production specialization, thus giving rise to emerging service sectors with technology intensity. The technological level of service exports can effectively promote by resources continuously flowing to these new service industries.

4.3 Scale of service trade

The scale expansion of service trade can effectively improve technological level of service exports. Service trade is the extension of service industry, the development of which directly affects the ability of a country to provide services to the international market. Developed countries' service industry, in the upstream position in the GVC, accounts for about 80% of GDP, and its trade development is key to improve a country's international competitive position. The scale of service trade plays an important role in optimizing service export structure. With trade scale expands, service trade will gradually show economies of scale, which helps enterprises to reduce production cost and invest more money and resources in the high-end services, thus improving the technology content and added value of service products as well as its export sophistication.

4.4 Service trade policy

Government's policy is essential to the development of service industry. The preferential and supportive policies will guide human capital, money and social resources to the industry, create a good

developing environment in tax burden, supervision, and financing, and foster emerging service industries by encouraging innovation. At present, Chinese government attaches great importance to the development of service trade and promotes it as a national strategy. Firstly, open trade policies reduce enterprises' production and transaction costs, and promote the participation of a country's service sector in global trade competition. Thus, the technological level of service exports will be raised quickly. Secondly, open policies are conducive to attracting direct investment from multinational service companies, which brings about advanced technology and management experience, upgrading the technical level of domestic service exports.

5 Conclusion

The research uses export sophistication index to measure the status of China's service industry in GVC and draws the conclusion as followed. China's service exports enjoy rapid growth, bringing about increasing technical content. However, the sophistication is not so high because Chinese exports in service industry mainly rely on traditional services with low technical requirements rather than modern services with high technology contents. In the background of international labor division, China embeds itself in GVC with advantage of labor resource, but is locked in the low-end due to the lack of advanced technology and innovation. The following suggestions are put forward to promote the upgrading of China's service industry in GVC.

Firstly, to improve IPR system, increase R&D and talent investment. The independent innovation ability of advanced technology must be enhanced, and IPR ownership must be increased to maintain the sustainable growth of Chinese service industry. Perfect IPR system helps to provide a good environment for independent innovation, encouraging service enterprises to use core technology to gain market share and to embed themselves in the industrial chain. R&D and talent investment should be in creased to improve enterprises' absorption ability of technology spillovers and upgrade the value chains of China's service industry.

Secondly, to expand the openness of service trade and optimize service exports structure. According to the results, China exports less service products of high sophistication and more service goods of low sophistication.

Thus, most Chinese service exports are less-skilled middle and low end products. In the future, China should actively implement diversified strategy of upgrading the technological level of service exports. China's service exports should focus on modern industries such as financial services, insurance services, royalties and license fees, personal, cultural and recreational services, computer and information services, and government services, which enjoy high export sophistication and output per capita. China should also develop export potential and increase added value in the traditional service industries through modern technology. Technical content improvement should be emphasized rather than scale expansion to optimize the export structure of service industry.

Finally, to improve policies and regulations, strengthen top-level design and macro-control of service trade. China's government should attach great importance to talents cultivation, foreign capital introduction and technical innovation in service industry. Multinational service corporations should be introduced by preferential policies, technological innovation should be strengthened by IPR protection and innovative talents should be both self-cultivated and introduced to enable China's service industry extending to high value-added industrial chain. In addition, China should build innovative industrial demonstration park of high-end service industries to increase the export sophistication by spending sufficient R&D investment in modern service industries, rationally optimizing resources allocation, and improving innovative infrastructure construction and information technology networks. The innovation of high-end service industries can promote the upgrading of service industry and service trade, and feed back the low-end service industries.

Acknowledgement

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On the Development Countermeasures of the University Industrial Research Institute Based on "One Axis and Three Helix" Innovation Mode

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Abstract: The study mainly uses the documentation research method and the comparative analysis method to discuss the construction mode, operating mechanism, resource allocation and talent training of the University Industrial Research Institute. It puts forward the construction of the university industry based on "One Axis and Three Helix" innovation mode. The institute's strategy is to take the "axis" of the enterprise development as the core, giving full play to the advantages of the "three helix" of government, universities, and agencies, complement each other's strengths, realize organic combinations of various production factors such as talents, capital, and information, and thus promote the sound development of the university's industry research institute.
Key words: The development countermeasures; The university industrial research institute; "One Axis and Three Helix" innovation mode; Construction

1 Introduction

As a bridge and link between universities and places, the University Industrial Research Institute inherits and continues the university's scientific and technological innovation functions. It is also closer to the needs of local industries and plays an important role in university research activities and local industrial technology innovation activities. At present, the number of overseas science and technology transformation institutions set up by universities themselves and built jointly with local governments or enterprises has grown rapidly and in various forms, but their technological transformation functions have not been fully realized. Based on this, this paper intends to further explore the development mode of the University Industrial Research Institute through the perspective of the "One Axis and Three Helix" innovation mode.

2 Construction Model and Problems of the University Industrial Research Institute

The University Industrial Research Institute is generally supported by local governments and universities. It focuses on the scientific research, teaching, and management of the university and integrates scientific and technological achievements such as "politics, production, learning, research, and use". It is a platform organization and service organization integrating scientific and technological innovation and entrepreneurship, professional personnel training and other functions.

2.1 Construction Mode of the University Industrial Research Institute

2.1.1 Government-driven Mode

In this mode, it includes various topics such as government, universities, and companies. The cooperation between the various entities is relatively close. The government plays a role in decision-making, coordination, management, assessment and supervision, and information exchange services. Universities and research institutes play a central role through scientific research capabilities, and companies actively participate.

2.1.2 Enterprise-led Mode

In this mode, enterprises are in a dominant or core position. Universities and research institutes actively participate in the research and development of enterprises. The government mainly provides policy support and the construction of a legal environment. Social intermediary agencies are actively providing various services. This type of mode is conducive to enhancing the company's technological innovation capabilities and competitive advantages. The enterprise-led mode can timely obtain market demand and change information and achieve market-oriented goals. This mode is an important way for the industrialization of scientific and technological achievements.

2.1.3 Cooperation and Cooperation Mode

It is an organizational mode in which universities, research institutes, and enterprises work together

to share risks. Universities and scientific research institutions provide technical achievements, research strength, and talent support. Governments or companies provide funds and test sites. The government provides comprehensive laws and regulations and with quality services, intermediaries serve as a bridge for all parties through the provision of market information and other services. The rights, interests, and risk sharing of all parties are determined by the contract. This is the most important form of China's current university industry research institute.

2.2 Problems of the University Industrial Research Institute

The capital investment is insufficient, and the industrialization of scientific and technological achievements is not perfect. To achieve a smooth process of technology from production to industrialization, this process needs to be completed in four stages, including: market forecasting, technology research and development, results transfer, and industrialization. The main responsibilities of the University Industrial Research Institute should be the scale-up and engineering improvement of scientific and technological achievements. However, this process requires sufficient funds to support the premise and guarantee. The ratio of a scientific and technological achievement from scientific research to the formation of technical achievements, to the pilot phase and final industrialization is about 1:10:100. Due to insufficient funds and related supporting facilities, some university industrial research institutes are difficult to conduct scientific research, and the ability to achieve results in pilot and industrialization is limited. It is more difficult to achieve results transformation, resulting in a large number of semi-finished products waiting for the word, hindering its innovation power.

Inadequate human resources, innovation and development are not enough momentum. The University Industrial Research Institute is a comprehensive institution that includes technology research and development, technical services, venture capital, and capital operations. It not only requires excellent professional and technical personnel, but also requires complex technical management talents who are good at integrating various resources. It is necessary to understand the situation of university scientific research institutions and to be familiar with the local industrial situation. It is necessary to have both scientific research experience and industrialization experience. It is necessary to be able to understand scientific research culture and be familiar with corporate culture. The shortage of talented people is first and foremost the number of leading talents in science and technology is lacking, and the structural contradictions of talents are more prominent; the existence of these problems has become a constraint factor for the further development of the university's industry research institute.

Hematopoietic capacity is not strong, and industrialization goals are not prominent. As shown in figure 1, from 2006 to 2016, the annual technical transaction volume of the universities as sellers was about 30 billion RMB, Accounting for 3-4% of the national technical transaction volume, it is relatively low proportion. The ultimate goal of the University Industrial Research Institute is the application of the market. Therefore, it should be closely integrated with the needs of the enterprise. That is, the goal of its technological research is to meet the needs of the enterprise and to regard it as the principle of industrial service. The government-supported research results should be commercially available technologies that can be applied to the industry to avoid the phenomenon that there are no results and no one wants to be. In order to avoid this phenomenon, it is necessary to require the active participation of enterprises in all aspects such as project declaration, research and funding. The current problem is that the selection of projects does not fully reflect the company's need for technology, which has led to some research from the actual needs of enterprises, which is a major obstacle to the industrialization of results.
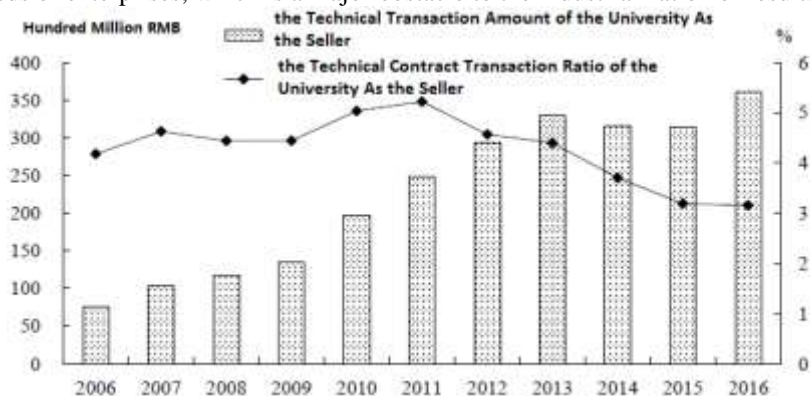
Figure 1   The Technical Transaction Amount and the Technical Contract Transaction Ratio of the University as the Seller (2006-2016)

3 Connotation of "One Axis and Three Helix" Innovation Mode

The "one-axis, three-helix" innovation mode is based on the triple helix theory. The triple helix theory is an innovative theory put forward by Henry Eczkowitz and Lloyd Redstoff in 1995. It refers to the fact that universities, industries, and governments maintain their unique functions while supporting other the main body is constantly innovating, forming an interactive and reflexive, spiral-progressive relationship and building a university-industry-government analysis paradigm.

The triple helix theory solves the traditional "demand traction" or "technical impetus" for the transformation of linear patent achievements. However, there is still no effective solution to such problems as technological asymmetry and technological needs. The intermediary, with its own knowledge, technology, talents, information and other resources, plays a role of media and catalyst in the process of science and technology transformation, and is an important subject to resolve this "last mile". Therefore, the author proposed the "one axis and three helix" innovation mode.
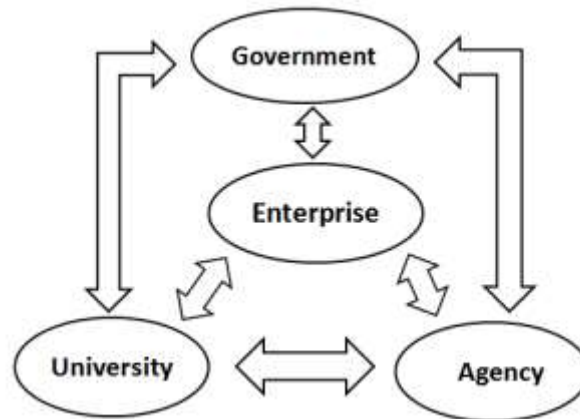
Figure 2   The Innovation Mode of "One Axis and Three Helix"

The "one-axis and three-helix" innovation mode, that is, the axis of "enterprise" and the three spiral subjects of "university, government, and agency," will exert their respective advantages in the process of transforming scientific and technological achievements, focusing on each other but assisting and integrating each other to achieve technology. Accurate transformation of results. Specifically, as a market entity, enterprises mainly play the function of realizing the transformation of scientific and technological achievements, leading the realization of the transformation of scientific and technological achievements into the industrialization chain. As the source of intellectual resources, the university plays a major role in the creation of scientific and technological achievements in the entire transformation chain. Leading the transformation of scientific and technological achievements into the creation of a knowledge chain; the government, as a policy maker and executor, plays a major role in guiding, coordinating, and creating a good environment, leading the improvement of the policy chain for the transformation of scientific and technological achievements, and the intermediary agency as an outcome transformation linker. It mainly plays a role in precision guidance and boosting, leading the integration of scientific and technological achievements into knowledge chains, policy chains, and industrial chains.

4 Construction of the University Industrial Research Institute System of "One Axis and Three Helix" Innovation Model

The "one-axis and three-helix" innovation mode has listed the university's industry research institute as an independent main body. Enterprises, governments, universities, and intermediary agencies are the core subjects of the university's industrial research institutes. In the process of co-construction, taking the "axis" of enterprise development as the core and giving full play to the advantages of the "three spirals" of the government, universities, and agencies, the parties complement each other's strengths, and various production factors such as talents, capital, and information will be organically combined. Effectively promote the sound development of the University Industrial Research Institute.
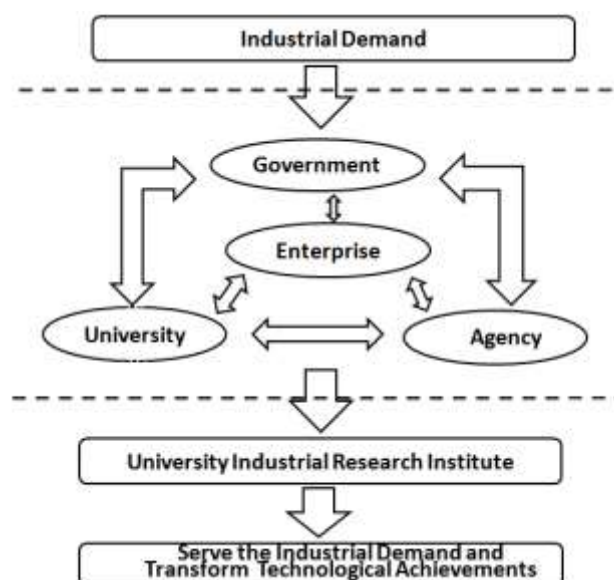
Figure 3   The University Industrial Research Institute Construction of
"One Axis and Three Helix" Innovation Model

4.1 Enterprise: Innovation Body

Enterprises to enhance their competitiveness through technological innovation is the most important means to increase the added value of their products. Enterprises should establish correct scientific and technological innovation values under the guidance of market demand, integrate scientific and technological innovation values into the development of university industrial research institutes, combine them with the economic benefits of the University Industrial Research Institute, and integrate with the core competitiveness. Science and technology innovation enhance the market risk-taking ability of the University's Industrial Research Institute.

4.2 Government: Leading Coordination

The government is the coordinator of the construction and development of the university's industry research institute. First, the government has formulated a series of macroeconomic policies such as financial subsidies to create a favorable environment for the development of the university's industrial academy. Secondly, actively guide the coordination of universities and colleges that have scientific research advantages in this field of technology, scientific and technological agencies with good credit status, and powerful companies to cooperate with the University Industrial Research Institute. Make the university industrial research institute more harmonious with companies, universities, and agencies in the process of cooperation.

4.3 University: Research and Development

The university has the advantage of talents and technology, and provides the university's industry research institute with abundant knowledge resources and is the main force. Universities should formulate relevant policies to encourage the industrialization of scientific researchers and enterprises. In addition, when translating scientific research results, it is necessary to actively integrate the resources of enterprises, governments, and science and technology intermediaries, formulate reasonable interest distribution methods and operational procedures, and use benefits as a link to effectively connect the participating entities and ensure the University's Industrial Research Institute. The effective operation.

4.4 Intermediary: Main Body of Information

As a participant in the market process and a promoter of the transformation process of scientific and technological achievements, the University Industrial Research Institute should strengthen the flow and smooth communication with the market information elements. The intermediary will use its own advantages to timely communicate the latest market information and technical resources to the University Industrial Research Institute. Openness, and the transfer of frontier market signals, enable the University of Industry Research Institute's scientific and technological achievements transformation process and personnel training to suit market demands and industrial development trends.

5 Conclusion

The development of the University Industrial Research Institute is a complex process with multiple links, mutual promotion, and multi-subject participation. This paper constructs an innovative mode of "one axis and three helix" The four main bodies of companies, governments, universities, and agencies are doing their best and interacting with each other. Strive to strengthen the shortcomings of intermediaries and make up for the lack of university industrial research institutes. This has important practical significance for improving the operational mechanism for the transformation of scientific and technological achievements in China.

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Research on Innovation Capability Evaluation of ST SMEs Based on Innovation Diagnosis

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Abstract: The enterprise's innovative diagnosis is an important force to enhance the company's scientific and technological innovation capabilities and accelerate the transformation and upgrading of the company. This article takes enterprise's innovation diagnosis as the breakthrough point and constructs the innovation capabilityevaluation index systemof ST SMEs(the scientific and technological small and medium-sized enterprises) from five aspects: innovation input ability, collaborative innovation ability, innovation transformation ability, innovation management ability and innovation output ability. Finally puts forward the countermeasures and suggestions for improving the innovation ability of ST SMEs.
Key words: Innovation diagnosis; ST SMEs; Innovation capability; Innovation capability evaluation index system

1 Introduction

As an important force for technological innovation and a direct carrier for the transformation of technological achievements, technology-based ST SMEs have become an indispensable economic subject and innovation subject in China (Hu Xiaojin, 2010). To help excellent ST SMEs overcome the growing difficulties, the government should formulate targeted policies and measures to conduct reasonable guidance and support. This requires the establishment of a scientific innovation capabilityevaluation index system for enterprises. For ST SMEs, their level of innovation capability plays a decisive role in the company's production and business activities and further growth and development. The diagnosis of innovation capability of ST SMEs is significant to help governments formulate targeted policies and measures to enhance the innovation capability of ST SMEs.

2 Literature Review

2.1 Enterprise Innovation Diagnosis

Yu Wu introduced how to carry out enterprise innovation diagnosissystematically and elaborated on 16 aspects of enterprise management such as establishing a perfect company operation and agency mechanism(Yu Wu, 2013). Wang et al. summarized and extracted thetechnological innovation nodes diagnostic methods and types of technological innovation path and pointed out the application conditionsof these diagnostic methods and innovative path selection (Wang Yong, 2014). Kozioł et al. analyzed the evaluation results of innovation degree in the Malopolska region to find out thatthe decisive factors for innovation diagnosis were employee competence, modern infrastructure, cooperation in knowledge management, organization of work, and protection of knowledge (innovation) created within the organization (Kozioł L, 2015). Tomlinson et al. conducted an innovation assessment of the cooperative relationship within the multiple regression framework and found that ST SMEs ' innovation capability is an important driver of a series of production activities within the value chain(Tomlinson P R, 2013).

2.2 ST SMEs and Evaluation of Their Innovation Capability

So far, the concept of ST SMEs at home and abroad has not yet formed a unified definition. Feng Chaojun believes that ST SMEs are small and medium-sized enterprises that mainlyproduce, develop, and sell high-tech products, and are the most innovative and dynamic enterprisegroup in social and economic development (Feng Chaojun, 2016). Schumpete pointed out that innovation is "recombination of factors of production", that is, introducing a new combination of production factors or production conditions to the production system and establishing a new production function (Schumpeter J, 1934). Liu Guoyi et al. divided independent innovation dimensions according to the three interconnected and important aspects of the innovation chain and described the independent innovation capability of the clustered enterprises(Liu Guoyi, 2014). Larry pointed out that technological innovation can be measured

in terms of organizational capability, adaptive capacity, and many other aspects of the level of competence (Larry E, 1984).

This study, takingvarious factors into consideration, will build theinnovation capabilityevaluation index system of ST SMEs from five aspects: innovation input capability, collaborative innovation capability, innovation transformation capability, innovation management capability, and innovation output capability.

3 Constructionof Innovation Capability Evaluation Index System and Model of ST SMEs

3.1 Building Evaluation Index System

According to the "State Administration No. 115" (2017), this article systematically studies and summarizes the existing theories, and combines the actual situation of enterprise innovation development in Hubei, bases on the definition and characteristics of ST SMEs and comprehensively considers the various development stages of ST SMEsso that an innovation capability evaluation index system for ST SMEsis built (Figure 1).

Innovation capability evaluation index system for ST SMEs includes the following: The first is innovation input capability of enterprises, that is, enterprises obtain production factors and invest in innovation activities, reflect the willingness and input of enterprises to carry out innovation activities, mainly including R&D expenditure and R&D personnel input; the second is collaborative innovation capability of enterprises, reflecting the ability of enterprises to use external innovation resources and carry out cooperation in production, teaching and research, including scientific and technological achievements and the cooperation of production, education and research; the third is innovation transformation capability of enterprises, which reflects the economic transformation efficiency of enterprise's innovation ability, including the transformation of enterprise product manpower and the transformation of scientific and technological achievements; the fourth is innovation management capability of enterprises, which reflects the ability of the enterprise to organize and manage innovative activities and mainly includes the enterprise system, management level and product or brand strength; the fifth is innovation output capability of enterprises, which reflects the direct results of enterprise innovation, including the technological level of innovation and the creation and use of intellectual property.
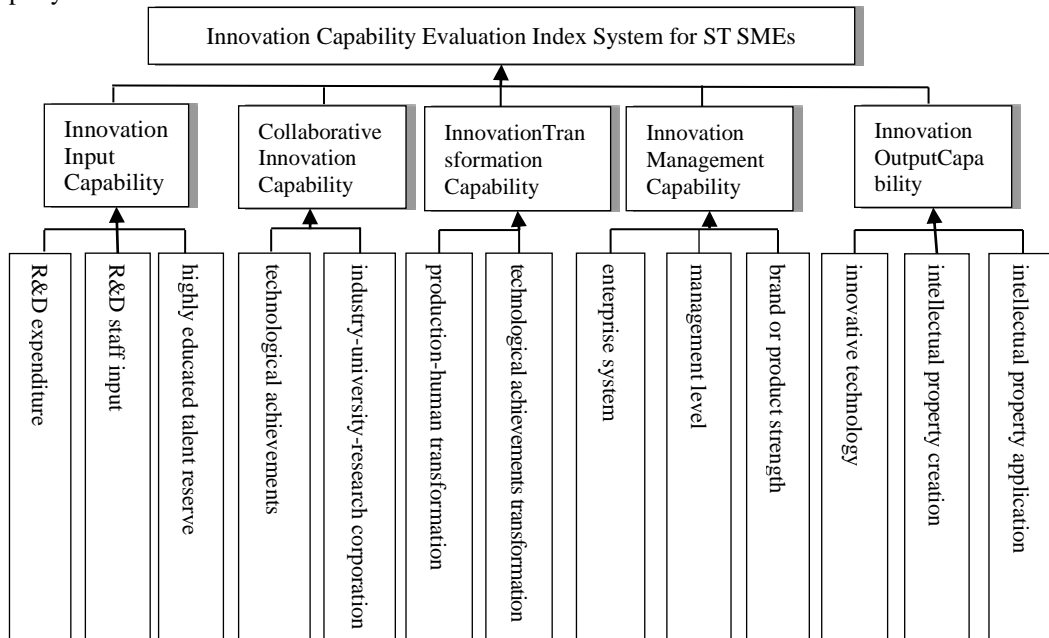
Figure 1   Hierarchy Analysis of Innovation Capability Evaluation Index System for ST SMEs

3.2 Establishment of Evaluation Model

3.2.1 Comprehensive Evaluation

The first step, each expert scores for the qualitative indicators one by one according to the actual

situation of specific enterprises; the second step, substituting the actual data of the company, calculating the scores of quantitative indicators and obtaining corresponding scores; the third step is to calculate the scores of innovation input capability, collaborative innovation capability, innovation transformation capability, innovation management capability, and innovation output capability respectively; the fourth step, the scores of these five innovation ability evaluations are weighted to obtain the total score of the enterprise's innovation capability evaluation (GuoCaiyun, 2013).

The calculation of enterprise innovation capability evaluation index is

$$X = x_1 f_1 + x_2 f_2 + ... + x_n f_n = \sum_{i=1}^{n} x_i f_n \qquad (1)$$

where X is the total score of the enterprise innovation ability, x_i is the score of each index, and f_i is the corresponding weight of each index.

Substituting a specific ST SME data into the formula (1) obtains the company's comprehensive score. According to the survey, the scores of ST SMEs with outstanding innovation ability are concentrated in more than 80 points, general innovation ability in 60-80 points, and qualified innovation ability below 60 points.

3.2.2 Determination of Weights

Through interviews with related experts, this paper averages the results of expert ratings and obtains a corresponding judgment matrix. Then the paper uses the common calculation process of AHP, and obtain the weight and consistency ratio of each judgment matrix, and subdivides it into third-class index according to each second-class index. In order to determine the scores of the index, the author consults relevant ST SMEs' identification, and draws on the relevant research results to obtain evaluation index weights and the evaluation criteriaof innovation capability for ST SMEs (Table 1).

Table 1　Innovation Capability Evaluation Index System for ST SMEs

First-class index	Weights	Second-class index	Third-class index	Weights	Evaluation criteria
Innovation input capability	0.2535	R&D expenditure	Enterprise R&D expenditure intensity	0.0623	Enterprise R&D expenses/sales revenue ≥6%, 100 points; 4%~6%, 80~100 points; 2%~4%, 60~80 points; ≤2%, 0 points
			Enterprise R&D expenditure growth rate	0.0436	≥15%, 100 points; 10%~15%, 80~100 points; 5%~10%, 60~80 points; ≤5%, 0 points
		R&D staff input	Enterprise R&D staff input intensity	0.0956	Number of R&D personnel/total number of employees in the enterprise ≥30%, 100 points; 20%~30%, 80~100 points; 10%~20%, 60~80 points; ≤10%, 0 points
		Highly educated talent reserve	Proportion of highly-educated personnel	0.052	Total number of master graduates/workers in the enterprise ≥50%, 100 points; 40%~50%, 80~100 points; 30%~40%, 60~80 points; ≤30%, 0 points
Collaborative innovation capability	0.1077	Technological Achievements	Science and technology project level and quantity	0.0310	One or more national science and technology innovation projects, 100 points; one provincial-level technological innovation projects or two municipal-level technological innovation projects, 80 points; one municipal-level technological innovation project, 60 points
		Industry-university-research cooperation	Number of industry-university-research cooperation projects	0.0389	≥ 3 items, 100 points; ≥ 2 items, 80 points; ≥ 1 item, 60 points
			Number of R&D institutions	0.0378	≥15, 100 points; 10~15, 80~100 points; 5~10, 60~80 points; otherwise, 0 points
Innovation transformation capability	0.1421	Production-human transformation	Innovative product share	0.0423	Innovative product sales/total sales ≥30%, 100 points; 20%~30%, 80~100 points; 10%~20%, 60~80 points; ≤10%, 0 points
			Staff productivity	0.0398	Total profit/total number ≥25,100 points; 20~25, 80~100 points; 15~20, 60~80 points; ≤15%, 0 points

Continual Table 1

First-class index	Weights	Second-class index	Third-class index	Weights	Evaluation criteria
Innovation transformation capability	0.1421	Technological achievements Transformation	Technological development capability	0.0278	Number of technical development contracts/total number of contracts ≥60%, 100 points; 40%~60%, 80~100 points; 20%~40%, 60~80 points; ≤20%, 0 points
			Technical service capability	0.0153	Number of technical service contracts/total number of contracts ≥30%, 100 points; 20%~30%, 80~100 points; 10%~20%, 60~80 points; ≤10%, 0 points
			Technical sales capability	0.0169	Number of technical sales contracts/total number of contracts ≥30%, 100 points; 20%~30%, 80~100 points; 10%~20%, 60~80 points; ≤10%, 0 points
Innovation management capability	0.1237	Enterprise system	Innovation environment	0.0392	Excellent enterprise innovation environment, forming a good enterprise culture, 100 points; enterprise innovation environment is good, there is an enterprise culture, 80 points; enterprise innovation environment is poor, enterprise culture, 60 points
			Enterprise innovation incentive system	0.0224	The enterprise innovation incentive system is perfect, the design is scientific and reasonable, 100 points; the enterprise innovation incentive system is relatively complete, the staff turnover is stable, 80 points; the enterprise has established an innovation incentive system, 60 points
		Management level	Systematic management of intellectual property	0.0184	The enterprise has specialized intellectual property management institutions or personnel, and the implementation is good, 100 points; the company has a special intellectual property management personnel, has a certain role in promoting, 80 points; companies have intellectual property management personnel, 60 points
			The efficiency of enterprise management system	0.0122	The enterprise has a complete management information system, with a rational design and efficient operation, 100 points; the enterprise has a management information system, which has a certain promotion effect, 80 points; the enterprise has no information management system, 60 points
		Brand or product strength	Enterprise brand or product level and quantity	0.0315	The enterprise contains one national or two provincial- and ministerial-level brand or product, 100 points; one provincial- and ministerial-level brand or product, 80 points; one municipal-level brand or product, 60 points
Innovation output capacity	0.373	Innovative technology level	Inventions, proprietary technology and patents per person	0.0774	Number of patents per person = 0.1, 60 points; for every additional 0.01 plus 10 points, each point is deducted by 0.01 for 10 points, and the total score is no more than 100 points
			Advancement of product technology	0.0636	Leading international level, 100 points; Internationally advanced level, 90 points; Domestic or industry leading level, 80 points; Domestic or industry advanced level, 70 points; Provincial leading level, 60 points; Provincial advanced level, 50 points

First-class index	Weights	Second-class index	Third-class index	Weights	Evaluation criteria
Innovation output capacity	0.373	Intellectual property creation	Enterprise authorized patent ratio	0.0589	The number of patents authorized by the enterprise accounts for the number of patent applications ≥80%, 100 points; 70%~80%, 80~100 points; 60%~70%, 60~80 points; ≤60%, 0 points
			Enterprise invention patent ratio	0.0714	The proportion of enterprise invention patents to total authorized patents is ≥90%, 100 points; 80%~90%, 80~100 points; 70%~80%, 60~80 points; ≤70%, 0 point
		intellectual property application	Enterprise implemented invention patent ratio	0.0523	The percentage of implemented invention patents as total invention patents = 100%, 100 points; 90%~100%, 80~100 points; 80%~90%, 60~80 points; ≤80%, 0 points
			Level and number of authorized patents	0.0494	1 or more class I intellectual property, 100 points; 4 or more class II intellectual property, 80 points; 3 class II intellectual property, 70 points; 1 or 2 class II intellectual property rights, 60 points [1]

Note: 1. The intellectual property rights are evaluated by classification, among which: invention patents, new plant varieties, national crop varieties, national new drugs, national grade one protected species, and integrated circuit layout design exclusive rights are evaluated according to Type I; utility model patents, design patents and software copyrights are evaluated according to category II

4 Innovation Diagnosis Process for ST SMEs

4.1 The Stage of Comprehensive Understanding

This phase includes data collection, in-depth interviews, and questionnaire surveys. The beginning of enterprise's innovation diagnosis, mainly through the Internet, or other organizations to review the company's information, makes a comprehensive understanding of the company. Among them, data collection includes industry data collection, regional data collection, product development status collection, and internal enterprise data review (current organization chart, existing job setup, business process system, financial statistics report, etc.). Then conduct in-depth interviews with high-level and basic-level employees of the company, design scientific and reasonable questionnaires that suit the actual situation of the company's customers according to the customer's needs and conduct questionnaire surveys to understand the management status of the company from multiple perspectives.

4.2 The Stage of Evaluation and Analysis

This stage includes status presentation, analysis issues, and benchmarking. Through the integration of collected data and feedback from interviews and questionnaires, the current status quo of enterprises is analyzed by the evaluation index system of innovation ability of ST SMEs, and the existing problems of enterprises in terms of innovation are expounded.

4.3 The Stage of Suggested and Countermeasures

Through the first two phases of work, a preliminary diagnosis of the enterprise was conducted. After innovation capability evaluation index system for ST SMEs was confirmed, it was calculated that the enterprise was at the level of innovation capability, and specific problems were analyzed from the criteria level indicators. Relevant countermeasures are proposed according to these issues, so as to solve problems in a targeted manner.

5 Measures to Improve Innovation Ability of ST SMEs

Through the analysis and evaluation of the innovation ability of ST SMEs, this paper puts forward the following countermeasures to enhance the innovation ability of ST SMEs.

5.1 Guide Enterprises to Increase R&D Investment

R&D activities are the core of innovation in ST SMEs. Compared with Japan, Sweden, Germany, and other developed countries, ST SMEs in China generally have problems such as lack of R&D institutions, shortage of R&D personnel and R&D funds. This directly weakens the company's ability to innovate. Therefore, Chinese business operators should pay full attention to the important role of innovation in the economic growth of enterprises, and increase investment in R&D equipment, R&D personnel, and R&D funds.

5.2 Accelerate the Establishment of a Sound Mechanism

At present, the management capabilities of China's ST SMEs are still relatively weak, and the organizational structure is still not perfect. Therefore, enterprises should speed up the establishment and improvement of the independent innovation incentive mechanism, risk prevention mechanism and supervision mechanism, establish a flexible organizational structure suitable for their development. At the same time, ST SME operators should also learn from the experience of foreign SMEs, establish a modern enterprise system with clear property rights and clear responsibilities, and attract investment funds from venture capital institutions to solve the problem of poor financing channels.

5.3 Create a Good Policy Environment

Government departments should create a favorable policy environment for Chinese ST SMEs, improve protection policies such as tax incentives and government procurement, increase support for technology incubators, advocate and encourage cooperation between industry, universities and research institutes, provide corresponding support for ST SMEs. At the same time, the government should also take effective measures to promote the development and improvement of the second board market, making it a capital market with sufficient depth and breadth to overcome innovative obstacles such as the shortage of funds and financing difficulties for China's ST SMEs.

6 Conclusion

The importance of innovation in the survival and development of SMEs is unquestionable, so innovative diagnosis of SMEs is crucial. This paper takes enterprise's innovation diagnosis as the breakthrough point and constructs the innovation capability evaluation index system of ST SMEs from five aspects: innovation input ability, collaborative innovation ability, innovation transformation ability, innovation management ability and innovation output ability, and finally puts forward the countermeasures and suggestions for improving the innovation ability of ST SMEs. This article mainly constructs a kind of innovation capability evaluation index system of ST SMEs, enriching the theoretical and applied research on the evaluation of innovation ability of ST SMEs.

Acknowledgement

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Research on Constitution, Measurement and Evolution of University Innovation Field

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Abstract: Innovation is the soul and motive force of university growth; it also is the historical mission of university. So innovation theory research is the major issue related to its survival and development. There is an important transition from the analytical paradigm to and field paradigm in the method of research on university innovation management which adopts a wholly thought on innovation system. The purpose of this paper is to answer what the composition of university innovation field space is, how do we measure it, how does it work and how does it evolve. Firstly, this paper builds the 3-dimensional field space of university innovation; Then this paper comprehensively expounds the measurement of university innovation field by using vector analysis and field theory; In addition, this paper discusses the innovative potential difference, field force, field intensity and innovative energy flowing; Finally, this paper studies its operation and evolution. It come to a conclusion that the innovative energy flows from the high potential energy node to the low potential energy node under the action of innovation field forces and innovation field shows self-strengthen process of path dependence and cumulative causation. the innovative points of the paper are that based on the university innovation field space with subject system dimensions, object system dimension, environmental system dimension has been constituted by defining innovative energy and innovative energy node, the innovation field operative mechanism and the evolution laws have been revealed and the new ideas and method have been provided for university innovation management.

Key words: University innovation field; Innovative energy flowing; Space constitution; Measurement; Operation system; Dynamic evolution

1 Introduction

Innovation is the soul and the power of university growth. Since American economist Schumpeter came up with "innovation theory" in his works "the theory of economic development" in 1912, it has been becoming the focus that university pays attention to. There is an important transition from analytical paradigm to field paradigm in the method of research on university innovation and management which adopts a wholly thought on innovation system. In recent years, the field theory research has become the hot issue in the study of management and innovation and have made some valuable academic achievement. As one of the innovative achievement, the knowledge with the accumulation, continuity, diffusion and non-exclusive usage shows it has the properties of flowing in essence. Its mobility has made innovative achievements get inheritance, transmission, sharing, social applications and create value for the whole society. The new classical economics think that the innovative achievements knowledge is public goods. so it may be for dissemination and transfer without cost and themselves does not affect the transfer process, the discussion about Knowledge field begins with the fields of philosophy. Miehael Polany at first put forward the concept "the general field" from the angle of the philosophical cognition, Hildrun Kretschmer pointed out: .Near the end of the twentieth Century a series of holism nature theory had been established among which some theory also implied the concept of field Pribram KH thought "as long as there is the far field effect to be illustrated, there is the concept of field to be used "Ikujiro Nonaka proposed the knowledge creation process (SECI) model and the corresponding the creating field, the dialogue field, the system field and the practice field. Chinese scholars Lixi Min, ZhangLi and Liuxi song have researched the concept, establishment, measurement and operation of knowledge field. Based on these studies this paper will build three-dimensional innovation field space of university and research innovative energy flowing within the field space in order to provide some beneficial ideas and method for university innovation activities.

2 Constitution of University Innovation Field Space

Innovative energy is an intelligentized spiritual energy released by innovation subject in innovation activities.it is embedded in innovation subject which in the levels can be divided into individual, team,

organization until the whole university. No matter what level it is, the subject embedded by innovative energy is called node. Every node both can receive innovative energy and can send innovative energy with the double properties. the node sending innovative energy can be known as the innovation source and the node receiving innovative energy can be seen as innovation recipient. The interaction among lots of innovation nodes in the space in university (including the innovation source, innovation recipient, transmission channels) has formed innovation field of university. Innovative energy in the field flows according to certain rules. The innovation potential energy of each innovation node is constantly changing. Along with the change of the potential energy the nodes are ceaselessly moving. it is through innovative energy flow in the field that complete innovative diffusion and realize innovation to jointly promote the enhancement of innovative stock and innovative flow. University will become more and more strong in the spiral growing of innovation.

Subject system dimension, objective system dimension and environmental system dimension have constituted a 3- dimension space of university innovation field. The interaction and innovative energy flowing among nodes within three-dimensional space have formed the operation system of innovation field. Innovation field is an active field with the source. Each node has the function of innovation source. In innovation field, the closer the distance away from the innovation source, the smaller the resistance of the innovative energy flowing. The node location in the innovation field has described the difficulty easy degree, efficiency and level of innovative energy flowing.

The subject system dimensions of university innovation space: Innovation field subject system refers to the nodes and their attributes. The nodes are innovating subject and the source of innovative energy flowing and form the subject of the innovation field. Innovation field subject system factors include: node cultural characteristics, values, ways of thinking, emotional competence, character trait, trust relations. Its attributes affect innovative energy flow level. The closer the relationship between nodes, the higher the strength of the relationship, the higher the levels of innovative energy flowing. Conversely, the bigger the difference between nodes, the worse the innovation flowing effect. For example, the thinking mode of the two nodes exists a big difference, the innovative recipient cannot understand the expression of innovation source. if the two nodes are more trust, the innovation source will be more active to send innovative energy and the innovation recipient will be more cooperation so the innovative energy transfer effect will be better. the bigger the difference between Node and innovation source node, the farther the distance between its location in space and innovation source node.

Objective system dimensions of university innovation field space: innovation field objective system refers to the objects of the innovation and their attributes. innovation objects include intellectual innovation, technology innovation, management innovation, system innovation, culture innovation. Innovation attributes include innovation tacit (i.e., explicit and implicit), Systematicity, complexity, path dependency, innovation fields, innovation levels and other aspects. Innovation attributes affects innovative energy flowing difficulty level. Innovative energy embedded in all sorts of carrier containing nodes inside, Therefore the innovation attribute is also reflected in the nodes. The higher and the more complicated the innovative recessive degree of node, the bigger the difference of the innovation field and level between two nodes, the more difficult the innovative energy flowing will be, the farther the distance between the corresponding nodes. On the contrary the closer the location of the nodes in the innovation field.

The environment system dimensions of university innovation field space: innovation field environment system refers to the environment factors of innovation energy flowing among innovation subjects which can be divided into the soft environment and hard environment, including development level, physical geographical, organization boundary, information infrastructure, school ethos, system characteristics, Innovation atmosphere and mechanism, technical level, communication standard and so on. These aspects constitute the development distance, organization distance, system distance, physical distance, communication distance and the technology gap distance of the nodes and form the present location gap of the nodes in the field space. The environmental factors influence the efficiency of innovative energy flowing. The smaller and the closer the distance among the nodes, the more conducive the environment to innovative energy flow, the smaller the resistance of innovative energy flowing, the higher the efficiency of the innovative energy flowing, the spatial location of the nodes is closer each other. And vice versa.

University innovation field is shown in figure 1. Its space vector function is as follows:
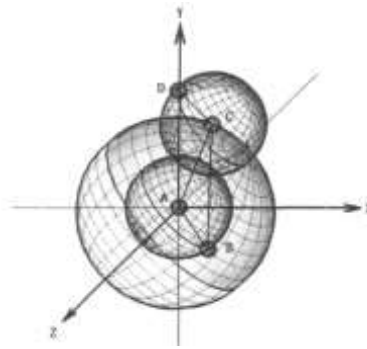
Figure 1   University Innovation Field Space

$$\vec{k} = k_x(x, y, z)\vec{i} + k_y(x, y, x)\vec{j} + k_z(x, y, z)\vec{k} \tag{1}$$

In which: $\vec{k}$ is the innovation field space vector; k_x、 k_y、 k_z respectively are the projection coordinate of $\vec{k}$ in the x axis(innovation field subject system dimension) ,in the y axis (innovation field object system dimension) and in the z axis (innovation field environment system dimension); $\vec{i}$、 $\vec{j}$、 $\vec{k}$ respectively are the unit vector of the X-axis, Y-axis and Z-axis.

3 Measurement of University Innovation Field

The measurement is to measure the scale of the attribute and feature of innovation field space. From the angle of the vector field, the continuous motion of the node with the innovation potential has made innovation field to be spin field with a source. The innovation field may be depicted by using four parameters such as the flux, the divergence, the ring volume and the curl. From the angle of the scalar field, it can be described by using the characteristic parameters such as the equaled potential surface, the directional derivative and gradient and so on.

3.1 The flux and the divergence of innovation field

3.1.1 Flux

The total flow of creative energy that goes through the curved surface S with the direction along the positive direction at unit time is called as flux. If the total innovation field is composed of two or more innovative field superposition, then the flux of the total innovation field that goes through some curved surface is equal to the algebraic sum of the fluxes that each innovation field passes the curved surface. When the close curved surface S is a particular area, one can consider the inflow and outflow of innovative energy within the area. The positive side means from the inside to outside. When the innovative energy from the positive direction passes (outflow)the area, then the flow is positive; When the innovative energy from the negative direction passes (inflow)the area, the flow is negative. Flux is algebra summation of the positive flow which goes through the area from the positive direction and the negative flow which goes through the area from the negative direction. When $\varphi > 0$,it shows that outflows is greater than inflows, this time the area contains the source of sending innovative energy when $\varphi < 0$, it shows that inflows is greater than outflows, this time the area contains the hole of absorbing innovative energy. It is shown in figure 2.
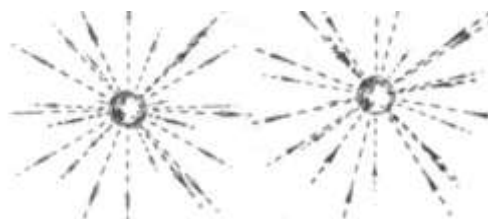
Figure 2   Innovation Source and Innovation Hole

The area may contain innovation source and innovation hole. As long as the outflow of the innovative energy is greater than the inflows of innovative energy, it can be said that the area contains

the positive innovation source: Conversely, it can be said that the area contains negative innovation source .If $\varphi = 0$, it is not sure whether area contains innovative energy flow or not. It is possible for the innovative energy that absorbs to just offset the innovative energy that sends each other. Flux can describe the regional active degree of innovative energy flow, its concentration ratio that innovative energy tends to focus (it flows from the circumference to the region) and divergent degree that the innovative energy tends to divergence (it flows from the region to all around).The calculation formula of flux φ is as follows:

$$\varphi = \oiint_s \vec{k}d\vec{s} = \iiint_s (\frac{\partial k_x}{\partial x}, \frac{\partial k_y}{\partial y}, \frac{\partial k_z}{\partial z})dxdydz$$

$$\varphi^* = \oiint_s \vec{k}d\vec{s} = \sum_{i=1}^m \oiint_s \vec{k}_i \cdot d\vec{s} = \sum_{i=1}^m \varphi_i$$

(2)

3.1.2 Divergence

According to the positive and negative of the flux that goes through the regional S, one can tell whether there are the positive surface or negative source within the curved surface. Divergence has been introduced to specifically instruct the distribution and the strength of divergent degree of the nodes in the region. That is the net flows which innovative energy flows out of the nodes at unit time. In the neighborhood of node M of the innovation field take any closed curved surface △s (including node M), and take △V standing for the volume △Ω that the closed curved surface contains. If when △Ω has been shrunk to the dot M at any way, the limitation of △φ / △V exists, then it is called the divergence of the innovation field at the node M.The divergence of each node in innovation field constitutes a number field .It is called divergence field. Divergence expresses the changing rate of the flux of some node in the field to the volume. That is the innovative energy flow of the closed curved surface of going through surrounded unit volume which comes from the node It measures the strength of the innovation source and the density of the innovative energy flow. When div>0, it shows that the node is the innovation source; When div<0, it shows the node is innovation hole. The size of the |div| expresses the strength of which the node sends innovative energy or absorbs the innovative energy. Node has double properties of both innovation source and innovation hole which either sends innovative energy or absorbs innovative energy. The formula of divergence div is as follows:

$$div\vec{k} = \lim_{\Delta\Omega \to m} \frac{\Delta\varphi}{\Delta V}$$

$$= \lim_{\Delta\Omega \to m} \frac{\oiint_{\Delta s} \vec{k} \cdot \vec{ds}}{\Delta V} = \frac{\partial k_x}{\partial x} + \frac{\partial k_y}{\partial y} + \frac{\partial k_z}{\partial z}$$

(3)

3.2 Circular rector and rotor of the innovation field

3.2.1 Circular Rector

From the angle of the relationship among the nodes the circular rector is introduced to consider the innovation field with node of mutual connection and interaction, innovative energy flowing circularly among them constitutes a closed loop L. The total innovative energy flow of going through the loop according to the direction that it flows is the circular rector (circulation) of innovation circulation. It measures the degree and level of innovation communication among the nodes. Its amount has something to do with the loop of the node that innovation stream passes and the size of innovation flow within the loop. Its calculation formula is as follows:

$$\Gamma = \oint_l \vec{k} \cdot d\vec{l} = \oint_l k_x dx + k_y dy + k_z dz$$

(4)

3.2.2 Rotor

Divergence has measured the density and intensity of node innovation flow. And judge the node is highly innovative or lowly innovative. But it has not measured the biggest innovative flow and the direction of the innovation flow. So the concept of rotor is introduced. In node M of the innovation field, the vector whose direction is the direction of the biggest innovative energy flow at node M, whose modulus equaling to the maximum innovation at is called the rotor of node M in the innovation field. The projection of rotor at the direction of any vector is equal to the circular rector rotor surface density at the direction. Innovation field rotor has measured the biggest innovative flow of every node in the field and its direction. It has instructed the relationship between each node and innovative energy flow.

Calculation formula of rotor rot is as follows:

$$rot\vec{k} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \dfrac{\partial}{\partial x} & \dfrac{\partial}{\partial y} & \dfrac{\partial}{\partial z} \\ k_x & k_y & k_z \end{vmatrix} \tag{5}$$

$$= (k_{zy} - k_{yz})\vec{i} + (k_{xz} - k_{zx})\vec{j} + (k_{yx} - k_{xy})\vec{k}$$

3.3 Directional derivative and gradient of innovation field

Consider the innovation field for the scalar field, we can have described it by using equipotential surface, directional derivative and gradient.

3.3.1 Equipotential Surface

In the innovation field, when node is closer to the innovation source, the flow of innovative energy is more easily; when it is far away the innovation source, the flow of innovative energy is difficult. In order to describe the difficult or easy degree of innovative energy flow in the innovation field we introduce the concept of equipotential surface. It is a curved surface composed of the dots put together that the difficult or easy degree of innovative energy flow is equal. In two-dimensional innovation field, it is a series of concentric circular surface with the source of innovation as the center. In the three-dimensional field, it is a series of concentric spheres with the source of innovation as the center.

3.3.2 Directional Derivative

Directional derivative describes the change of innovation flow along arbitrary direction. in the neighborhood of each node within innovation field which embodies the flowing velocity of innovative energy in any direction. When directional derivative is greater than zero, it expresses that innovation flow along the direction of the L at the node is increased; whereas it is reduced. Through the directional derivative the direction of the fastest growth, the fastest decline and the zero growth of innovative energy flow can be found. Directional derivative is the changing rate of innovative energy flow along the direction of the L at node M0 to the distance. If M is a moving point along the direction of the L at nearby fixed point M0; ρ is the distance between M and M0; then the formula of directional derivative for calculation is as follows:

$$\frac{\partial k}{\partial l_{m_o}} = \lim_{m \to m_0} \frac{k(m) - k(m_0)}{\rho} \tag{6}$$

$$= \frac{\partial k}{\partial x}\cos\alpha + \frac{\partial k}{\partial y}\cos\beta + \frac{\partial k}{\partial z}\cos\gamma$$

3.3.3 Gradient

Directional derivative can describe the changing rate of innovative flow along particular direction at some node of innovation field. Gradient describe along which direction the changing rate of innovative flow is the biggest rate and how much is the changing rate. The gradient at the node is a vector, whose direction is the direction of maximum changing rate of innovative flow, whose modulus equals to the value. of the maximum changing rate of innovative flow at the node. Gradient is perpendicular to the equipotential surface that goes through the node, always pointing to the direction with the increase of innovative energy flow. It measures the change rate of innovation flow and the flowing speed of innovative energy. Its direction is the fastest one of innovation flowing and its size indirectly depicts the flowing speed of innovative energy. From the angle of change and speed of innovation flow in different direction of node individual direction derivative and gradient consider innovation field. The calculating formula of gradient is as follows:

$$grad\,k = \frac{\partial k}{\partial x}\vec{i} + \frac{\partial k}{\partial y}\vec{j} + \frac{\partial k}{\partial z}\vec{k} \tag{7}$$

4 Operation System of University Innovation Field

The entity element of innovation field is a node. Each node is a field source. All the nodes connected with each other and their common function constitute a field space, in which Innovative energy flows and node is impacted by the innovation field force. With the flow of the innovative energy,

the change of environment and the change of position of the nodes in the field; with the interaction and mutual influence among nodes, the innovative potential energy has been upgraded and innovation stock is increasing as a result.

4.1 Innovation potential difference

The potential difference of innovation node exists. As university innovation subject, as for as the individual is concerned, because of the difference of individual talent, qualification, quality, experience, education background, effort degree and specialization division and so on, their innovation ability are different as a result, which reflect the difference of the individual innovative potential energy. As university of the innovation subject, because of the difference of its member ability level, degree of cooperation tacit, university culture, convention, member's ability structure and degree of integrated innovation caused by complementary advantages, these different factors resulting in the resultant force difference formed by the interactions among members under environment background, which embodies the difference of the university innovative potential energy. The distribution of innovation in time and space is not balance. so the innovation potential energy between the innovative nodes is different. There are relative high potential energy nodes and the low potential energy nodes in the innovation field. There exists the potential energy difference   between nodes. The potential difference between innovation nodes brings about innovative energy flow. Innovative energy flows from high potential nodes to low potential energy nodes.

4.2 Force and intensity of university innovation field

Any one node is impacted by the force of innovation field. It comes from the interactions among the nodes in the innovation field. The Coulomb's law is the special form of gravitation in the electrostatic field. It can be used in the innovation field. In which the size of interaction force between two nodes is proportional to the product of the capacity Q (potential energy) of innovation source energy and the innovation potential difference Q-q (potential difference) of two nodes; and inversely proportional to the square of the distance r between two nodes; the direction of interaction force is along connection of the two nodes. The higher the innovative energy of the innovation source, the greater the driving force of the innovative flow. Another factor influencing on the size of the force is the innovative potential gap between the innovation source and the innovation energy receiver. If the innovative potential energy gap between two nodes is too little or close to the same, then that would not have occurred the innovative energy flow. The bigger the gap, the higher the innovative flowing efficiency, the bigger the work done the field force. But it is necessary to point out that the innovative potential energy gap between nodes cannot be too big, if it exceeds a certain limit, because of the constrains of the receiver's understanding and accepting ability which may lead to the fact that the flow of innovative energy is invalid. So in the innovation field, innovative potential gap only in a certain range can effective innovative energy flow be maintained. K expresses the critical point of the innovative potential energy gap between the innovation source and innovation energy recipient which can guarantee the effective innovation energy flow. Node distance reflects the difficulty easy degree of the innovative flowing, which reflects comprehensively the various factors influencing on the innovative energy flow. the smaller the distance, the smaller the resistance of all aspects, the stronger the power: instead, the greater the distance, the weaker the power. K is a flowing coefficient, influenced by the innovative flowing will, the innovative consciousness, the sending ability of the innovation source; the receiving will, the innovative absorptive capacity of the innovative energy recipient and the flowing channels and so on. The intensity can be calculated through the force of the innovation field. The formulas of force F and intensity E of innovation field is as follows:

$$\vec{F} = k \frac{Q(Q-q)}{4\pi r^3}\vec{r}, 0 \le (Q-q) \le k$$

$$\vec{E} = \frac{\vec{F}}{Q-q} = k \frac{Q}{4\pi r^3}\vec{r}$$

(8)

Field superposition principle: when there are more than two innovation source nodes in the field space, the total force on a receiver is equal to the vector summation of the force the other innovation source nodes exist alone and exert on the node. The field intensity of the N nodes at some point of the innovation field space is equal to the vector summation of the field intensity of the point with each node existing alone. The superposed field intensity formula is as follows:

$$\vec{E}^* = \sum_{i=1}^{n} \vec{E}_i = \sum_{i=1}^{n} k \frac{Q_i}{4\pi r^3}\vec{r}$$

(9)

4.3 Innovative energy flowing in innovation field

Innovation field force makes innovative energy flow from the higher potential node to the lower potential node. Node not only receives the innovative energy coming from different nodes in different direction but also sends innovative energy for the different nodes in different direction. With the constantly absorption of innovative energy from other innovation source node and with the realization of innovation in the circulation, feedback and synergistic of innovation energy, which makes the innovation potential energy of the nodes constantly changing and growth and which makes field intensity of the nodes continuously increase as a result the innovation field effect is more and more strong. Due to the difference of innovative contents, categories, object and direction and so on, the innovation potential energy exists different levels. The innovation potential energy of two nodes on the different levels exists difference between high and low. The innovative energy of different levels flows between two nodes. So between the same two nodes the role of innovation source and innovation hole is often interchangeable Or a node acts as two roles at the same time .when there exists multiple nodes, innovative energy of innovation source is always the first inflow to the equipotential surface node being nearest away from the node(gradient minimum).the closer the equipotential surface including the node away from the innovation source, the higher the innovative energy flowing efficiency, the better the result. Similarly, the node of receiving innovation energy is also firstly absorbing innovative energy from the node of nearest equipotential surface away from it. After the node has absorbed the innovative energy from innovation source node, the node will also become another source node for the innovation and has sent this innovative energy for other nodes. As shown in figure l, relative to the node C, node B being on the closer equipotential surface away from node A, so node B the first get innovative energy from A node. After mastering this innovative energy, B node begin to send the energy to C node, while the innovation energy flows from A and B node to C node simultaneously**.**

4.4 Field hole

A field hole is similar to the social network structure hole. In the field innovation, there is not always direct innovative energy flowing between any two nodes. When the distance between the nodes is too far, the resistance is too large, the force of innovation field is close to zero. Thus there is not direct contact between two nodes, the innovative energy flowing is invalid. But innovative energy of innovation source through a bridge indirect can be transmitted to innovative energy recipient, this bridge location is known as a field hole, which has connected two nodes with no direct link. As shown in figure 1, the distance between A node and node D is too far, they do not happen direct connection with no innovative energy flowing, but node C has contact with node A and D, it is in a location of the bridge. The nodes C obtained innovative energy at node A and then transfer to node D. The node occupying a field hole has information advantages and control advantage, simultaneously occupying nodes can get the non-repetitive information from multiple aspects with asymmetric information advantage.

5 Movement and Evolution of the Innovation Field

5.1 Evolution of node potential energy and field intensity

With the mutual connection and interaction between innovation subject, the flowing and collision of innovative energy between them form the space with field effect. In the process of innovation flow, the nodes get innovative energy and realization of innovation unceasingly so that its innovative potential energy upgrades, the intensity of innovation field increases and field effect enlarges. The enhancement of innovative potential energy for node also make the gap of the innovative potential energy between nodes become smaller, the force of field decreases. When the innovative potential gap between the nodes is close to equality (each node has mastered needed innovation energy), innovative energy will no longer instruction type flow, more is through the collaborative and the independent to realize innovation so as to enhance the innovative potential energy of the nodes and produce the new potential gap. At the higher level the flowing of innovation energy between nodes has been realized as a result. At the same time, the recipient of innovative energy has been transformed into innovation source node which can sent out innovative energy. As a matter of fact, there are constant nodes which exits or joins the innovation field. The entry of new innovation source node leads to enhancement of the field intensity; the exit of innovation source node and Innovation transfer node results in imperfect of the field intensity, which has been always changing.

5.2 Evolution of node location and innovation field measurement

The mutual influence and synergy between the nodes makes its behavior, psychology, thinking patterns and values change constantly; the close to each other and mutual understanding between nodes

shorter their cultural differences, thinking difference, systematic distance, psychological distance and so on. In the innovative energy flowing of the long time, the communication standard, metaphor and common language between the nodes have been formed in order to improve the innovative energy flowing efficiency, reduce innovation energy flowing obstacles and make the location of two nodes in the three dimensional field space be near constantly. That node is close to a node in every respect at the same time may make the difference between the nodes and another node widen, make the distance between the nodes pull away, the force that each node has exerted on the node has formed a joint effort, the node in the role of the force constantly changing his location. Within Innovation field among nodes through the exchange, communication, mutual influence, resonance, synergistic effect makes the relative position of nodes change. the absolute location of nodes in the innovation field. Also be changed constantly. Its geographic location, development level, organization, innovative potential energy is ceaselessly changing. This makes node move to the closer equipotential surface away from the innovation source or makes it move to the further equipotential surface away from the innovation source. These make nodes motion in the innovation field, make its location constantly change, make inside innovation field continuously for dynamic change. Innovation field constantly goes through field intensity change and node motion dynamic evolution. The Measurement parameters of innovation field such as flux, circular rector, rotor, directional derivative, gradient, divergence and so on has also been changed.

6 Conclusion

Innovation is the soul and motive force of university growth. innovative energy is an intelligent spirit energy released by innovation subjects in the innovative activities. Innovative energy is embedded within the innovation subject, who embedded by the innovative energy is called nodes. The nodes can both release the innovative energy and absorb innovative energy. The mutual connection, cooperation, coordination between two nodes constitutes the innovative energy flowing chain. The multiple nodes and multiple chain form innovative energy flowing network. With network continuous extension and expansion, with node constant collection and concentration, this makes innovative energy flow depth and breadth expand constantly, the flow and stock of innovation increase and the field effect form. The university innovation field will be constituted as a result. The situation structure of innovative energy flowing among the nodes experiences the movement of the chain structure→ network structure→ spatial structure, along with the evolution of innovation chain→ innovation network→ innovation field. The innovative energy flow effect finally changes from the mode of network to the mode of the field. On the bases of constituting 3 d innovation field space with subject system dimension, object system and environment system dimensions this paper has conducted a comprehensive description on university innovation field space by utilizing Flux and Divergence, Circular Rector and Rotor, Directional derivative and Gradient and field Force and field Intensity. Moreover, it has probed into the operation mechanism of university innovation field space and revealed the evolutionary law of node potential energy and field intensity, node location and innovation field measurement of university innovation field space. The research on innovation field will provide a new method for the innovation management of university and help innovative university from behavior and psychology guide and promote the active and effective innovative energy flowing among the nodes and the sharing and the realization of innovation. As for the self-organization evolvement rules of university innovation field space will be studied further.

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Study on the Clustering Development of Provincial Cultural Creative Industry of Hubei Province

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Abstract: The paper introduces the spatial autocorrelation analysis method to the quantitative analysis on clustering development of provincial cultural creative industry and make Hubei province as case analysis. With the typical indicators of industrial development situation and calculation of autocorrelation, it analyzes the aggregation degree of the attribute values in spatial unit and adopt different development strategies according to their local conditions which offer useful insights for ultimately achieving the overall coordinated and rapid regional development.
Key words: Clustering development; Cultural creative industry; Spatial autocorrelation; Hubei province

1 Introduction

Spatial autocorrelation analysis initially started in biometric research. In 1950s, Moran put the one-dimensional space concept to the two-dimensional space, based on the biological phenomena, and thus defined the Moran index; Li Yanbo (Li Yanbo, 2011) proposed that the space auto-correlation method is spatial statistical methods reflects certain geographical phenomena or the dependence of an attribute value within the region and neighboring regional units on the property of the same phenomenon.

In order to study the correlation of a particular variable in different spatial positions, we use the space autocorrelation method to analyze the aggregation degree of the attribute values in spatial units. Regional autocorrelation analysis method can be used to analyze the geographical distribution within the regional industrial agglomeration, to estimate the industry clustering and diffusion function of regional units. Therefore, the paper makes functional re-partition based on the result of quantitative analysis.

2 The Principle of Research Methods

2.1 The basic formula

Moran index and the G-coefficient method are the general methods to estimate regional autocorrelation. The author chose Moran index to have a study on the autocorrelation degree within provincial industry clusters. Anselin (Anselin, 1995) Suggested the Moran index formula is

$$Ii = \frac{((Xi - \overline{X})}{S^2} \sum_j Wij(Xj - \overline{X})$$

and Xi is the attribution value of special unit i,

$$\overline{X} = \frac{1}{n} \sum_{i-1}^{n} Xi \, , S^2 = \frac{\sum_{j=1, j \neq i}^{n} Wij(Xj - \overline{X})}{n-1} \, ,$$

Wij is spatial weight matrix, means whether the mutual influence relationship exists between unit i and unit j, which judged by to the adjacent standard.

2.2 The connotation of calculation results

'Related' refers to the growth and decline relationship of two or more variables simultaneously, 'spatial auto-correlation' refers to the correlation of the same variable in different locations. If variable value in a position is high, the variable value in the vicinity is also high, is the positive spatial autocorrelation between two locations; On the contrary, a negative spatial autocorrelation. According to different values of Ii, local spatial auto-correlation is divided into four types as shown in table 1.

Table 1   Calculation Results of Values of Ii

Type	Ii Value	Connotation	Spatial Meaning
HH	Ii>0	Positive spatial autocorrelation	Attribution value in area i is higher than regional average level
LL	Ii>0	Positive spatial autocorrelation	Attribution value in area i is lower than regional average level
HL	Ii>0	Negative spatial autocorrelation	Attribution value in area i is higher than regional average level
LH	Ii>0	Negative spatial autocorrelation	Attribution value in area i is lower than regional average level

3 The Spatial Autocorrelation Estimation of Hubei Provincial Cultural Creative Industrial Clustering

3.1 Case analysis of Hubei province

This paper selects 17 cities in Hubei Province as the research objects, takes the output of cultural creative industrial value as the evaluation index. Firstly, defining spatial weight matrix W based on the adjacency standard. If two cities are adjacent, it is 1 for their relationship; if two cities are separated in the map, it is 0 for their relationship. Secondly, taking 17 cities' total cultural creative industrial output in 2016 as property values, to calculate the difference between each city's industrial output and the provincial average output($\triangle$IO), each city's spatial autocorrelation I_i is also shown in Table 2. Finally, according to the calculations of I_i values and the classification criteria of spatial autocorrelation, to get Moran index scatter diagram which divided into HH, LL, HL, LH spatial development type.

As it shown in Figure 1, only one cities Wuhan City falls into the HH quadrant, covering 5.88% of the total cities; nine cities Huangshi City, Ezhou City, Jingmen City, Jingzhou City, Enshi City, Suizhou, Qianjiang City, Tianmen and forest areas, fall into the LL quadrant with 52.94 percent; Yichang City,Shiyan City, and Yangyangthree cities, covering 17.65% of the total cities, belong to the HL quadrant; Xiaogan, Huanggang City, Xianning City, Xiantao City, four cities in the LH quadrant, covering 23.53% of the total cities. Based on the basic agglomeration and diffusion principles of regional economic growth pole theory and the identification of industrial clusters, Hubei Province can be divided into four categories of clusters in space functional areas as it shows in figure 2.

Table 2 $\triangle$IO and Spatial Autocorrelation I_i of Each City of Hubei

Area	$\triangle$IO	I_i	Area	$\triangle$IO	I_i
Wu Han	6370.413	1.89672316	Huang Gang	-458.609	-0.17263727
Huang Shi	-58.458	0.021457896	Xian Ning	-538.90	-0.241618255
Shi Yan	7.45346	-0.001185416	En Shi	-1170.143	0.138864310
Yi Chang	1546.3435	1.668963489	Sui Zhou	-743.859	0.006172742
Xiang Yang	780.359	-0.019185551	Xian Tao	-827.508	-0.210421127
E'zhou	-438.137	0.114795687	Qian Jiang	-714.627	0.180510478
Jing Men	121.374	0.007898744	Tian Men	-872.783	0.213943259
Xiao Gan	-468.368	-0.055421683	Forest Area	-1157.24	0.048047116
Jing Zhou	-374.212	0.050985124			
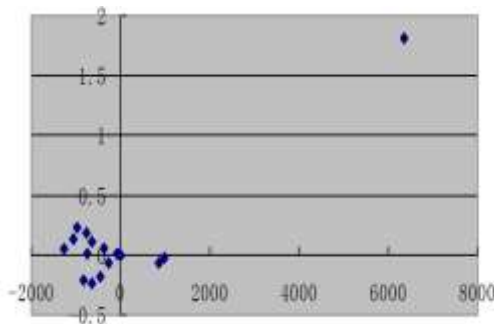
Figure 1   Moran Index Scatter Diagram of Hubei Industrial Clustering
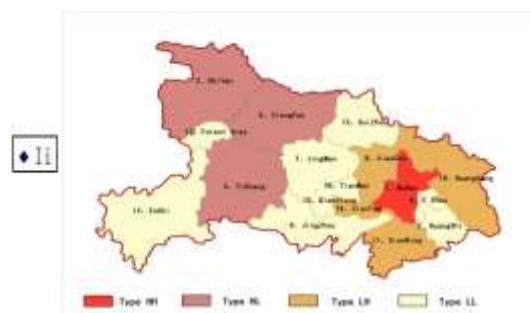
Figure 2   Categories of Industrial Cluster in Space Functional Areas in Hubei

3.2 Conclusion of analysis of Hubei province

3.2.1 HH type

Only Wuhan City belongs to this type, which is the diffusion cluster of province's cultural center. With the outstanding cultural development status and strong radiation effect and significant agglomeration benefits to the surrounding cities, Wuhan gives a positive impact to them. It gathers a lot of capital, labor, information, market and other resources, and external diffusion of resources, promotes the concurrent development of the surrounding regional cultural entities.

3.2.2 HL type

In accordance with the growth pole theory, they should be positioned as the 'gathering center'. They need to continue to attract capital, labor, information and other resources from neighbor regions,

which led to low level of industrial development in surrounding areas. They should be classified as the key development areas, to strengthen the focus fostering and obtain the diffusion benefits.

3.2.3 LL type

We can call them 'poverty zone' because of the slow development pace and the backward development situation. However, the local spatial autocorrelation $I_i > 0$, represents these areas and the surrounding areas are correlative, having great potential for the accumulation and spread effectiveness. Therefore, making them as the guiding development areas.

3.2.4 LH type

These 'low-lying' fringe areas in the industrial clusters are formed because of their poor cultural resources resulting in their slow development. Congenital cultural resource endowments are in unfavorable situation. It is difficult to accept the radiation effect from the surrounding developed areas because they lack the internal driving force. They are classified as the moderate development areas.

4 Positioning and Development Strategies for Cultural Creative Clusters

4.1 Instruction to the priority development area of cultural creative clusters

Wuhan City esteems as the priority development area as a provincial capital. It is the only sub-provincial city in the middle of China. Wuhan's cultural creative industrial output value accounted for 15.3% of the provincial total industrial output. With rich cultural resources and intensive development steps, it is proved to be the important competitiveness area of Hubei Province as the leading role in Hubei cultural industry.

Development direction for Wuhan should realize the industrial structure optimization and upgrading by improving industrial growth model, enhancing the participation level in national and global industrial markets, raising the industrial independent innovation capability. We should focus on exhibition industry, cartoon industry and other high-end creative products, introduce more advantageous industrial environmental management systems, strengthen the protection of industrial resources and the environment, play the exemplary role as the leading of industrial clusters.

4.2 Instruction to the key development areas of cultural creative clusters

Shiyan City, Yichang City, and Xiangyang cities belong to the key development areas. Shiyan located in the adjacent area of Hubei, Henan, Shaanxi, Chongqing four provinces, next to the region's largest automobile manufacturing base. Shiyan is known as the "Car City", so it is adaptable to develop creative industry. Yichang, an important industrial city in Yangtze River Economic Belt; Xiangyang is the western fulcrum in Hubei, ranking second in the provincial tourism output.

Although the basis of them is weak relative to the priority development areas, but they have huge development potential. Synergistic effect and spillover effect make a geometric growth of the regional culture creative industry cluster. The advanced methods are using advanced service concepts and management concepts, undertaking the development shift from the priority development areas to accelerate the industrial development pace in accordance with the protection of industrial resources.

4.3 Instruction to the guiding development areas of cultural creative clusters

Nine cities put together to the guiding development areas which concentrated in the southeast region of Hubei Province, covering 52.94% of whole provincial cities, but the total industrial output accounts for only 20.14% of the provincial industrial output. These areas have less development constraints, better overall regional environment; they are back-up entities of the industrial clusters.

Strategies to the guiding development areas are guiding industrial enterprises and institutions cluster in a specific area under uniform layout; Attracting talent, capital, information and other resources, with the introduction of proper cluster development strategies, undertaking the role of co-operators with the key and priority development areas. With the specialization and collaboration development of core enterprises, it will inevitably lead to the extension and expansion of the industry chain because of the characteristics of consumption and transmissibility of the cultural industry.

4.4 Instruction to the moderate development areas of cultural creative clusters

Xiaogan City, Huanggang City, Xianning City, and Xiantao City are the moderate development areas. They scatter around two poles of Hubei province, with only 13.38% of the total provincial industrial revenue. Due to the poor endowment and historical reasons, their cultural industry is lagged behind. According to the proportionality principles of the industrial layout and efficiency principle of resource allocation, these areas should implement differentiation development strategy on the characteristics of regional resources status We can cultivate some cultural enterprises such as music, culture and art, film, animation and traditional handicraft, which will lay the foundation for the

formation and development of regional cultural creative industry chain.

The development methods for the moderate development areas are: firstly, to improve the poor environment for industrial development in these areas to strengthen the construction of industrial infrastructure, fully optimize the environment for industrial development. Secondly, to learn management experience and technologies from the advanced areas, increase productivity and make efforts to improve the professional development level, and ultimately realize the all-round development.

5 Conclusion

The paper suggests that Hubei industry should gradually form the 'point, pole, belt, circle' low-carbon development of spatial pattern. By optimizing the co-ordination and common development among four development areas, we suggest the different strategies of breakthrough and innovative clustering improvement for each city in Hubei.

Meanwhile, the paper uses the quantitative analysis of spatial autocorrelation to analyze the clustering development of provincial cultural creative industry. Therefore, industrial functional clusters adopt different development strategies according to their local conditions; these optimal strategies dynamically evolve with practice and offer useful insights for ultimately achieving the overall coordinated and rapid regional development, which can be used in other cities or countries.

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Acknowledgement

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Research on the Factors Influencing the Willingness of College Students' Social Entrepreneurship: An Empirical Study Based on Colleges in Wuhan

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Abstract: This paper takes the willingness of college students as the research object, constructs the model of social entrepreneurial willingness and the model of non-social entrepreneurial willingness of college students based on the research literature, and finds out the unique influencing factors of social entrepreneurial willingness through comparison. The data of this paper comes from the questionnaire survey of colleges in Wuhan. Through Logistic regression analysis, it will be found that altruistic values, family entrepreneurship atmosphere, entrepreneurship education in colleges have a significant relationship with the social entrepreneurial willingness of college students. Therefore, this paper believes that the cultivation of altruistic values and entrepreneurship education in colleges can promote college students to participate in social entrepreneurship.
Key words: College students; Public interest entrepreneurial willingness; Altruistic values; Entrepreneurship education in colleges

1 Introduction

The Party's 19th CPC National Congress report encourages college graduates to pursue multi-channel employment and entrepreneurship. University students' innovative undertaking can cultivate the innovation consciousness and ability, and alleviate their employment pressure. At the present stage, university students innovative undertaking is mainly divided into social entrepreneurship and non-social entrepreneurship. Colleges encourage and support the college students to participate in entrepreneurial activities, but there is no clear distinction between social entrepreneurship and non-social entrepreneurship, and these two types of entrepreneurship are different. Social entrepreneurship refers to the entrepreneurial activities in which individuals or social organizations pursue innovation, efficiency and social interests under the stimulation of a sense of social mission (G Dees., 2001). Social entrepreneurship pursues the social maximum of profit and the necessary economic benefit, solves the social pain point question, and takes the realization of social benefit degree as the measure standard; While non-social entrepreneurship is oriented to maximize profits, pays attention to the realization of self-needs and self-value, and measures the success or failure of the enterprise by the number of profits. It can be seen that these two kinds of entrepreneurship have the difference in essence. Therefore, it is necessary to study the behavior of social entrepreneurship of college students, which factors make them more willing to choose the social entrepreneurship. This paper attempts to explore the factors that affect the willingness of college students to start the social entrepreneurship through the empirical research, and provides theoretical guidance for colleges to effectively promote college students to participate in the social entrepreneurship.

2 Literature Review and Research Assumptions

2.1 Literature review

College students' social entrepreneurial willingness is the motivation and understanding of individual plan or decision to put into action, and it dominates the attitude and behavior intensity of entrepreneurial practice activities (Conner, 1998; Fan Jinghao, 2018). Gender, entrepreneurship education, family environment, financial support and other factors affect college students' willingness to start the social entrepreneurship (Liu Yuexiu, 2013). Social entrepreneurship is oriented by social demand, which innovates the solving ideas and ways, and shows strong characteristics of sociality, innovation and market orientation (Zhang Rui, 2015). At present, college students' social entrepreneurship is in its start stage, there are some problems, such as lack of value cognition, lack of policy and university support, lack of funds and talents, etc. (Lin Aiju, 2016). In view of this, the scholars suggest that we should create a social public welfare culture atmosphere, build the social entrepreneurship incubator, explore the four-party cooperation mode of "school and government, school and society, school and enterprise, school and youth", so as to promote the sustainable development of social entrepreneurship (Wang Yiming, 2007; Mei Yingying, 2016).

2.2 Research assumptions

2.2.1 Impact of values

Values play a significant role in promoting entrepreneurial activity, such as Protestantism, which spawns entrepreneurial spirit and leads to innovation and entrepreneurship (Weber). Similarly, the participation of college students in social entrepreneurship will also be affected by the values (literature). The values of college students' social entrepreneurship mainly include dedication, social responsibility, social risk awareness and other social personality (Hou Qian, 2017). Therefore, this paper argues that the values can be divided into three types: egoism, altruism and public, among which altruistic values have an impact on college students' willingness to set up social entrepreneurship. Based on this, the author puts forward the hypothesis H1 that the students who have more strong altruistic value, the more inclined to choose social entrepreneurship.

2.2.2 Impact of the family

Distinct occupation of parents has different influence on college students' entrepreneurial action tendency, meanwhile, the relationship between family economic status and college students' entrepreneurial intention is "U", that is, the students with the best and the worst family conditions have the strongest entrepreneurial intention (Krueger, 1993; Chu Chunxing, 2016); However, some scholars think that parents' occupation has little influence on their children's entrepreneurial intention, and that family factors have no great influence on college students' entrepreneurship (Brenner, 1991; Ghazali, 1995; Xie Xijin, 2018). Then whether the family factors affect the social entrepreneurial willingness of college students, this paper puts forward the hypothesis H2 that the students who have richer entrepreneurial atmosphere in family, the more inclined to choose social entrepreneurship.

2.2.3 Impact of entrepreneurship education in colleges and universities

Social entrepreneurial education refers to the education of consciousness, spirit, knowledge, ability and related social entrepreneurial practice activities needed by social entrepreneurship (Tang Yayang, 2011), most scholars study the impact of entrepreneurial education on entrepreneurial intention from entrepreneurial curriculum and innovative talent training mode of colleges and universities (Xiang Hui, 2014). From the perspective of theory and practice, this paper studies whether entrepreneurial education affects the willingness of social entrepreneurship, and puts forward hypothesis H3 that stronger the atmosphere of entrepreneurial education in colleges and universities, the students will be more inclined to participate in the social entrepreneurship.

3 Research Methods and Variable Selection

3.1 Research methods

This paper conducts the questionnaire survey on university students' willingness to start social entrepreneurship in Wuhan. The questionnaire is divided into four parts: basic information, value impact, family environment, and entrepreneurial education in colleges and universities. The project team issued 505 questionnaires in 211 universities such as Wuhan University and Wuhan University of Technology, all of which were withdrawn. Among the respondents, 247 men and 258 women accounted for 48.9% and 51.1% of the total sample respectively.

3.2 Variable selection and description

This paper chooses the social entrepreneurial willingness and non-social entrepreneurial willingness as dependent variables. Social responsibility, voluntary service spirit, innovation spirit, adventure spirit and sense of wealth achievement are all selected as independent variables among the value factors, among which social responsibility and voluntary service spirit are altruistic values, innovation spirit and adventure spirit represent the public value, while the sense of wealth achievement is regarded as the egoistic value; Family factors choose family entrepreneurial atmosphere as independent variables, school entrepreneurial education factors choose policy support, entrepreneurial education, entrepreneurial lectures and entrepreneurial competition as independent variables. The control variables of this paper are gender and discipline. The assignment, meaning and descriptive statistics of relevant variables are shown in Table 1 below:

Table 1 The Assignment, Meaning and Descriptive Statistics of Related Variables

Variable name	Variable meaning and assignment	Mean value	Standard deviation
Social responsibility	Very agreed=0; Comparative agreed=1; Generalization=2; Not quite agreed=3; Very disagreed =4	0.82	1.025
Innovation spirit	Yes=1;No=0; Unclear=2	0.90	0.902
Adventure spirit	Very agreed=0; Comparative agreed=1; Generalization=2; Not quite agreed=3; Very disagreed=4	1.67	1.070

Continual Table 1

Variable name	Variable meaning and assignment	Mean value	Standard deviation
Sense of wealth achievement	Very agreed=0; Comparative agreed=1; Generalization=2; Not quite agreed=3; Very disagreed=4	1.16	1.042
Family entrepreneurial atmosphere	Have=0;Not have=1	0.38	0.486
Policy support	Have=0;Not have=1	0.84	0.371
Entrepreneurial education	Have=0;Not have=1	0.55	0.498
Entrepreneurial lecture	Have=0;Not have=1	0.79	0.405
Entrepreneurial competition	Not participating=0;Participated=1	0.34	0.473
Gender	Female=0;Male=1	0.49	0.500
Discipline	Literature and history=0; Social sciences=1; Engineering=2; Science =3;Art=4；Entrepreneurial=5	1.40	1.156
Entrepreneurial willingness	No=0;Yes=1	0.82	0.385
Social entrepreneurial willingness	No=0;Yes=1	0.76	0.427

4 Research Model and Analysis

4.1 Research model

This paper carries on the multivariate Logistic regression analysis to the data through SPSS, puts the values, the family, the university entrepreneurial education into the model step by step, and constructs the "model of social entrepreneurial willingness" and "the model of non-social entrepreneurial willingness", then compares the characteristics of social entrepreneurship with the non-social entrepreneurial intention model, highlights the relevant characteristics of college students with social entrepreneurial willingness.

Table 2   The Results of Entrepreneurial Willingness Model of College Students

Variables	The model of college students' willingness to start the social entrepreneurship			The model of college students' willingness to start the non-social entrepreneurship		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Value factors						
Social responsibility	0.347*** （0.362）	0.350*** （0.365）	0.330*** （0.371）	0.551 （0.371）	0.560 （0.380）	0.656（0.387）
Voluntary service spirit	0.170*** （0.674）	0.176*** （0.682）	0.191*** （0.688）	1.160 （0.291）	1.121 （0.295）	1.133（0.315）
Innovation spirit	1.915** （0.277）	1.921** （0.280）	1.818** （0.289）	2.838*** （0.329）	2.940*** （0.338）	2.883*** （0.345）
Adventure spirit	1.255 （0.258）	1.139 （0.262）	1.060 （0.266）	2.274*** （0.302）	1.908** （0.307）	1.909** （0.315）
Sense of wealth achievement	1.575* （0.263）	1.556* （0.264）	1.321 （0.278）	0.294** （0.627）	0.291** （0.650）	0.255** （0.675）
Family factors						
Family entrepreneurial atmosphere		2.084*** （0.260）	1.976*** （0.263）		4.007*** （0.340）	3.790*** （0.343）
School factors						
Policy support			1.258 （0.304）			1.291（0.333）
Entrepreneurial education			1.577* （0.267）			0.775* （0.305）
Entrepreneurial lecture			1.147 （0.280）			1.357（0.305）
Entrepreneurial competition			1.029 （0.264）			2.143** （0.329）
Control variables						
Gender	1.179 （0.255）	1.183 （0.257）	1.210 （0.260）	1.004 （0.287）	1.010 （0.294）	1.061（0.299）
Discipline	1.110 （0.108）	1.127（0.110）	1.127（0.111）	1.002 （0.123）	1.012 （0.128）	1.013（0.133）
Pearson			0.720			0.879
N			505			

Note: ***P＜0.01,**P＜0.05,*P＜0.1

4.2 Quantitative analysis

4.2.1 Altruistic values are significantly related to social entrepreneurship willingness

The social entrepreneurship emphasizes the promotion of social value and social welfare, and its essential requirements are consistent with altruistic values. The conformity of ideas makes it easier for altruistic college students to recognize the model of social entrepreneurship, and the desire for personal material return and enjoyment is lower, which shows relatively stable and long-term participation power of social entrepreneurship. Public values have neutral value characteristics and have significant relationship with social entrepreneurship and non-social entrepreneurship in general. Public values enhance the sensitivity and ability to capture social problems, and increase the possibility of success in social and non-social entrepreneurship. The influence factors of the social entrepreneurial value are complicated, which involves the egoistic value and the altruistic value, but it is generally controlled by the altruistic value.

4.2.2 Family entrepreneurial atmosphere is significantly related to social entrepreneurship willingness

The study finds that 88.4% of the college students' financial resources are dependent on the financial support of their parents, so their independent personality and behavior choice are greatly affected by the will of the family. Family entrepreneurship atmosphere represents the degree of support on family entrepreneurship support, capital and other social capital. A good family entrepreneurial atmosphere can effectively integrate family resources, interpersonal relationships and other social capital. They even assist and guide their children to participate in entrepreneurial activities. Therefore, family will directly affect the willingness of college students to begin the social entrepreneurship.

4.2.3Entrepreneurial education in college and university is significantly related to social entrepreneurship willingness

In the perfect stage of entrepreneurial policy, the effect of the entrepreneurial willingness of college students is remarkable, but when the entrepreneurial policy of college students is relatively perfect, the flexible space of entrepreneurial policy to affect entrepreneurial willingness is reduced. In the current society, non-social entrepreneurial competition is the mainstream. College students have a high degree of awareness and participation in the "Challenge Cup" and other entrepreneurial competitions, while the social entrepreneurial competition is in its infancy, most of which belong to a part of non-social entrepreneurial events, and lack a better practical platform. Cultivating and triggering the entrepreneurial motivation of college students as a starting point, integrating entrepreneurial policy support, curriculum education and entrepreneurial competition resources, entrepreneurial education provide intellectual support and ability training for college students.

5 Conclusion

5.1 Conclusion of research

Through multiple Logistic regression analysis, it was found that altruistic values, family entrepreneurial atmosphere, entrepreneurial education in colleges and universities had a significant relationship with the social entrepreneurial willingness of college students. Altruistic values make college students have relatively stable motivation to participate in social entrepreneurship, good family entrepreneurial atmosphere can guide their children to participate in entrepreneurial activities, entrepreneurial education provides intellectual support for social entrepreneurship. In view of this, this paper puts forward the following suggestions, hoping to provide certain reference significance for the government and universities to promote the social entrepreneurship of college students.

5.2 Countermeasures and recommendations

5.2.1 Fostering and internalizing altruistic values

The theory of social cognition points out that people's beliefs and motives often strongly dominate and guide people's behavior. The government and society should strongly advocate the spirit of "commonweal" and the culture of "entrepreneurship", and integrate altruistic values into the talent training mechanism. Colleges should pay attention to the cultivation of college students' sense of social responsibility, increase the value education of the first classroom, promote the students to form the concept of social welfare and social responsibility; Strengthening the construction of the second classroom in colleges, taking social practice and volunteer service as the platform, so that college students can deeply understand society and discover social problems, and participate in voluntary service activities through many channels, so as to enhance the sense of charity and social responsibility of college students.

5.2.2 Improving the entrepreneurial education system

Colleges should build and perfect the entrepreneurial education system which combines theory with practice. Set up a high-quality team of social entrepreneurial teachers combining theory and practice, invite

successful alumni to return to school for reports and lectures, and act as outside guidance teachers for practice teams and associations; Vigorously build a diversified practical training platform, link government and social organization resources support on the platform of social entrepreneurial incubator, provide funds, talents, consultation and other services for college students' social entrepreneurship; Encourage college students to participate in the social entrepreneurial competition, and promote the transformation of outstanding entrepreneurial projects into market operation.

Acknowledgement

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Measuring the Impact of Equity Distribution Justice Perception on Agri-enterprises' Performance: The Entrepreneurial Intention' Mediated Effect Study

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Abstract: This articleexamines nascent agricultural enterprise's performance effect ofthe justice perception of equity distributionand entrepreneurial intention, we contextualized the corporation governance theory and operationalized as equity distribution, and adopted 198 nascent small and micro-sized agricultural technological enterprises'datato explore the causality that why the entrepreneurs chose to entry and exit? The results indicate that the justice perception of equity distribution affects entrepreneurial entry and exit behaviors; entrepreneurial entry and exit behaviors impact on performance; and the entrepreneurial entry and exit played mediated role between the justice perception of equity distribution and entrepreneurial performance; the justice perception of equity distribution impacts on performance positively.
Key words: Justice perception; Equity distribution; Entrepreneurial entry and exit; Performance

1 Introduction

Equity distribution signifies the degree of trust for the team members, some empirical evidences show that the harmonious relationship among entrepreneurial team's members will positively impact on nascent entrepreneurial performance (Gemmell, et al, 2012). Certainly, it is emerging as a crucial method in coordinating the equity balance between entrepreneur and other co-founders (Wasserman, 2006). As a reasonable equity distribution of nascent start-ups, it is explored obviously that it will positively motivate the entrepreneurial teams' morale and improve the company's speedy growth, and vice versa, the perception of equity distribution will impact on the entrepreneurial intention: entrepreneurial entry or exit. Entrepreneurial exit is widely regarded as inevitable experience during entrepreneurial process (DeTienne, 2010). In practice, a successful starts-up may specifically get several rounds entrepreneurial entries and exits (DeTienne and Chirico, 2013). Although some existing researches depict that the heterogeneity of founders and co-founders will appeal to more new investors, simultaneously, the operational contradiction amongst original entrepreneurs and new participators also may lead to entrepreneurial exit, and the individual level's ambidexterity is correlated negatively with entrepreneurial entry (Yeganegi S et al, 2018),indeed, the previous researches are prone to discuss identification and exploitation of entrepreneurial opportunity (Shane and Venkataraman, 2000) and how to successfully establish a new business. For small and micro-sized firms, yet, the equity distribution setting has not been paid more attention and not widely recognized, under no circumstance should not we neglect the truth that the equity distribution will play a critical role during new businesses forming and small businesses growing process (Luzzi and Sasson, 2015). This paper will examine the performance effects of equity distribution perception and entrepreneurial entry and exit intentions in nascent small and micro-sized agricultural technological Enterprises.

2 Theoretical Framework and Hypotheses

Obviously, the nascent small and micro-sized agricultural technological enterprises,which compared to the large-sized mature corporations with stable internal control mechanism, own relative flexible corporation governance mechanism (Blatt, 2009) and face high risk of failure challenge when they are entering in an industry (Schjoedt et al, 2013). Indeed, the original founders or family members will dominate the stocks shares that shows highly ownership concentration, it seems to mean that they will bear high proportion entrepreneurial risk (Hall and Woodward, 2010). Nevertheless, the members of nascent entrepreneurial team will undertake more free space to issue new strategy and flexible to implement strategy. On the flip side, both the nascent firms and the mature incumbent firms seek for sustainable development through reasonable governance mechanism: the formers will preserve some

proportion for non-family members or new entry members, who own unique specialties; the latters will properly set a systematic governance mechanism, which consists of "Shareholders'meeting, Board of directors and Board of Supervisors", will help the founders to keep balance of internal relationship. However, the firms' performance is not only constrained by the ownership concentration, they also be influenced by the feeling of new members of the firms, that is referred to the perception of equity distribution. Hence:

Hypothesis 1: The Justice perception of equity distribution will encourage the new members choosing entrepreneurial entry, vice versa, it will choose to exit from the entrepreneurial team.

Actually, entrepreneurial exit is a proactive behavior when the firm will face unbearable difficulties, the entrepreneurial exit aims to take good opportunity to re-enter at a good market situation. The experience and background of entrepreneurial exit will enhance the survival rate of future entrepreneurial process (Albion-S ánchez, 2016). Furthermore, once we discuss the entrepreneurial exit intention or motivation from the individual perspectives of entrepreneurs, we cannot ignore the truth that if the core founder of a nascent firms, who masters the competitive technology, chose to entrepreneurial exit would exert negative influence on the performance (DeTienne and Cardon, 2012). Some scholars will analyses the causing factors through industrial or firm's perspectives(Sarkar et al,2006). Hence:

Hypothesis 2: Entrepreneurial entry will exert positive influence on nascent technological firms'performance; Entrepreneurial exit will negatively impact on Agri-enterprise's performance.

The disequilibrium of market will affect the diffusion of new technology and creative destruction with new methods of production(Hass, 2015).Actually, imbalance is a normal situation that entrepreneur will encounter during the whole entrepreneurial process, nevertheless, there are plenty of literature focused on entrepreneurial entry, and at same time, fewer researches emphasized on entrepreneurial exit, in fact, both of above dual entrepreneurial behaviors are correlated with each other: the high profitable industry will induce thousands of entrepreneurial entries that obviously cause the fierce competition, that means some incumbents will be displaced by nascent firms and forced to entrepreneurial exit. Entrepreneurial exit consists of three strategies: Business is inherited by family member exit or merger and acquire by other companies; bankruptcyliquidation, and the exit types are classified into two dimensions: Firm exit and Founder exit (DeTienne, 2015). Whatever the exit patterns are chose by entrepreneur, the intention will negatively impact on the staff morale, and the entrepreneurial entry will encourage the existing business. Hence:

Hypothesis 3: Entrepreneurial entry and exit will mediate this relationship between perception of equity distribution and Agri-enterprise's performance.
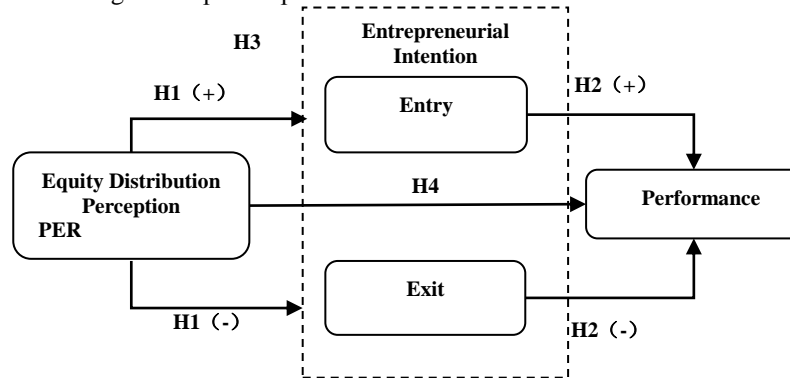
Figure 1   The Concept Model

Due to the mobile internet context, some new governance patterns emerge recently, such as crowd-founding, which may cause equity distribution more uncertainty and ambiguity for the entrepreneurial team than traditional governance mechanism. If the member of entrepreneurial team owns high level justice of equity distribution, it will reduce the coordinated cost, avoid agency conflicts (Breugst et al,2015), and also attract more new partners or investors joining in the team, that produce a positive effect on enterprise's performance,otherwise,the distrust will exert a negative effect on firms' valuation as the partners take such perception that injustice for equity distribution. Hence:

Hypothesis 4: The justice perception of equity distribution will positively impact on Agri-enterprises' performance.

3 Data and Methodology

3.1 Sample

As this paper sets the nascent small and micro-sized agricultural firms as research target, the first and foremost thing is to define the nascent firms, that refer to the company which was founded less than 3 years, and then, the agricultural technological firms, which refer to the enterprises that engage in farming, forestry, husbandry and fishing businesses with some innovative technologies. Finally, we defined the small and micro-sized firms as that their annual operation revenue was less than RMB5million yuan according to the definition of Ministry of Industry and Information Technology of the People's Republic of China in 2011. Under the guidance of Economic, Trade and Information Commission of Xiaogan Municipality, our questionnaire investigation was held from July,2015 to September, 2015, we totally sent out 220 questionnaires and recycled valid 198 questionnaires, the valid recovery rate is 90%.

3.2 Measures

Dependent Variable. In entrepreneurial researches field, there is no consensus for measuring entrepreneurial performance as the relative objective financial data is not easy to investigate for business secret, on the other hand, the subjective 5 or 7 scale data cannot signify the firm's real performance. However, under the assistance of local Statistics Bureau, we collected the proactive financial data submitted, which ranges from 2013 to 2014, through the sample Agri-firms, thus, we adopted the ROE (Return on Equity) testified the Agri-firms entrepreneurial performance according the Dupont Analysis Method.

Independent Variables and Mediated Variables. The ownership concentration of a company usually be measured by HHI (Herfindahl-Hirschman index) (Bruton et al, 2010), yet the justice perception of equity distribution as an independent variable is very difficult to be examined by the objective index, as it stands for a psychological cognition for the nascent company, thus we employed five dimensions, which consist of Regulatory Corporate Finance, Position'sOpenness, OwnershipClarity, Reasonable Equity Distribution, and Scientific Organizing, to measure Equity Distribution. Entrepreneurial entry and exit as mediated variables are measured by the intention question items Do you like to accept a new partner joining in your company? Are you plan to exit the company if you feel unfair with the equity distribution?

Controls Variables. In this paper, we also controlled the firms 'size (log employees' number), the form (the firms 'ownership type), and the industry (the various firms from different sectors, farming, fishing etc.)

3.3 Analysis

We employed Multivariate Regression Analysis to analyze how ED (equity distribution) and Entrepreneurial intentions affect Agri-firms' performance. We adopted Two-Stage Least Squares Regression to avoid the endogeneity effect, the first step to take the Entry and Exit as endogenous variables, which they will show in Model 1 and Model2, on the second step, we treated entry and exit as instrumental variables with other independent variables and controls variables to predict performance. Referred to prior scholars' suggestion, we also made a Robustness Test by splitting the sample into two partial samples (Pohlmann, 2002) to testify the entry and exit's effect on Agri-firms' performance respectively.

4 Results

The Table1 shows the factors loading and Cronbach's α value for the five dimensions' Perception of Equity distribution, the values are 0.849,0.850,0.759,0.861,0.903,and the measuring scale's *KMO* and *Bartlett* value is 0.917, all the indicators provide a good reliability level for the scale (*Cronbach's α>0.6;KMO>0.7*); The Factor Loading value of five dimensions are amongst *0.53-0.85*, it presents the scale owns a good convergent validity, and the scale's discriminant validity is acceptable as it is indicated by the *AVE> 0.5*thereof.

To testify our four hypotheses, we employed two steps and six models to analyses the relationship among equity distribution, entrepreneurial entry and exit, Agri-firms' performance in the regression. The Table2 demonstrates that when we take entrepreneurial entry(Entry for short) and entrepreneurial exit (exit for short) as endogenous variables during model1 and model2, the latter one shows that ED (abbreviation for perception of equity distribution) produces positive effect on Entrepreneurial entry($\beta=0.499,p<0.01$) in the first step(the sample number is 198),on the second step and robust test(the sample number is 108),the ED is negatively related with Entrepreneurial exit($\beta=-0.227,p<0.05$),which is

consistent with Hypothesis *1*.The model4'results respectively show positive association between Entrepreneurial entry and performance($\beta=0.157,p<0.05$) in first step and negative association between Exit and performance in second step($\beta=-0.331,p<0.01$），which are in line with Hypothesis *2*.In model 5 and model 6, presumably added the instrumental variable Entry and Exit, the coefficient value β of ED.

Table 1　ED' actors Loading andCronbach's α

Item	Regulatory corporate finance Cronbach's α=0.849					Position's openness Cronbach's α=0.850				
	EDf1	EDf2	EDf3	EDf4	EDf5	EDp1	EDp1	EDp1	EDp1	EDp1
loading	0.76	0.71	0.68	0.73	0.64	0.71	0.56	0.65	0.73	0.81
Item	Ownership clarity Cronbach's α=0.759		Reasonable equity distribution Cronbach's α=0.861				Scientific organizing Cronbach's α=0.903			
	EDo1	EDo2	EDg1	EDg2	EDg3	EDg4	EDs1	EDs2	EDs3	EDs4	EDs5
loading	0.53	0.65	0.71	0.81	0.85	0.77	0.74	0.66	0.75	0.65	0.79

Table 2　Multivariate Regression Analysis Results of ED, Entrepreneurial En/x and Performance

Variable	Model1:En/x	Model2:En/x	Model3:Prf1	Model4:Prf	Model5:Prf	Model6:Prf
Size	0.106 （0.066）	0.034 （0.058）	-0.009*** （0.030）	-0.026*** （0.030）	-0.017*** （0.030）	-0.023*** （0.030）
Industry	-0.001 （0.019）	-0.014 （0.017）	-0.028*** （0.009）	-0.027*** （0.008）	-0.029*** （0.010）	-0.027*** （0.008）
Form	-0.208*** （0.081）	-0.186*** （0.070）	-0.031*** （0.037）	0.002*** （0.040）	-0.028*** （0.038）	0.004*** （0.047）
ED		0.499*** （0.140）			0.055 （0.074）	-0.031 （0.085）
Entry (198)				0.157** （0.032）		0.173** （0.037）
Exit (108)				-0.311*** （0.031）		-0.267*** （0.030）
<ED>		-0.227** （0.088）			0.350*** （0.029）	0.301*** （0.028）
R^2	0.046	0.290	0.002	0.025	0.005	0.026
ΔR^2	0.031	0.275	-0.013	0.005	-0.016	0.001
F	3.104**	19.668***	0.131	1.264	0.242	1.035

Note: ∗, ∗∗,∗∗∗ : statistically significant at the10%, 5%, and1% level, respectively

Related with performance respectively decreases into -0.0031 and 0.301, however, the association is positive between Entry and performance($\beta=0.173,p<0.05$),oppositely, Exit is negatively associated with performance($\beta=-0.267, p<0.01$),which is consistent with Hypothesis 3,it means that Entrepreneurial entry and exit play mediated effect between ED and Agri-firms'performance. However, in model6, Hypothesis4 is not verified by the first step, it is supported by the second step($\beta=0.350, p<0.01$; $\beta=-0.301, p<0.01$).

5 Conclusion

Most prior researches pay more attentions to the governance mechanism of mature companies, and neglect the new potential partners 'justice perception for nascent small and micro-seized firms' equity distribution. Thus, this paper extends the equity distribution governance theory to discuss how it will affect on entrepreneurial intentions: entry or exit and then the Agri-firms' performance during a special context such as agricultural industry? This study employed the nascent small and micro-sized agricultural technological companies' sample in Xiaogan Municipality to testify our four hypotheses.

Specifically, our study results show that the justice perception of equity distribution will positively affect the entrepreneurial entry, otherwise, the potential relative stakeholders, which include Venture Capital and Private Entity, will chose to entrepreneurial exit as they emphasize on the equality of equity distribution. Generally speaking, if the original founders over-emphasized their own team's interest will cause the suspiciousness of new partners, that will expel the new participators withdrawing investing

from the current company, hence, the nascent agricultural companies should establish a reasonable governance mechanism that make co-founders feeling justice treatment at the early stage.

Certainly, we consider the endogenous effect of entrepreneurial entry and exit, our findings show that entrepreneurial entry will directly enhance the nascent firm's value, as new investors will input money and other resources after entering; entrepreneurial exit may produce significantly negative effect on firm's performance in short term, yet it couldn't make sure that it will exert a bad influence in a long time, under some circumstance, the entrepreneurial exit will be a promising strategy that beneficial to the nascent firm. On the second step analysis, we operated the entrepreneurial intentions: entry and exit as instrumental variables, the results shew that the entrepreneurial entry and exit respectively produce positive effect and negative effect on the relationship between Equity Distribution and Agri-firms' performance. Obviously, the entrepreneurial entry will encourage the temporal team, that will combine more heterogenetic abilities and resources to improve the firms' value, on the flip side, entrepreneurial behavior will discourage the current staff morale, contemporarily it will decrease the firms 'value.

In the agricultural industry context, the evidence from small and micro-sized firms data shows positive association between the Equity Distribution and firms'performance, it means that the VC or PE will be more sensitive to the governance mechanism at nascent step than mature companies, it also be supported by the findings 'result shown in Table 2 that the Size of firm is negatively related with the performance. Finally, the trust amongst co-founders is crucial to the growth of nascent small and micro-sized technological agricultural firms, it will increase the survival rate of nascent start-ups.

Acknowledgement

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Research on the Relationship among Ethical Leadership, Knowledge Sharing and Organizational Innovation

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Abstract: In today's complex and competitive environment, how knowledge-intensive companies can improve their knowledge management capabilities and organizational innovation levels is an important research topic. Although theoretical researchers have recognized the effect of ethical leadership on knowledge sharing and organizational innovation, empirical studies examining the relationship among the three have not been widely reported.This study found that there is a significant positive correlation between ethical leadership and knowledge sharing by reading a large number of documents and empirical investigations of 159 knowledge-intensive companies; at the same time, it is found that knowledge sharing plays a partial intermediary role between ethical leadership and organizational innovation. Our research enriches the literature on knowledge management and provides useful insights for ethical leadership practices and organizational innovation management practices.

Key words: Ethics leadership; Knowledge sharing; Organizational innovation; Knowledge-intensive enterprise

1 Introduction

1.1 Ethical leadership

The broad-based ethical leadership adopts a normative perspective and focuses on the universal ethical leadership connotation. "Leadership" is the process by which individuals in a leadership role in an organization lead their subordinates to accomplish organizational goals.. "Ethics" is a shared view of "right and wrong" (Brown & Mitchell, 2010). It is a social norm.Integrating the two, "ethical leadership" is the process of demonstration, regulation, and practice of leadership in relation to "right and wrong" standards. The focus of this definition is on "ethics," which ethical norms the leader follows or which moral qualities the leader has. In the narrow sense of ethical leadership, according to the definition of Brown. Ethical leadership is a leadership style that demonstrates normative and agreeable behavior through personal actions and interpersonal relationships, and promotes these behaviors in subordinates through two-way communication, reinforcement, and decision making (Brown, 2005).

1.2 Knowledge sharing

Knowledge sharing is a communication process in which knowledge owners share ideas, issues, and information related to work through communication media and programs. In other words, it refers to the sharing of work-related information, advice, and experience among members of the organization. Nahapiet and Ghoshal pointed out that knowledge sharing among employees can not only promote the use of existing knowledge of organizations, but also promote the creation of new knowledge within the organization. Knowledge sharing is beneficial for companies to acquire knowledge resources and enhance their competitive advantages, and good knowledge sharing has a significant role in promoting corporate performance (BI Wenming, 2017). Huang emphasized that it is also necessary to explore the various factors that affect knowledge sharing in different contexts. From the individual level, they explored the influence of "face concept" and "relationship orientation" on knowledge sharing in Chinese situation.

1.3 Organizational innovation

According to Damampour's study, the most commonly used criterion for classifying organizational innovation is the thoroughness of innovation and the Binary model (Damanpour, 1991). The former divides organizational innovation into gradual innovation and radical innovation. The latter divides organizational innovation into technical innovation and management innovation. Among them, technological innovation can be divided into product innovation and process innovation. This study adopts the binary model definition of technological innovation and management innovation.

2 Research Hypothesis

2.1 Ethical leadership and knowledge sharing

The relevant literature shows that employees within the organization may not be willing or able to

effectively share knowledge. Nahapiet and Ghoshal define social capital in the Social Capital Theory as "the sum of potential or existing resources embedded in the network of relationships owned by individuals or social units". The sum of "Social capital theory" (Nahapiet, J&Ghoshal S, 2000) points out that social capital can provide people with the material support and emotional support they need. Knowledge is essentially a category of information resources, and its access to a large extent depends on the individual's social network. While leadership is an important part of social network relationships, Blau pointed out in the Social Exchange Theory that social exchange is the foundation of interpersonal interaction, with the aim of gaining valuable resources. Knowledge sharing to some extent embodies the interpersonal exchange interaction with knowledge as the object, "ethics" and "morality" are considered to be interchangeable, and ethical leaders are more inclined to empower subordinates and encourage their personal growth, based on social capital theory and social exchange theory, we know that employees will "feedback" their own gains. The organization acts to create an atmosphere of respect for knowledge, resulting in the spread of knowledge.

In summary, ethical leaders can promote knowledge sharing. On the one hand, they can directly inspire individual employees, by encouraging individuals to talk, create, and share. On the other hand, Ethical leadership will influence or control individual employee knowledge sharing behaviors through organizational trust, ethical atmosphere, psychological security, Subordinate relationship (Yang Xia&Li Wen, 2017) and enhance the organizational knowledge sharing atmosphere (Wang Yongyue&Ye Jiajia, 2015). Therefore, we propose the following assumptions:

Hypothesis 1: Ethical leadership has a positive effect on knowledge sharing.

2.2 Knowledge sharing and organizational innovation

Innovation has become an important source of organizational competitive advantage, and the knowledge possessed by the organization is an important resource that affects organizational innovation (Rosenkopf,L&Almeida,P, 2001).Whereas the knowledge possessed by the organization is distributed among different departments and individuals within the organization, through the sharing and exchange of different departments and employees, these knowledge scattered in different departments and individuals can be fully mobilized within the organization. It helps to promote the integration of different kinds of knowledge (Easterby-Smith&Fang les, 2008). Researchers have recognized that the organization's ability to integrate different internal knowledge is a key factor affecting its organizational innovation (Henderson, R&Clark, K, 1992).At the same time, there are studies that show that knowledge sharing within an organization, including informal knowledge sharing and formal knowledge sharing within an organization, can significantly promote technological innovation, while informal knowledge sharing within organizations and between organizations. Knowledge sharing has a positive impact on management innovation.

In summary, organizational innovation is inseparable from knowledge sharing. Knowledge itself provides a resource basis for organizational innovation. Organizational innovation is inseparable from the knowledge enhancement and knowledge innovation brought about by the organization's internal and external knowledge sharing process. So, we propose the following hypothesis

Hypothesis 2: Knowledge sharing has a positive effect on organizational innovation

2.3 The mediating role of knowledge sharing

Studies have shown that there is a significant positive correlation between ethical leadership and employee innovation behavior. Interaction fairness has a complete intermediary role between ethical leadership and employee innovation behavior. Ethical leadership can motivate and induce employees to increase creativity and improve Job satisfaction and create innovative behavior (ZhaoYu&MoShenjiang, 2015). The innovative behavior of employees is an important content and guarantee of organizational innovation. And as Gupta and Singhal have studied, the main asset of innovative organizations is people, not products. Subramaniam and Youndt pointed out that the organization of human capital has an active role in promoting organizational innovation (Subramaniam, M.&Youndt, M, 2005). In other words, only employees who are important human capitals in an organization are the participants and Practitionersof organizational innovation, and employees have the knowledge they possess. It is a key resource for inspiring innovation. Throughout the organization's entire innovation process, employees effectively contribute to organizational innovation by effectively sharing and applying their own knowledge and skills. In order to make the best use of human capital, organizations need a leadership style that is conducive to employees' innovative behavior and organizational innovation atmosphere.

According to the foregoing discussion, we believe that in the process of promoting organizational innovation, ethical leaders can exert their positive effects by effectively influencing the behaviors of participants and Practitioners of organizational innovation, especially such as knowledge sharing

behavior. In other words, the ethical leadership does not directly affect the final organizational innovation results, but it does so through important organizational intermediary such as knowledge sharing. Therefore, we have the following assumptions:

Hypothesis 3: Knowledge sharing mediates ethical leadership and organizational innovation.
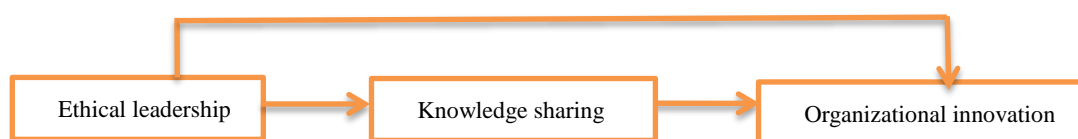
Figure 1   Research Model

3 Research Methods
3.1 Research sample and data collection
Ethical leaders may influence different organizational resources and capabilities in different industries. According to the purpose of the study, this paper uses knowledge-intensive companies as research objects. Among them, sample companies mainly include consulting companies, advertising companies, training companies, law firms, and IT companies. We used paper questionnaires and electronic questionnaires to collect data. A total of 324 questionnaires were sent. After screening, we obtained 172 questionnaires. However, due to the deletion of 13 questionnaires that were incomplete, the final questionnaires received 159 copies. The questionnaire recovery rate is 49.0%.

3.2 Measurement of variables
In order to ensure the validity and reliability of the measurement tools, the scales used in this study are all scales that have been used in existing literature at home and abroad, and have been appropriately modified according to the purpose of this study. Ethical leadership.

The Chinese Ethical Leadership Questionnaire (Meng Hui&Song Jiwen, 2014). In view of the special connotation of ethical leadership in the context of China, this paper used MengHui to develop the Chinese moral leadership questionnaire. They used interviews and factor analysis to determine the 24 items and 3 dimensions of the scale: moral quality, respect and tolerance, and moral reward and punishment. A coefficient of the overall questionnaire was 0.949. The coefficients of the moral quality dimension, respect and inclusive dimension, and moral reward and punishment dimension were 0.923, 0.918, and 0.867, respectively. CELQ can be considered as having high reliability.

Knowledge sharing. This article uses a scale with four items used by Cabrera to measure the behavior of employees sharing information, advice, and experience. The fourth item is reverse-encoded. (Cabrera, A&Collins, W. C, 2006). Based on this, we have made appropriate changes to the scale. We changed the subject "I" of the original scale into a "company employee" to measure the overall situation of the organization. The internal consistency reliability coefficient of this scale is *Cronbach's a = 0.67.* which Reflecting the fit of the factor model is acceptable.

Organizational innovation. Jimenez-Jimenez and Sanz-Valle (Jimenez-Jimenez, D&Sanz-Valle, R, 2008) used a scale with nine items to measure three aspects of organizational innovation: product innovation, process innovation, and management innovation. The internal consistency reliability coefficient of this scale is *Cronbach's a = 0.91.* which Reflecting the fit of the factor model is acceptable.

4 The Results of the Study
4.1 Correlation analysis
The mean, standard deviation, and correlation coefficients of all variables are shown in Table 1. From the correlation coefficient matrix table, we can see that there is a significant correlation between ethical leadership, knowledge sharing, and organizational innovation. Moreover, there is a positive correlation between ethical leadership and knowledge sharing, knowledge sharing, and organizational innovation.

Table 1   Correlation Coefficient Matrix

variable	Mean	S.D	1	2	3	4	5
Age of company	19.55	26.78	1				
Company Size	2.82	0.98	0.389***	1			
Ethical leadership	56.66	11.42	0.153	0.044	1		
Knowledge sharing	20.72	4.20	0.058	-0.142	0.519***	1	
Organizational innovation	41.78	12.05	0.063	-0.055	0.376***	0.409***	1

Note: 1.*** indicates P<0.01, ** indicates P<0.05, * indicates P<0.1

4.2 Hypothesis testing

For the hypothesis test, this study used statistical analysis software SPSS11.5 to conduct multiple regression analysis.

4.21 Regression analysis of the relationship between ethic leadership and knowledge sharing

Table 2   Regression Analysis

Variable	Knowledge sharing		Organizational innovation	
	Model 1 Regression coefficients	Model 2 Regression coefficients	Model 3 Regression coefficients	Model 4 Regression coefficients
Control variable				
Age of company	0.102	0.051	0.032	-0.025
Company Size	-0.196*	-0.188**	0.057	0.112
Ethical leadership		0.598***		
Knowledge sharing				0.317***
R^2	0.038	0.257	0.029	0.107
Adjusted R^2	0.019	0.292	-0.022	0.090
ΔF	1.921	32.694***	0.178	12.898***

Note: All regression coefficients have been standardized

This study assumes that ethical leadership has a positive effect on knowledge sharing. Model 1 of Table 2 examines the effect of control variables on knowledge sharing. Model 2 shows that there is a significant correlation between ethical leadership and knowledge sharing after controlling the age of the company and the size of the company. The standardized regression coefficient is *Beta=0.598, p<0.01*. This means that ethical leaders who focus on employee development have a positive impact on knowledge sharing. Hypothesis 1 of this study was supported.

4.22 Regression analysis of the relationship between knowledge sharing and organizational innovation

In this study, we assume that knowledge sharing has a positive effect on organizational innovation. Models 3 and 4 of Table 2 show the test results of this hypothesis. In Model 3, we only examined the impact of company age and company size on organizational innovation. Model 4 shows that there are significant correlations between knowledge sharing and organizational innovation after controlling for the age and scale of the company. The standardized regression coefficient is *Beta=0.317, p<0.01*. Hypothesis 2 of this study has been supported. This shows that within the organization, different employees actively share their knowledge, experience and experience can bring about a higher level of organizational innovation.

4.23 Analysis of the mediating role of knowledge sharing

The second important purpose of this study is to test the mediating role of knowledge sharing between ethical leadership and organizational innovation. According to the research(Baron R. M &Kenny D. A, 1986),to verify the intermediary role played by knowledge sharing, four conditions need to be met.: (1) The relationship between ethical leadership and knowledge sharing is obvious; (2) The relationship between knowledge sharing and organizational innovation is significant; (3) The correlation between ethical leadership and organizational innovation is significant; (4) After the variable of knowledge sharing is added to the theoretical model, the ethical model The relationship between leadership and organizational innovation will change. If the original correlation does not exist, it indicates that knowledge sharing plays a complete mediating role; if the original relationship weakens, it indicates that knowledge sharing plays a partial intermediary role.

In order to test the mediating role of knowledge sharing, we tested the regression coefficients in turn according to the above criteria. The results are shown in Table 3.

Table 3   The Mediating Role of Testing Knowledge Sharing

Variable	Organizational innovation		
	Model 1 Regression coefficients	Model 2 Regression coefficients	Model 3 Regression coefficients
Control variable			
Age of company	0.026	-0.023	-0.035
Company Size	0.051	0.047	0.092
Ethical leadership		0.356***	0.244**
Knowledge sharing			0.236*
R^2	0.028	0.132	0.151
Adjusted R^2	-0.023	0.094	0.123
ΔF	0.171	12.884***	3.873*

In Table 3, we use Model 1, Model 2 and Model 3 to test the mediating role of knowledge sharing between ethical leadership and organizational innovation. Model *2* shows that after controlling the company's age and company size, there is a significant correlation between ethical leadership and organizational innovation *(p<0.01)*. Model 3 is a full model. After adding the variable of knowledge sharing, the regression coefficient of the ethical leader became 0.244, and the correlation with organizational innovation was reduced, and its significance became *0.01<p<0.05*. At the same time, knowledge sharing the regression coefficient for this variable is 0.236, and it is statistically related to organizational innovation as a general correlation *(0.05<p<0.1)*. This means that after the variable of knowledge sharing was added, the influence of ethical leadership on organizational innovation was reduced, and knowledge sharing partially replaced the effect of ethical leadership on organizational innovation. Therefore, we believe that knowledge sharing plays a partial intermediary role between ethical leadership and organizational innovation.

5 Conclusion

This article takes a knowledge-intensive enterprise as the research object and discusses the relationship among ethical leadership, knowledge sharing, and organizational innovation. We have mainly done two tasks: (1) examining the influence of ethical leadership on knowledge sharing; (2) and testing the mediating role of knowledge sharing in the relationship between ethical leadership and organizational innovation. The main conclusions are as follows: (1) The ethical leader has a positive role in promoting the sharing of knowledge among employees. Since many researchers have investigated the impact of ethical leadership on employee innovation behavior, following this logic, hypothesis 1 was supported *(p<0.01)* by theoretical analysis and empirical tests. This shows that the organization managers can use ethical leadership to enhance the relationship and communication between managers and employees, and promote the sharing of knowledge among employees. (2) Knowledge sharing can promote organizational innovation (hypothesis 2). This study hypothesis was also supported by empirical results *(p<0.01)*. This shows that knowledge sharing can promote organizational innovation by facilitating the flow of knowledge within the company and accelerating the integration of knowledge within the organization. (3) Knowledge sharing plays a partial intermediary role between ethical leadership and organizational innovation (hypothesis 3).

There are also deficiencies in this article. This study does not control the nature of the ownership of the company. Considering that foreign companies, state-owned enterprises, and private enterprises may have different incentives for innovation, future research needs to control this variable. In addition, you can also continue to study the relationship between the level of ethical leadership and employees' knowledge sharing. Future research should focus on these issues.

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A Study on Burden-reduction Strategies in Chongqing Small and Medium-sized Enterprises

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Abstract: As the number of SMEs in Chongqing is growing, they have become the key to the smooth running and development of Chongqing economy. It also plays an important role in absorbing employment. However, for small and medium-sized entrepreneurs whose own capital is relatively scarce, they feel too much pressure by these burdens like high taxes and financing cost etc. Government adopts a series of burden-reduction policies of benefiting enterprises to reverse the situation and help SMEs to resolve difficulties. Through reading all kinds of literature to understand the existing countermeasures and implementation, through the issuance of questionnaires to a number of SMEs, a practical understanding of the source of the burden of SMEs, and a profound understanding of the difficulties of the managers of SMEs. This article mainly studies the reasons of heavy burdens in Chongqing SMEs, and the financing channel of entrepreneurs to find effective ways to get them out of trouble.
Key words: SMEs; Burden-reduction; Strategies; Heavy burden; Financing difficulties

1 Introduction

At present, SMEs trapped in the mire of weak capital, lack of resources, lack of ability, and many taxes and difficulties. The government has the right and obligation to support SMEs. "The reduction of negative" action is imperative. In addition, with the slowdown of economic growth, the performance of enterprises is declining, and the whole economic environment is at a low pressure. Therefore, the research on reducing the burden of SMEs in Chongqing is in line with the current economic development situation and plays a vital role in the future economic development of Chongqing.

Domestic scholars have done a lot of research on the issue of "burden reduction". Zhang Long (Zhang Long, 2012) believes that the macro negative tax collected by China don't compared well with the developed countries, but the main problem is all kinds of miscellaneous taxes. In addition to the positive tax, the tax obligation of the enterprise is also required to deal with the administrative charges on the heels of the governments at all levels. Gen Lin (Gen Lin, 2011) believe that the burden of SMEs is mainly because of the difficulty of financing. Aiming at the problem of burden reduction for SMEs, domestic scholars have worked hard and put forward some measures to solve this problem. Wang Lijuan said (Wang Lijuan, 2001), rational use of tax planning methods, making full use of various preferential tax policies, and emphasizing the establishment of long-term mechanism are important measures to reduce burdens. While foreign countries also attach great importance to the reduction of enterprises, Ebiringa(Ebiringa, 2011) said, the governments of Britain and U.S.A have issued a series of "negative" decrees from the thorough examination of government functions, simplification of reports and records and preservation.

2 Development of SMEs in Chongqing

2.1 Concept of SMEs

SMEs are relatively small economic units in terms of personnel size, asset size or scale of operation compared with large enterprises in the industry. This kind of enterprise is made up of a single person or a small number of people, and the number of employees and the turnover are less, so the business is generally managed by the owner and is less interfered by the outside world (Yin Danli, 2009).

2.2 Basic situation of SMEs in Chongqing

In 2017, 127 thousand new SMEs set up in the city. The number of registered households reached 727 thousand at the end of last year, accounting for more than 99% of the total number of enterprises in the city. The added value of 820 billion 470 million yuan, up 10.1%, higher than the GDP growth of 0.8 percentage points, accounting for 42% of the total economy in the city, is an important force in the economic and social development of the city (Chongqing Municipal Bureau of small and medium enterprises, 2018).

Table1   Important Economic Indicators of SMEs in Chongqing in 2016-2017

Index name	2016	2017
1The number of enterprise units (ten thousand)	67.0	72.7
2 Employees (tens of thousands of people)	710	761.2
3 Added value (billion yuan)	7020	8204.7
4 Contribution to GDP growth	42.6%	42%
5Year-on-year growth	11.1%	10.1%

2.3 Characteristics of SMEs in Chongqing

First, the industrial structure has been optimized gradually, but it still needs to be improved compared with the developed areas. SMES are dominated by traditional industries, and the proportion of new and high technology industries is relatively small.Two, the quality of enterprise managers is gradually improving, but competitiveness remains to be improved. Most of the SMES are family enterprises. Many managers lack the theoretical knowledge of management and manage the enterprises only by experience. The decision is not prudent, the strategy is not long, the use of people is not appropriate and the enterprise governance structure is unsuitable, which will lead to the development of the enterprise not long. Finally, it can only choose "close the door". Three, the financing situation is still grim. At present, there are many financing channels, but the total amount of financing from the capital market direct financing and private placement is still weak, and the financing structure needs to be optimized. Besides, the financing of SMES needs to pay high cost, including interest expense and financing cost (Jian Jie,2015).

3 Investigation and Analysis on the Burden of SMEs in Chongqing
3.1 Survey design

In order to understand the source of the burdens of SMEs in Chongqing, the author visited many districts and counties of Beibei, Bishan, Jiangjin, Banan, Fuling and other districts. The project group teacher issues a questionnaire, and successfully recovered 336 questionnaires, by sorting out the questionnaire to get the following data.
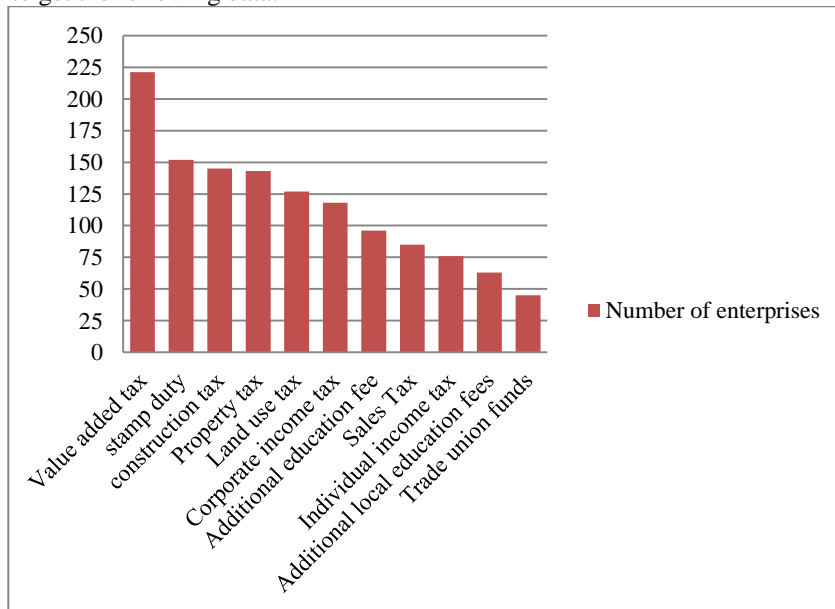
Figure 1   The Types of Tax and Fee of 336 SMEs Undertake
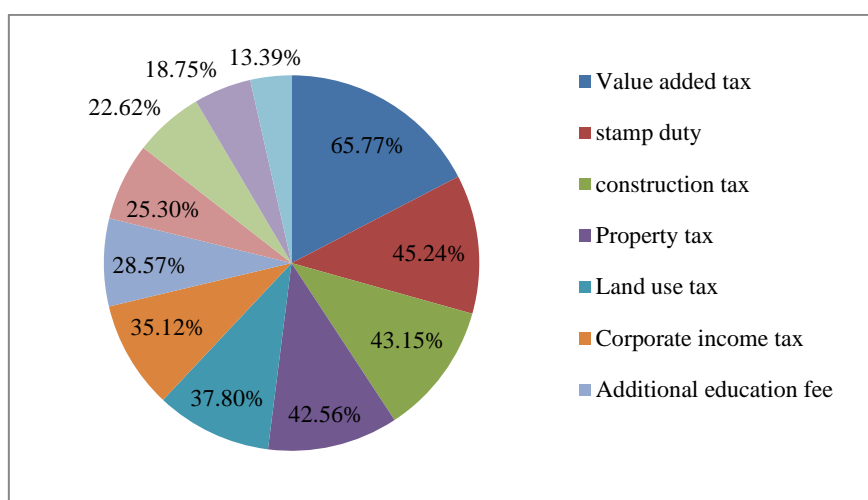
Figure 2   The Proportion of 336 SMEs Undertake the Tax and Fee

3.2 Specific analysis of the burden of tax and fee

According to the data, the first major tax types paid by 336 small and medium sized enterprises each year belong to the transfer tax, and 221 enterprises have paid the value-added tax, which accounts for 65.77% of all the research enterprises. There are many SMEs have not reached a large scale, so when they pay the VAT,small scale taxpayers' input tax is not allowed to be deducted and can't enjoy the preferential treatment of the general taxpayer. The second "right-hand man" is income tax, which takes all income as the object of taxation. In addition to various kinds of "taxes", there are various kinds of "fees". Education surcharge, social insurance fee, local education fee, employment fund for the disabled, trade union funds and so on. In addition, it also includes administrative charges levied by many government departments, such as industry and commerce, environmental protection, quality supervision, and so on. Many of these charges are not to be paid by the business profit or not, but must be paid (Wu Wenjia, 2012).

4 Reasons of the Burdens of SMEs in Chongqing

4.1 Government fees

The main types of taxes in China are value-added tax, income tax and business tax, and other taxes and fees are often related to it. In addition, the phenomenon of random charges occurs, but the tax is mandatory, unpaid and fixed, and SMEs can only "eat the Coptis in dumb". Finally, the government has alarge number of charges, and often prone to duplication of fees, cross billing and other phenomena.

4.2 Governance

Some scholars have suggested that the government's corruption has also increased the burden on enterprises to a certain extent. In the form of "eat, drink and play", the expenditure of "eat, drink and play" belongs to all kinds ofnon-taxation burdens, which increase the operating cost and economic burden of the enterprise. The function of our government has not been changed in place, and the revenue and expenditure of the government has not been adequately supervised and restrained by law.

4.3 Policies and benefits

Tax incentives for a certain type of SMES, and indifferent to other enterprises, reflects the unfair market, it is not conducive to the SMES to go hand in hand, and will give local government a huge space for the operation of dark boxes, easily cause political and enterprise undivided, breeding corruption. There is not enough preferential policy will be unfair. The existing structural tax cuts "avoid the heavy lifting" and the effect of reducing the burden of enterprises will give a big discount.

5 Reduction Countermeasures

5.1 Conscientiously implement tax incentives

Small and micro businesses that do not exceed 20 thousand yuan in monthly sales or turnover are temporarily exempt from business tax or value-added tax. To encourage SMEs to give subsidies to the local remaining parts of the enterprise income tax, value-added tax and business tax, and to effectively implement the preferential tax policies to support SMEs (Wang Huilin, 2012).

5.2 Strengthen the management of the fee for enterprise

The establishment of a list of catalogues, the reduction of the amount of the charge items in the government departments, the clearer content and the standard of the charge, the clear and clear payment of the enterprises, which effectively contain all kinds of charges, disorderly fines and disordered apportionment. Charges related to enterprises are open and sunshine, and fees have been reduced greatly.

5.3 Establish a long-term mechanism for reducing the burden ofSMEs

The establishment of long-term effect reduction mechanism will provide a reasonable legal guarantee for the work reduction work, and consolidate the existing achievements of the burden reduction work, and will not make the results of the income reduction in various regions fall down, and can also make up for the defects of the existing system in our country. The state and governments at all levels also realized the importance of establishing a long-term mechanism for reducing burdens. The government of Shanxi has put forward "an effective approach to the construction of long-term mechanism and actively explore the effective way to do a good deal of special governance" (Yi He, 2014). The government of Chongqing suggests "a long-term guarantee mechanism for reducing the burden of enterprises," and so on.

5.4 Work on improving the financing environment

In order to increase the credit of SMEs, it is necessary for the commercial banks to increase the growth rate of loans, increase the increment, simplify the procedure of loan, establish circular loan and so on, and strictly prohibit the "loan deposit" and "deposit and loan link". Establish a docking mechanism for industrial guidance fund projects, so that enterprises can get external support and expand financing channels.

6 Conclusion

Through the analysis of the sources of enterprises' burdens on the spot, this paper puts forward some effective measures for reducing the burden of burden: 1, implementing the preferential tax policy; 2, strengthening the management of the fee for enterprises; 3, establishing a long-term mechanism for reducing the burden of burden; 4, and improving the financing environment. The four above are guided by the government and hope that these jobs will be improved qualitatively during the 13th Five-Year. The government is the main force in reducing the burden of enterprises, and the strength of enterprises should not be underestimated. This article is only limited to the government's point of view and puts forward the countermeasures. In the future, we still need to find the important means of reducing the burden from the enterprise, and combine the government policy with the enterprise action effectively and play a beautiful "combination boxing".

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Impact of Strategic Planning and Management on Performance of Small and Medium-sized Enterprises in Laos

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Abstract: Small and medium-sized enterprises (SMEs) play a vital role in the economic development of Laos. However, SMEs in Laos are relatively small and lack competitiveness. The inflow of foreign direct investment (FDI) and trade liberalization in Laos brought both opportunities and challenges for SMEs in Laos. Over the last two decades, SMEs have gained wide recognition as a major source of income generation, poverty alleviation, employment and regional economic development in Laos People's emocratic epublic (PDR). However, issues relating to SMEs and assessment of SMEs performance are not well understood due to lack of studies. The factors such as locus of control need for achievement, risk-taking propensity, strategy making, environmental uncertainty, and infrastructure have been viewed as critical factors for the performance of SMEs. The objective of this study is also to evaluate the aforementioned factors in assessing the performance of SMEs in Vientiane Province in Laos. Following the survey research design and convenient sampling method, data for the study was collected from 100 SMEs in Vientiane Province using structured questionnaires. The data were analyzed using Pearson Correlation and hierarchical regression to identify the relationship between study variables and impact on the performance of SMEs. The findings indicate that the owners have a high level of internal locus of control and need for achievement; owners willing to take a moderately high-level risk and significant differences between male and female owners on the locus of control, need for achievement and risk taking propensity.
Key words: SME; Performance; Factors; Laos

1 Introduction

Laos joined the Association of Southeast Nations (ASEAN) in 1997 and Asian Free Trade Area (AFTA) in 1998. As part of its commitment under the AFTA agreement, Laos had to reduce the tariff rates to 0 to 5 percent in 2008. Reducing tariff rates would increase imports and have a negative impact on the domestic economy. Moreover, increasing FDI is expected to play an important role in increasing SMEs productivity. On the other hand, FDIs may reduce the number of domestic investments, especially those of SMEs. Most SMEs in Lao face challenges and constraints, such as lack of financial support and inadequately skilled labor, and low level of competitiveness.

It is widely accepted that SMEs play a very important role in Lao's economy. In 2004, medium enterprises numbered about 722 and small enterprises, 25,271. In term of employment, SMEs offer more than 60,000 job opportunities, which accounted for 40 percent of the country's total employment. To save Lao SMEs from the adverse impact of globalization, it is crucial to identify the issues confronting SMEs and evaluate the government policies and the impact of trade liberalization and FDIs on SMEs.

Despite the important role that garment SMEs play in SMEs in Laos, the termination of the Agreement on Textiles and Clothing (ATC) in December 2004 caused a shift in the global textile and garment industry in terms of trade and investment flows. The export value and employment of the garment industry were expected to decline (Unido, 2003). Moreover, the safeguard policy will be eliminated in 2008 and China will pose an even greater obstacle to Lao garment exporters. The government of Laos (GoL) would do well to formulate appropriate policies to support garment SMEs and enhance their competitiveness.

According to Kyophilavong (Kyophilavong, 2007), about 10 percent of establishments are performing well in Vientiane Municipality (VTM) and Other Provinces (OTP). In addition, about 20 percent of the SMEs in VTM and 17 percent in OTP are optimistic about the future of their businesses, saying they anticipated better business prospects. These show that economic prospects in Laos are favorable. Kyophilavong (Kyophilavong, 2007) said the obstacles to running a business in VTM and OTP are the same as the top four obstacles among SMEs in Laos, namely, high tax, high inflation, unstable exchange rate, and lack of fund (Table 2). Based on interviews with SME owners, the tax collection system lacks transparency (Lord Montague, 2006).

At the height of the Asia financial crisis during 1997-1998, Lao suffered like other affected countries in the region. Among the impacts on its economy was high currency (kip) depreciation that led

to hyperinflation. SMEs, in particular, bore the brunt of the crisis. These problems continue to hound SMEs. Until now, no banks or financial institutions provide credit support to SMEs. The banking sector in Laos is dominated by the state-owned Commercial Bank, which has limited assets and deposits and offers no credit facilities to SMEs. Moreover, the banking sector does not have incentives to provide credit to SMEs(Kyophilavong, 2008). Therefore, SMEs mainly depend on informal sectors for credit and funding. Based on the foregoing, what SMEs specifically need government to do is to ease their tax burdens and provide them with capital support (Kyophilavong, 2008).

Notwithstanding the important role of SMEs in the economy, by far there are few studies which have examined the factor influencing on the financial performance of SMEs in Laos(Kyophilavong, 2007; Souksavath, Kyophilavong, & Phoyduangsy, 2012; Southiseng, Ty, Walsh, & Anurit, 2008). Especially quantitative assessments of impacts of locus of control, need for achievement, risk-taking propensity, strategy making, and environmental uncertainty on firm performance are very limited in both number and scope(Souksavath et al., 2012; Uchikawa & Keola, 2008). Therefore, the main objective of this study is to examine the relationship between the aforementioned factors and the performance of SMEs.

2 Literature Review

Small and medium enterprises are recognized as one of the most important players in the economy regardless of the size of the economy. Even in a huge economy, take for example Japan, "large enterprises" and "SMEs" have always been coexisting in the so-called "dual structure." SMEs are often affiliated with and/or work as subcontractors or suppliers for large assembly firms in a vertical production network. Previously, SMEs were perceived as less efficient, having low technological and skill level, and temporary employment, etc. However, the image of SMEs has gradually changed as they have contributed significantly to Japanese industrialization. With their huge number, they have provided employment opportunities to a large portion of the labor force, created various industrial agglomerations, and enabled regional development (Ito & Ito, 1992).

In a global context of developing countries, SMEs are considered as the backbone of the private sector that has the potential for rapid growth in employment, income generation and poverty reduction (IFC, 2011). In a discussion on the role of SMEs in economic growth, it is argued that the contribution of small firms to an economy is related to higher growth but might not be pro-poor. Active and vibrant private enterprises can help enhance the effectiveness of aid projects in developing countries. Many SMEs in supporting industries and export-oriented industries have developed as part of a transnational production network or have been established by means of FDI, such as garment firms. Many of the foreign-owned SMEs (wholly or partly) would eventually grow and develop themselves to large enterprises.

On the other hand, the majority of domestic market-oriented establishments are SMEs which are often founded in cities having a relatively large population and sharing the border with Thailand or Vietnam, such as the Vientiane Capital City, Savannakhet Province, Champasack, Khammuan, Xayabury, Xiengkhuang, and Vientiane Province. For instance, most of SMEs in cottage industries are family business and groups of villagers producing and selling handicrafts to retail shops and the like. These middlemen (shop owners) would directly resell the products, or modify the fashions, or distribute them to domestic and foreign markets. One remarkable development event of enterprises of this type was the "One Village One Product" movement initiated by the Japan International Cooperation Agency (JICA) in 2002. The Lao version of this movement is the "One District One Product" (ODOP) movement. One major problem faced by SMEs in this category is the lack of information and coordination (Uchikawa & Keola, 2008). In addition to the asymmetric information issue, challenges facing SMEs in Laos include business climates (tax issues, red tapes, etc.), limited access to financial sources, and lack of labor skills (Onphanhdala & Suruga, 2010; Souksavath et al., 2012; Southiseng et al., 2008). Especially, enabling broader access to sources of finance and strengthening education and skill training for workers would enhance firm performance, attract more FDI, accelerate economic growth and reduce poverty (Onphanhdala & Suruga, 2010).

Number of studies have been carried out to assess the relationship between entrepreneur's characteristics and the performance of the SMEs. Within the broad category of owner-manager characteristics, five elements which are likely to influence the performance of a firm were suggested by Storey (Storey, 2006) such as age, gender, motivation, education, previous work experiences of the owner-manager. On gender of entrepreneur, Kentor (Kentor, 2001) and Chell (Chell, 2001) reveled that

most SMEs firms owned by men were bound to perform better than those owned by women. Jones-Evans (Jones Evans, 2000) emphasized that this difference could be arisen due to limited access to finance, stringent collateral requirements and women's double duties. On the effect of the age of the entrepreneur, the younger entrepreneur has the necessary motivation, energy and commitment to work and is more inclined to take risks as the older entrepreneurs are likely to have reached their initial aspiration. Basic education enhances the overall quality of the business owner by providing the basic numeric and literacy skills, thus increasing the chance of survival (Carter and JonesEvans, 2000). Some studies state that the fact that a business owner has a higher level of education seems to stimulate the growth and better performance of the firm, thus having an impact on survival, growth and performance (Hall, 2001). The converse argument is that SMEs entrepreneurs who have higher level of education generally achieved lower performance rates than those less well educated (Kenneth, 2006).

Cant and Lightelm (Cant and Lightelm, 2003) in a survey of small business failure maintain that entrepreneurs often have good ideas and are competent but they do not have a clue on how to run a business in an uncertain environment and have no underlying appreciation of business fundamentals. Professional experience has been cited as an important factor affecting many aspects of entrepreneurial firms. Experience takes many guises and breadth of experience is shown to be an important factor driving the performance of firms, with the number of previous jobs positively related to new firm performance (Lumpkin and Marvel 2007). Thapa (Thapa, 2007) reported that the likelihood of SMEs failure was also found to be associated with the owner/manager's work experience prior to business launch and education. The ability of the SMEs entrepreneur to motivate affects the performance of a firm. Beaver (Beaver, 2003) makes a distinction between positive and negative motivation. Positive motivation includes the perception of market opportunities for a product or service and the desire to make money while negative motivation encompasses dissatisfaction with an existing employer and threat of actual unemployment. Blackman (Blackman, 2004) showed that the characteristics of the entrepreneur would influence the following: market opportunity, ways of handling business challenges, personal achievement, employment creation, independence, improvement of social status, profit, growth target thereby having effect on the performance of the firm.

3 Materials and Methods

The objective of this study is to investigate factors influencing of small and medium enterprises in Laos. This study adopts a survey research design to achieve this objective. Data for the study were collected through a standardized questionnaire distributed among 100 owner managers selected from manufacturing SMEs in the Vientiane province. As there was no official list of SMEs established in the Province, 100 SMEs were selected through convenient sampling. In addition to descriptive analysis procedures, bivariate and multivariate analysis of hierarchical linear regression, ANOVA and Chi-square test procedures were used to determine the general relationship between the variables.

4 Results and Discussion

The results of the study show that the respondents have a high level of internal Locus of Control (LOC) and the need for Achievement (n-Ach) in their goal achievement process. Further, the results also prove that owner-managers willing to take a moderately high level of risk in their business activities. The results revealed that owner-managers are in lacking strategy making(Inmyxai & Takahashi, 2012; Onphanhdala & Suruga, 2010; Souksavath et al., 2012; Southiseng et al., 2008) behavior and facing a high level of uncertainty in their business environment. ANOVA shows that significant statistical differences between male and female owner on LOC, n-Ach and risk-taking propensity (RTP).

Table 1   Correlation Coefficients Matrix

Variable	Mean	LOC	n-Ach	RTP	Strategy Making	Environment Uncertainty
LOC	8.25	1.00				
n-Ach	4.35	0.58**	1.00			
RTP	3.36	0.35**	0.25**	1.00		
Strategy Making	3.56	0.12	0.65**	0.07	1.00	
Environment Uncertainty	3.34	0.10	0.38*	0.06	0.62**	1.00
Firm Performance	3.25	0.36**	0.34*	0.03	0.78**	-0.36**

*** Significance at 0.01*
* Significance at 0.05

According to the correlation analysis (Table 1), positive significance correlations were found between LOC, n-Ach with firm performance. Literature relating to the RTP suggests that RTP is positively influenced towards the firm performance, unexpectedly, no significant correlation found between RTP and firm performance. A significant positive relation was found between strategy making and firm performance, and it also identified as a mediating variable strengthens the relationship between an entrepreneur's traits and firm performance.

The moderated influence of environmental uncertainty on strategy making and firm performance were evaluated using hierarchical regression. Table 2 shows the ability of business strategy in explaining the higher variance of firm performance after inserting the variable of environment uncertainty to the model, that is, 47 percent to 48 percent. Partially, the influence of strategy making is positive toward firm performance, but the influence of environmental uncertainty is negative. This means that business strategy implemented by firms will motive firm performance; however, environmental uncertainty will weaken the achievement of good firm performance. The results also show that the interaction variable can explain the change in firm performance significantly (R^2 change by 0.029 and F change by -21.12, p = 0.00). Therefore, it can be concluded that environmental uncertainty is moderating variable towards the relationship between strategy making and firm performance.

Table 2   Regression Summary for the Moderator Variable

Independent Variables	Dependent Variable (Firm Performance)					
	B	p	B	p	B	p
Business strategy (BS)	0.72**	0.00	1.20**	0.00	7.43**	0.00
Environment Uncertainty (EU)	-	-	-0.43*	0.05	4.19**	0.00
Interaction BS x EU	-	-	-	-	-1.212	0.00
R2	0.45		0.56		0.419	
R2 change			0.04		0.121	
F value	132**	0.00	60.32**	0.00	52.14*	0.00

** Significance at 0.01
* Significance at 0.05

5 Conclusion

The aim of this study was to review some of the critical factors that may determine the performance of the SMEs in the Lao context. The study has revealed some important findings. It is also concluded that internal factors such as entrepreneur's internal Locus of Control and Need for achievement and strategy making are positively correlated with firm performance. Further, strategy making abilities of entrepreneurs are vital to achieve their desired business objectives and superior performance in the environment which is rapidly changing, competitive and hostility in the present arena. As the study was limited to only manufacturing SMEs in Laos, replication of the study in other industries, as well as other regions in the country, are needed to validate the current findings. Future studies should give due attention to investigate the benefit of entrepreneurship development and policy implementation in business promotion. To promote the development of the private sector, assessment of the quality and appropriateness of education deserves more consideration in the policy formulation for human resource development (HRD) and Private sector development (PSD). If the policy targets of the government of Laos (GOL) are to be attained, equally important will be needed for systematic monitoring and evaluation of policy implementation.

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Grey Relational Analysis of Factors Influencing High-tech Service Industry in Hubei Province of China

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Abstract: According to the 13th Five-year Plan of service industry in Hubei province, it is urgent to carry on strategies to upgrade service industry, promote its efficient and innovative development and thus build up a service industry highland of the middle and lower reaches of Changjiang River. This paper comprehensively uses the second-hand data analysis method and grey relational degree analysis method to study the factors that influence the development of high-tech service industry in Hubei province. It finds that researchers and R&D expenditure are the most important factors among others. Therefore, it proposes that Hubei province should increase scientific and technological input and improve facilities.
Key words: High-tech service industry; Grey relational degree; Innovation; Strategy

1 Introduction

With the development of productivity, the service industry has been recognized by many scholars as the upgrading of the national economy and the supply of labor market. High-tech service has been the subject of domestic research since the beginning of 21th century, mainly because of the fact that high technology in China began to develop in the century. Different scholars have different definitions of it: the main input factor of high-tech service industry is knowledge, with innovation input and innovation performance (Wei Jiang, 2003); high-tech service industry is the development of high-tech and modern management concept, mode of operation and organizational form (Zhou Zhenhua, 2005). High-tech service industry is the service industry, which is mainly affected by the process of industrialization and the division of social production, and uses modern technology, new service mode and new mode of operation to transform the traditional service industry (Xia Jiechang, 2007). The importance of the innovation in the high-tech service industry has also been affirmed by scholars, the knowledge-intensive service industry is one of the most important agents of technological change and economic growth (Yuan Lihong, 2007). The core of the high-tech service industry is to strengthen the customer participation in the innovation process, and promote the knowledge interactive delivery (Xiao Deyun, Xu Ke, 2013). Service innovation is considered to be the primary driver of innovation performance in a service environment (Chao-hung Wang, 2014).

2 Characteristics and Classification of High-tech Service Industry
2.1 Features of the high-tech service

As a product of technological progress, the high-tech service industry has different characteristics compared with traditional service industry. It has the following characteristics (Lu Weixia, Zhao Liang, 2014):

a. High-tech. High-tech service industry relies on high and new technology. Such information as the influence of macro-economic regulation on consumer's consumption habits can be made through data analysis to make better decisions. Thus, it is necessary to acquire high technology first in order to obtain more accurate information.

b. High added value. High-tech can bring higher service value, while improving the service experience can reduce the waste of resources.

c. High quality of employees. Only when they have a good command of the high-tech can the personnel provide better service.

d. High innovativeness. In order to sustain the competitive advantages in the high-tech service industry, an enterprise should strengthen the innovation of high-tech service industry and form the advantages of differentiation.

2.2 Classification of high-tech service

From the technology dimension high-tech service can be divided into new technology users, the carrier of new technology and the integration of new technology generation (Windrum, 1999); from the knowledge dimension, it can be divided into consulting service, electric business service and technical

service (JinXuejun, 2002); from the interactive dimension, it can be divided into the professional service organization and the mass production service organization(Silvesrour, 1992); from the source dimension, it can be divided into public science&technology service industry and enterprise science & technologyservice industry (Lee, 2003); based on the joint dimension, service dependency and service standardization, high-tech service industry is divided into technical knowledge service, peripheral support service and professional knowledge service industry (Qian Zhongqian, 2004).

3 Analysis of the Development of High-tech Service Industry
3.1 Advantagestatus quo of high-tech service industry in Hubei
The 12[th]Five-year Plan saw a rapid development of service industry in Hubei province,which is playing a more and more important role.

a. The scale of market continues to expand and market participants continue to grow. The growth of service industry in Hubei has kept increasing since 2010, with annual growth rate reaching 10.8%, higher than GDP growth of Hubei. Participants in service industry has also grown rapidly. Up to 2015, service enterprises have reached 65.45million.

b. Hubei is rich in human resources, with strong innovative potential. Hubei province is a talent gathering place, with the number of college students ranked top three and the number of senior technical personnel working in such as the Chinese Academy of Engineering ranked top five in the country.Human resource is the core resource and the core competitiveness of the development of high-tech service industry. In recent years, the number of accepted patents in Hubei is in the forefront of the country, and both the volume of accepted patents and approved patents have kept growing during the decade.

Table 1   Patent Situation in Hubei Province from 2005 to 2016

Project	Accepted Volume (a)				Approved Volume (a)			
	2005	2010	2015	2016	2005	2010	2015	2016
Total	11534	31311	59050	74240	3860	17362	28290	38741
Invention	2038	7410	22536	30204	733	2025	4855	7766
Utility model	4835	12792	27829	35676	2238	10431	19801	25298
Exterior design	4661	11109	8685	8360	889	4906	3634	5717

c. The contribution of service to economic development continues to increase. Finance, logistics, technology information, e-commerce and other modern service industry has accounted for 41.5%of service and have become an important part of the service industry.As to facilitate residents' life, the high-tech service industry, such as e-commerce and shared bicycles, has brought greater convenience to the residents.
3.2 Weakness status quo of high-tech service industry in Hubei
a. Brain drain. Hubei has more than a million college students each year, which is the necessary resource for the development of high-tech service in Hubei. However, the brain drain is very serious.Take Wuhan as an example, with 1.3 million university students, has the second largest number of college students, but brain drain is almost the most serious in China.According to the Antgold's report on university students employment flow in 2015, it shows the top five popular trans-provincial employment migration routes, respectively, Wuhan → Shenzhen, Wuhan → Beijing, Changsha → Shenzhen, Wuhan → Guangzhou and Harbin → Beijing. The main reason why college students can't stay in Hubei is that they are dissatisfied with salary and employment development, and there is a big gap between Wuhan and first-tire cities.

b. Insufficient funds of R&D investment. Until the end of 2010, population in Hubei has reached to 58 million,GDP per capita 50635.85 yuan,and investment in R&D for 5617415 million, which only accounted for 1.896% of GDP in Hubei. The GDP of third industry in Hubeiis 1273.7 billion, accounting for 42.65% of the GDP. It shows that the development of high-tech service in the tertiary needs to be improved, and the government should increase the investment in R&D.

c. Lack of adequate hardware facilities. Infrastructure is the foundation for the development of high-tech industries, including transportation, servers, machinery and equipment, housing and so on. Regions equipped with advanced infrastructure canattract more talents and enterprises gathering. The infrastructure construction of Hubei is not perfect, mainly are:i. not equipped with advanced infrastructure to appeal talents; ii. the real estate problem of high-tech industry area is also a factor restricting the development of high-tech industry. Due to the industrial cluster effect, the store of the

industrial park has become the target of the real estate business, which will make some companies in the high-tech service industry move out of the park because they can't afford the exorbitant rents, which has affected the innovation development of the whole high-tech industry. For instance, 798 Cultural Creativity Zone in Beijing, because the rent is too high, many companies moved out of the park.

4 Grey Relational Degree Analysis

For a factor between two systems, the measurement of the degree of association that changes over time or between different objects is called the correlation degree. In the process of system development, if the trend of two factors is consistent, the degree of synchronization change is high, so the correlation degree is high; if not, the correlation degree is low. Research has shown that there is a positive correlation between science and technology input and industrial economic growth, but the impact of science and technology input on high-tech service industry is still under study, this paper introduces science and technology input as the first research variable which is expressed by R&D funding and scientific activity personnel.

Region with high level of economic development, the value of the service industry will also be higher. High-tech service industry acts as an important part of the service industry, whose development closely related to the whole service industry, which provides a good market environment for high-tech service industry, should be relevant to economic development. The level of economic development is expressed in terms of GDP per capita. And as people's income rises, many new requirements are created, such as VR experience, unmanned aerial aircraft technology, etc. The higher the level of consumers' demand is, the higher the likelihood that high-tech service will be consumed. The level of consumption demand can be expressed in CPI.

In comprehensive, in the grey relational degree analysis, R&D funding, scientific activity personnel, GDP per capita and CPI these four variables are introduced. Because of the lack of access to the production of high-tech service, so here the value of added production is used as another system variable of high-tech service industry. Due to different statistical calibers, the added production of high-tech service was not counted before 2012, therefore, only data from 2012-2016 will be analyzed. MATLAB is used to analyze the influence of these four factors on the added production of high-tech service industry. Table 2 shows the value of these five variables from 2012 to 2016 (The data come from the Hubei provincial statistical yearbook 2013-2017).

Table 2   Value of Five Variables from 2012 to 2016

year	R&D funding (10000 yuan)	Scientific activity personnel(Person)	GDP per capita (yuan)	CPI (%)	added production of high-tech service (million yuan)
2012	3845239	339786	38572.33	1444.3	258.3
2013	4462690	365502	42825.76	1597.4	337.9
2014	5108973	388430	47144.60	1769.9	467.88
2015	5617415	378828	50653.85	1932.7	609.04
2016	6000422	393333	55038.40	2120.2	726.67

The steps are as follows:

a. Set $\{X_i, X_J, X_k, X_l, X_m\}$ as R&D funding, scientific activity personnel, GDP per capita, CPI and added production of high-tech service industry the grey system that forms, where X_i represents i variables from 2012-2016, $x_i= \{x_i(1), x_l(2) ... x_i(5)\}, X_i, X_j, X_k, X_l$ are for comparison series, X_m is a reference sequence.

b. Make the variabledimensionless. Because the data in each factor column of the system may be different in dimension, it is difficult to compare or to get the correct conclusion in comparison, so we should first eliminate the influence of dimension. In this method, the average value of each sequence is compared with the average of the whole sequence, thus new series $\{ X_i', X_j', X_k', X_l', X_m'\}$ are obtained.

c.Handle parameters. Setting the difference series between series X_i' and series as a new series:

$$\Delta_{i,m} =(\Delta_{i,m}(1) ... \Delta_{i,m}(5)),\tag{1}$$
$$\Delta_{i,m}(') =| X_i'-X_m' |,\tag{2}$$

setting the difference series to $\{\Delta_{im}\}$;

setting environment parameter, $\Delta max = \max_{i} \max_{m} \{max\Delta_{i,m}(')\}$, (3)

$$\Delta min = \min_{i} \min_{m} \{min\Delta_{i,m}(')\},$$ (4)

setting resolution factor $\zeta=0.5$;

   d. Calculate association coefficients:

$$r_{i,m}(') = \frac{\Delta min + \zeta \Delta max}{\Delta i,m(') + \zeta \Delta max},$$ (5)

   grey relational degree:

$$r_{i,m} = \frac{1}{5} \sum_{,}^{5} = 1 r_{i,m}(')$$ (6)

Repeat steps c, d, r_{jm}, r_{km}, r_{lm} can be calculated separately, and results shows in figure 1, these four factors all have strong impact on high-tech service industry, especially R&D funding and scientific activity personnel. According to China statistical yearbook (2017), GDP per capita in Hubei is ranked 11[th,] and CPI is ranked in 13th, and science and technology input has grown a lot, which contributes a lot to the development of this industry in Hubei. However, there is big gap in technology input in comparison with other provinces, where needs more efforts-making.
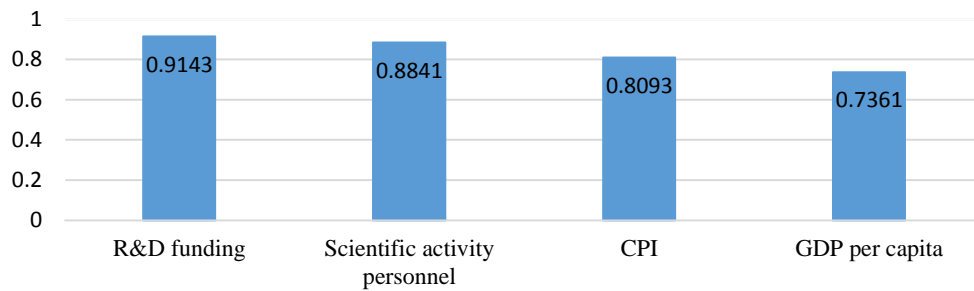
Figure 1   Result of Grey Relational Degree About High-tech Service Industry

5 Innovative Development Strategy for High-tech Service

According to the problems encountered in the development of high-tech service industry in Hubei and the results of grey relational analysis, the following strategies are proposed:

a. Government should increase its investment in high-tech service. In recent years, the R&D funding in Hubei has grown, until year 2016 has grown to 56178 million, but compared to Zhejiang and Jiangsu, whose R&D funding is far more than that Hubei, increased investment is needed. The differentiation advantage of high-tech service industry is embodied in the innovation of science and technology, but innovation is accompanied by high cost and high risk. Many enterprises can only be deterred from innovation, so the government should provide some policy support to encourage innovation. By providing low-interest loans, tax concessions and various subsidy policies, the provincial government can increase its investment in enterprise research and development, thus reduce cost of innovation and reduce risk of innovation and increase the enthusiasm of enterprise innovation. Enterprises should also take advantage of the support of government to strengthen the research and development capabilities of the enterprise, to promote the industry's technological innovation.

b. Strengthen talent retention and achievement transformation in high-tech service industry. The shortage of talents in high-tech service industry is an important restricting factor for the slow development of high-tech service industry in Hubei. Besides R&D funding, scientific activity personnel is another part of technology input. On the one hand, it is important to cultivate a group of high-tech service personnel by cooperating with colleges and universities, fully tap the talent resources; on the other hand, creating a good employment environment, while improving the salary of college students.

The scientific research institutes in Hubei have accumulated a lot of scientific research achievements such as patents and technology, some of which are cutting-edge achievements, but the industrialization of scientific and technological achievements in Hubei is seriously insufficient. Therefore, the scientific and technological service intermediary in Hubei should strive to promote the effective transformation of scientific and technological achievements in the area. For one thing, overcome the institutional mechanism obstacles to the transformation of scientific and technological achievements, resolutely implement the central and Hubei policy measures on encouraging the transformation of scientific and technological achievements; for another, organize the scientific research

institutes in Hubei and the relevant enterprises, especially small and medium-sized enterprises and entrepreneurial enterprises interaction, narrowing the cognitive gap between the two sides, transferring scientific and technological achievements to specific industrial development projects.

c. Perfect hardware facility configuration. On the one hand, we should strengthen the facilities allocation of transportation, logistics and so on, so as to reduce the transaction cost of enterprises; on the other hand, we should actively establish industrial park and absorb enterprises to enter the park, creating a good environment for high-tech service enterprises andforming industrial cluster effect.

d. Encourage the service sector to increase the level of openness. Government should encourage the high-tech service enterprises in Hubei to learn experience from other regions, especially like Beijing, Shanghai and Guangdong; in the area of international cooperation, government should make efforts to attract foreign enterprises to invest in Hubei or set up branch offices, which can introduce new technology to Hubei, and encourage enterprises in Hubei to step into the international market and open their horizons, so better know how to improve the high-tech service industry in Hubei to accelerate its development.

6 Conclusion

Through the grey relational degree analysis, this article obtains the most important two factors that influencing the development of high-tech service in Hubei are R&D funding and scientific activity personnel, and GDP per capita and CPI also have strong impact. Combined with the problems in the current development of high-tech service industry in Hubei, countermeasures of strengthening the innovation and development of high-tech service industry are put forward: government should increase investment in high-tech service, strengthen talent retention and achievement transformation in high-tech service industry, perfect hardware facilities configuration and encourage the service sector to improve the level of openness.

This paper only discusses the development of high-tech service industry in Hubei province, the scope of research is relatively narrow, and the factors introduced in grey relational degree analysis are relatively not sufficient, and the analysis is not comprehensive enough. It is hoped that the future research will be able to study the problem in a larger scope and introduce more factors which affect the development of high-tech service industry to drive the development of this industry.

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Research on Financing Efficiency of Technology Based on SMEs in NEEQ Market: A Case Study of Beijing

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Abstract: Technology-based SMEs are the driving force and important carrier for promoting China's economic development, but their financing difficulties have not been resolved. This article uses the DEA model based on the financial data of the Beijing technology-based SMEs in the NEEQ for the period from 2015 to 2016, from the financing of input and output as the breakthrough point, the financing efficiency of around 2015.Results found that NEEQ market met the financing needs of technology-based companies and its efficiency increased after financing. However, there were still serious problems such as serious capital idling, low capital utilization and excessive scale expansion. Finally, this paper puts forward some suggestions to further enhance the financing efficiency of enterprises from three aspects: the technology-based SMEs,the NEEQ market and the government.
Key words: Technology-based SMEs; NEEQ market; Financing efficiency; DEA model

1 Introduction

Technology-based SMEs are the main carrier of China's technological innovation and an important driving force for economic growth. Although the state attaches great importance to the development of technology-based SMEs, and various departments are encouraged to take various measures to support the development of SMEs. However, the innovation and development of China's technology-based SMEs still face many problems. The establishment of the NEEQ has improved the financial environment of SMEs and has played a significant role in actively promoting the healthy, stable and sustainable development of financial in China. Due to the economic system, foreign scholars have less research on financing efficiency, and there are many domestic research articles on enterprises finance efficiency and the NEEQ. In the research on financing efficiency, applying the DEA model to find that the financing efficiency of SMEs listed on SME board and the GEM is generally inefficient (Gao Shan, 2010); Using the DEA-Malmquist index method to find out the financing efficiency of China's technology-based SMEs, the financing efficiency of China's SMEs is low, and there is a waste of input resources (Wu Juan, 2012); Using the DEA model to measure the financing efficiency of SMEs listed on SME board and the GEM found that its resources have not reached the optimal allocation (Song Guanghui,2017). Although the NEEQ market has eased the problem of financing difficulties, its mechanism still has many problems(SuYa, 2015). The paper selects the research object of the technology-based SMEs, which reduces the bias caused by the individual differences between the research objects in the analysis process. At the same time, the selection of Beijing technology-based SMEs financed by the NEEQ Market as a sample to reduce the influence of regional differences on the analysis.

2 Research Methods

2.1 Model selection

DEA was proposed by the famous American operations researcher Charnes,Coper and Rhodes in 1978. It is a mathematical programming method for the relative effectiveness of homogeneous decision-making units (DMUs). Its essence is to calculate the weight of each input and output variable of the DMU. C^2R and B^2C are two basic models of DEA. The premise of using the C^2R model is the assumption that the scale returns are unchanged and the technical efficiency (TE) is obtained. The technical efficiency index can be decomposed into pure technical efficiency (PTE) and scale efficiency (SE). The technical efficiency of a company when pure technical efficiency is changed by scale returns can be solved by the B^2C model. Assume that there are no decision units, each of which has K inputs and M outputs. Under the assumption of constant scale returns, the C2R model of DEA input Angle:

$$Min_{k,1}K$$
$$s.t.\, Y_1 - y_j \geq 0, k_{x_j} - X_1 \geq 0,1 \geq 0 \tag{1}$$

Under the assumption of variable returns on scale, the B^2C model of DEA input perspective:

$$Min_{k,1}K$$
$$s.t. Y_1 - y_j \geq 0, k_{x_j} - X_1 \geq 0, I_1 = 1, 1 \geq 0 \qquad (2)$$

Among them, for the first j decision unit, the K-dimensional input column vector and the M-dimensional output column vector are represented by x_j and y_j, respectively, and X and Y represent the input data matrix and the output data matrix of the n decision units respectively. For K rows and N columns and M rows and N columns of matrices. I am used here to represent an n-dimensional row vector whose elements are all 1. l is an n-dimensional column vector whose elements represent the weight of the corresponding decision unit.

2.2 Selection of indicators

Technology-based SMEs are characterized by high investment, high risk, high profit and fast growth. Therefore, it is necessary to determine the input and output indicators that meet the characteristics of the enterprise in order to correctly use the DEA method. Considering the scientificalness and effectiveness of data, this paper selects three input indicators and three output indicators.

Table 1   Input and Output Indicators

Financing efficiency index	Index name	Index meaning
Input indicator	Total assets	Reflects the size of the company
	Main operation cost	Reflects the ability of the company to use assets
	Debt to assets ratio	Reflects the impact of capital structure on financing efficiency
Output indicators	Return on equity	Measures the efficiency of corporate capital operations
	Main operation income growth rate	Reflects the company's future development capabilities
	Total assets turnover	Reflects capital operating capacity and internal management

2.3 Data selection and source

The paper selects Beijing as a case. It mainly considers that Beijing is one of the most economically active cities in China. Technology-based SMEs cover a wide range of industries and are representative. This article selects the technology companies that were listed on the NEEQ in Beijing from 2014 to 2016, and excluding those companies that have been delisted, incomplete financial statements and abnormal financial conditions, a total of 45 sample companies have been selected. The data comes from the company's annual financial report and the WIND financial advisory database disclosed on the official websites of the exchanges.

3 Empirical Research

3.1 Statistical description of the sample

Data of input and output indicators were obtained from the annual reports of each sample company in 2014, and their mean values were calculated. The statistical results were shown in table 2 and table 3.

Table 2   Input Indicators

Asset size (10000 ￥)	Number of companies (45)	Debt to assets ratio(%)	Number of companies (45)	Main operation cost(10000 ￥)	Number of companies (45)
≥10000	3	≥80	1	≥6000	2
7000-10000	1	50-80	10	4500-6000	1
4000-7000	6	20-50	24	3000-4500	6
1000-4000	31	<20	10	1500-3000	8
<1000	4	—	—	<1500	28
Mean	3172.95	Mean	35.53	Mean	1797.34

Table 3   Output Indicators

Return on equity(%)	Number of companies (45)	Main operation income growth rate(%)	Number of companies (45)	Total assets turnover(%)	Number of companies (45)
≥40	8	≥100	10	≥200	8
30-40	2	70-100	3	160-200	7
20-30	7	40-70	7	120-160	10
10-20	8	10-40	13	80-120	10
0-10	18	0-10	7	40-80	8
<0	2	<0	5	0-40	2
Mean	23.72	Mean	72	Mean	141.23

In table 2, companies with total assets of 10-40-million-yuan account for 68.89% of the total number of companies, and the average asset size of the sample company is less than 40 million yuan., and the main operation cost is relatively low, with an average of 17.97 million yuan.The average debt-to-equity ratio is 35.53%, and the asset-liability ratio of more than half of the companies is less than 50%, indicating that the debt-to-asset ratio of selected SMEs in Beijing is relatively low.

In table 3, 40% of the company's return on equity is 0-10%, the average value of sample companies is 23.72%; the growth rate of main operation income is higher than 100% of the companies reached more than 22% of all companies. It can be seen that the technology-based SMEs in Beijing had strong growth before they were listed;The mean value of total assets turnover rate is 141.23%, and the total assets turnover rate of 35 companies is over 80%, accounting for 77.78% of the company. Among them, the total assets turnover rate of 8 companies is over 200%, which reflects that the total assets turnover rate of the sample company is relatively high.

3.2 Financing efficiency static analysis

The C^2R model and the B^2C model were constructed using the input and output indicators before financing, in the year after financing, and in the second year after financing, selected from the raw data of 45 sample companies listed on the NEEQ market in Beijing. The data envelopment analysis software DEAP2.1 calculates the financing efficiency and obtains the average financing efficiency of the sample companies in 2014,2015 and 2016. The calculation results are shown in Table 4:

Table 4   The Mean Value Financing Efficiency of Sample Companies

The efficiency of the mean	TE	PTE	SE
Before financing(2014)	0.408	0.622	0.600
After financing(2015)	0.542	0.725	0.691
Follow-up financing(2016)	0.556	0.681	0.799

As can be seen from table 4, whether it is TE, PTE or SE,the average value of 45 sample companies in Beijing after financing is greater than that before financing. Among the 45 sample companies, the technical efficiency (TE), scale efficiency (SE) and pure technical efficiency (PTE) after financing were higher than the number of enterprises before financing, which were 26, 29 and 26, accounting for 57.78%, 64.44% and 57.78%, respectively, of the 45 sample companies. It can be seen that the financing efficiency of financing has been further improved.

3.3 Dynamic analysis before and after financing: 2015-2016

The static financing efficiency of selected sample companies in 2015 has not yet fully demonstrated their overall situation. So, we can compare the financing efficiency of 45 companies listed in Beijing in 2015 and 2016. From Table 4, we can see that in addition to the average value of pure technical efficiency lower than 2015, the average financing technology efficiency and scale efficiency in 2016 are higher than in 2015.
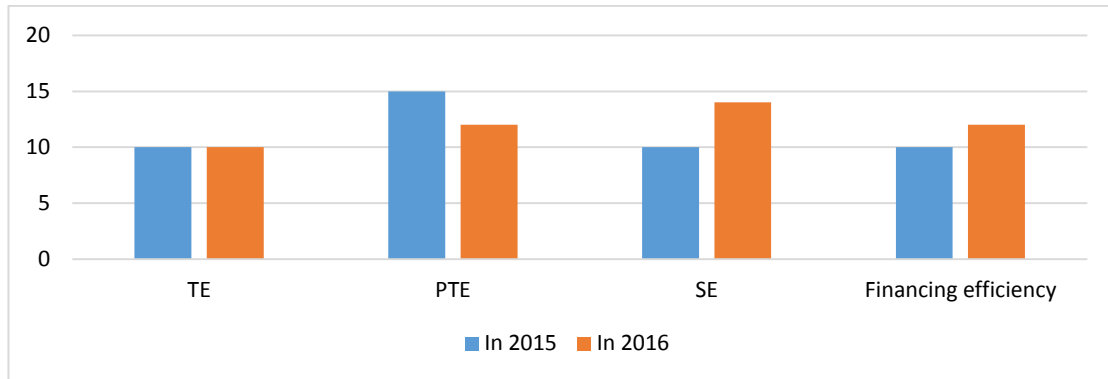
Figure 1　Comparison of Effective Financing Efficiency of Sample Companies

From figure 1, we can see that after listing on the NEEQ market, the financing efficiency of enterprises tends to increase. The increase of financing efficiency in 2016 is the main reason for the improvement of the financing technology efficiency. This is also consistent with the trend of China's vigorously supporting technology-based SMEs. With the introduction of some national policies, and the development of financing platforms becoming more and more standardized, it can be seen that the financing efficiency of Beijing's SMEs is gradually improving. It shows that technology-based SMEs are vulnerable to the impact of national policies, and the improvement of their financing efficiency is closely related to the country's environment. However, the majority of companies still experience diminishing returns to scale. Therefore, the scale should be appropriately reduced and funds should be invested in efficient projects. The reduction in pure technical efficiency also indicates that it should increase its technical level of input, increase output, and reduce the problem of redundant funds.

4 Conclusion

By using the DEA model to calculate and analyze the financing efficiency of 45 technology-based SMEs in Beijing before and after financing, we can find that the financing efficiency of the technology-based SMEs has been improved, and the NEEQ market to a certain extent, to satisfy the small and mid-sized enterprise financing needs, but after the financing of SMEs, there are serious idle funds, low capital utilization, and excessive expansion. For this reason, based on the above research, we can propose suggestions for further improving the financing efficiency of SMEs:

4.1 Suggestions for Technology-based SMEs

First, technology-based SMEs strengthen innovation and upgrade their core competitiveness. For technology-based companies, innovation is the driving force for development. Second, companies must enhance the efficiency of the use of funds and avoid the idle and waste of funds. They should maintain a moderate expansion strategy, control their own development scale and improve the efficiency of resource. Third, companies choose the right financing method. Whether it is listed on the NEEQ, the Main Board or the Growth Enterprise Market, the most important thing is to adapt to own financing needs and consider the financing costs of the listing.

4.2 Suggestions for the NEEQ market

On the one hand, the internal mechanism should be improved to strengthen the review and screening of listed enterprises.The NEEQ market just started running, due to the internal screening mechanism is not perfect enough, and the financial threshold is low, which leads to the lack of attention to the integration of funds after listing, making the development and financing of enterprises in an inefficient state. On the other hand, we must improve the transfer and delisting mechanism of the NEEQ market and accelerate reform of the market-making business system. Improving the mechanism of refunding can stimulate the development of enterprises and provide a good financing environment.

4.3 Suggestions for the government

On the one hand, as the supervisory department of the industry, the China Securities Regulatory Commission must actively maintain a fair, open and fair market environment for the NEEQ market and maintain a good market order. The government must strengthen its guiding role and introduce relevant support policies. Therefore, the government can optimize the technology and financial environment and increase financing channels through various financial intermediaries such as venture capital guidance funds, policy guarantee institutions, and technology sub-branches.On the other hand, we must strengthen

the construction of multi-tiered capital markets and promote the rapid development of SMEs. With the gradual increase of the thresholds for the listing of small and medium-sized boards and GEM, the NEEQ market and the regional equity transfer market have become the best choice for technology-based SMEs in the seed period, start-up period and growth period to get out of financing difficulties.

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Impact of Institutional Ownership on the Corporate Governance

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Abstract: A great number of enterprises reform the ownership structure, for the sake of improving the corporate governance structure and promoting financial performance. Actually, institutional ownership plays a positive role in improving the corporate governance. Company managers are expected to introduce institutional ownership, so impact of institutional ownership on the corporate governance becomes the hot spot atpresent. In this article, after introducing the classification and features of institutional investors, the author analyzed the participating mechanism of institutional investors in corporate governance, selected the financial data of listed companies as samples, and constructed the mathematical model for statistical analysis, the result shew that there was a positive correlation between institutional ownership and financial performance. Finally, the research proposed suggestions on developing the governance role of institutional investors.

Key words: Institutional investors; Corporate performance; Corporate governance; Ownership structure

1 Introduction

In China, since listed companies generally have the ownership structure of the single-large shareholder. In addition, considering omission of other governors, it is common that substantial shareholders encroach on interests of corporations. Learning from western countries, institutional investors develop an important role on corporate operation and supervision. As a result, the supervision department places great hopes on institutional investors, which will develop a positive effect on corporate governance.

It is widely believed that the academic circles have the diverse comprehensions on institutional investors. The Western Scholars(Davis, Steil, 2001) described institutional investors as special financial institutions and gathered medium and small investors together to stand for their interests, engaged in investment activities in the specific range of time and risks, and pursued for benefit maximization. The Chinese scholars(Zhou Zhengqing, 1998) enumerated institutional investors as eight categories including insurance companies, securities companies, social insurance funds, securities investment funds, and qualified foreign institutional investors(QFII) in the Textbook of Securities Knowledge.

From the perspective of the relationship between institutional investors and corporate governance, after scholars(Bushee, 2000) investigated more than 200 institutional investors, the author found that when these investors make an investment decision, they pay more attention to the corporate governance status in line with investment status. In addition, the study of professor (Mcconnell, Servaes, 2003) also showed that the stocks held institutional investors have the positive correlation. While the study of Chinese scholars (Wang Kun, Xiao Xing, 2005) indicated that Chinese institutional investors can participate in the corporate governance activities to some extent. The professor(Li Qiang,2015）selects listed companies in China as the research object, and concludes that institutional investors' shareholding can promote the performance of enterprises. The author(Xu Qin, 2016) believes that the regulatory mechanism of institutional investors in China's capital market is not perfect, which is not conducive to the improvement of corporate performance. Comprehensive domestic and foreign research, because of large investment, institutional investors have the power to supervise the operation of the enterprise and assess the management activities, thus promoting the improvement of the enterprise financial performance level.

2 The Mechanism Analysis for Institutional Investors to Participate in the Corporate Governance

By making a comparison between institutional investors and individual investors, institutional investors have the following features: (1) Professional project management: institutional investors generally set up a professional department in information collection, corporate study, and decision-making analysis. Experts will be responsible for operation, but individual investors are often lack of professional knowledge and skills. (2) Structural modularization: capital of institutional investors gather the idle funds, so they are relatively sensitive to capital safety and risks. In order to reduce the

investment risks, institutional investors often devote themselves to optimizing investment structure. In fact, individual investors often have limited capital, so they are hard to do the effective portfolio. (3) Behavior standardization: institutional investors are economic entities with status of a legal person, so their investment behaviors are supervised in multiple aspects. At the same time, in order to improve investment earnings and maintain customer interests, institutional investors will autonomously standardize their investment behaviors （Xu Meifang, 2010）.

Corporate governance refers to supervise and balance operators by subsidiary corporation owners, including the governance structure constituted by shareholders, directors, supervisors and managers. Just institutional investors are equipped with the above-mentioned features, so they own the stock voting right for units to be invested, so as to participate in the governance activities through communication with managers, performance assessment and proposal of shareholder, improve management efficiency of the companies, gain investment earnings and reduce investment risks.

2.1 The mode for institutional investors to participate in the corporate governance

Collection of voting right: under the circumstance with the scattered stocks, a single shareholder holds few shares, so it is hard to play a decisive role in voting in the general meeting of stockholders, thus when institutional investors express different opinions and strive for voting right, they can collect stock voting right of other minority shareholders, so as to reinforce its role in decision-making and governance by virtue of proxy voting.

Communication with managers: institutional investors can positively communicate with company managers through board meeting, private meeting, visiting and investigational studying to effectively discuss investment decision-making and governance structure.

Proposal of shareholders: when the power of institutional investors is constantly expanded, their proposal is hard to be neglected by company managers. Particularly, when the proposal of institutional investors gains the higher approval rating, this proposal becomes the weight of institutional investors to negotiate with managers.

Performance assessment: institutional investors can exert pressure on company managers by evaluating board of directors and assessing corporate performance. Meanwhile, institutional investors can link corporate performance with managers of directors' salary, so as to affect the corporate governance.

2.2 Effect of institutional investors to participate in the corporate governance

They can reduce governance costs and form economy of scale. Institutional investors can gather idle funds to invest. With the expansion of capital scale, governance costs of apportion per share are decreased (Huang Qian, 2009) At the same time, due to large capital trading volume, it is easy to form the economy of scale.
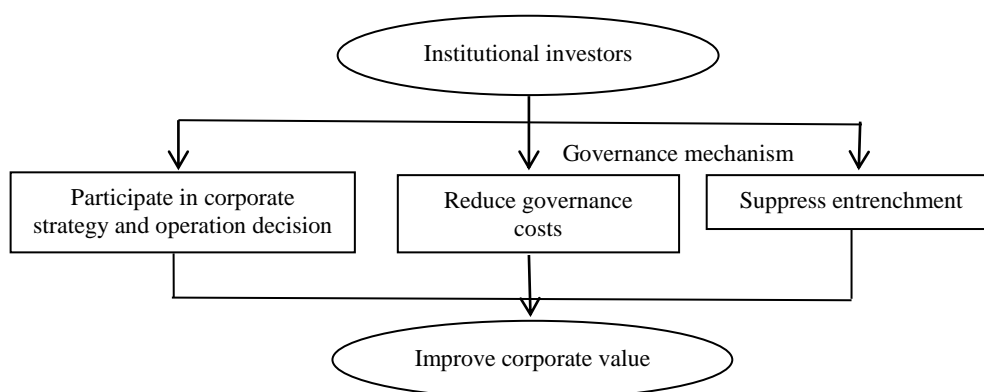
Figure 1　Mechanism for the Institutional Investors to Participate in Corporate Governance

When institutional investors participate in corporate governance, they can reduce dilemma of the single investor. Since the single investor holds few shares, the power is limited. Therefore, it is difficult to do effective communication with company management and hard to master full information, thus it is not good for participating in the corporate governance, so as to form the dilemma of the single investor. Institutional investors gather idle funds and have more shares, so they are relatively easy to participate in the corporate governance.

When institutional investors participate in the corporate governance, they can restrain entrenchment

of controlling shareholders (Wu Xiaohui, Jiang Yanfu, 2006). Controlling shareholders use their status and information asymmetry and utilize related-party transaction and malignant bonus to embezzle company property and damage interests of minority shareholders. Institutional investors can utilize information control and stock voting right to restrain entrenchmenteffectively.

3 Correlation Analysis Between Shareholding of Institutional Investors and Financial Performance

3.1 Research hypothesis

Institutional investors participate in corporate governance to implement the direct supervision on the management. They have the stock selling right in the secondary market, so as to indirectly supervise managers. All of these can promote management to improve the corporate governance and improve financial performance. In addition, it is good for institutional investors to gain the higher investment earnings.

As a result, this author in this thesis showed that shareholding of institutional investors can promote the improvement of financial performance, thus the author proposed the research hypothesis in this thesis.

Hypothesis: there is a positive correlation between shareholding of institutional investors and financial performance.

3.2 Sample selection

In this thesis, the author selected financial data disclosed by A-share listed companies in Shanghai and Shenzhen from 2009-2016 and treated with it in a necessary manager, including eliminated ST and *ST listed enterprises and eliminated incomplete enterprises of data disclosure. In the end, the author gained 10320 samples. After conducting the preliminary statistics, the author used Stata software for analysis.

3.3 Variable design

Dependent variable: the return on total assets of enterprises was used to measure the financial performance, marked as IAROA.

Independent variable: shareholding ratio of institutional investors was measured by using the absolute shareholding ratio and relative shareholding ratio, marked as INSH and Balance, respectively.

Regulated variable: the factor affecting the financial performance was designed as the regulated variable, including SIZE, R&D, LEV and GROWTH.

Table 1   Variable Design and Explanation

Types	Name		Marks	Notes
Dependent variable	Financial performance		IAROA	If the return on total assets is larger, it shows that financial performance of enterprises will be higher.
Independent variable	INST	Absolute shareholding ratio	INSH	If the sum of investors' shareholding ratio is higher, it shows that institutional investors have the higher occupation in stock rights.
		Relative shareholding ratio	Balance	The specific value between institutional investors' shareholding ratio and controlling shareholders' shareholding ratio
Control variable	R&D		R&D	Specific value of innovative input in business incomes
	LEV		LEV	Specific value between total liabilities and total assets
	SIZE		SIZE	Absolute number of total assets
	GROWTH		GROWTH	Growth rate of business incomes

3.4 Model construction

In order to demonstrate the hypothesis in this thesis, the following regression model was constructed:

$$IAROA = \beta 0 + \beta 1 INSN + \beta Balance + \beta R\&D + \beta 4 LEV + \beta 5\ SIZE + \beta 6\ GROWTH + \varepsilon \qquad (1)$$

3.5 Result analysis

As shown in Table 2, the regression coefficient between the absolute shareholding ratio of institutional investors(INSH) and financial performance IAROA was 0.438, while the regression coefficient between relative shareholding ratio Balance and financial performance IAROA was 0.402,

indicating that absolute shareholding or relative shareholding passed the significance testing, showing that there was the positive correlation between shareholding of institutional investments and financial performance.

Table 2   Statistical Analysis Table

Variables	IAROA		
	B	T	P
Con_s	0.661	5.93	0.0031
INSH	0.438	4.93	0.0044
Balance	0.402	4.64	0.0015

4 Suggestion on Reinforcing Institutional Investors to Participate in Corporate Governance

4.1 Cultivate diversified institutional investors

Shareholding of institutional investors has the important role on improving corporate governance, thus it is necessary to promote harmonious development of institutional investors, cultivate diversified institutional investors, expand social security funds and scale of entry for pension funds, and broaden admission of QFII, while stabilizing securities investment funds.

4.2 Guide institutional investors to develop a positive role on corporate governance

Institutional investors develop a positive role on the corporate governance by virtue of stock voting right and right of making motions, so as to improve financial performance. As a result, it is necessary to positively guide governance role of institutional investors and support in-depth participation in corporate governance and supervision in policy-making and system design.

4.3 Optimize ownership structure and create conditions for introducing institutional investors

In China, since ownership structure of listed companies is irrational, controlling shareholders become the single-large shareholders. Hence, controlling shareholders occupy the absolute predominance in the corporate governance and they often embezzle interests of corporations. To sum up, it is imperative to reform the ownership structure in listed companies. Institutional investors can be positively introduced in the reform with certain ratio and this is good for main shareholders to balance each other and improve governance level of the companies.

4.4 Reinforce supervision on institutional investors

Capital of institutional investors is originated from investment individuals. The capital earnings and safety influences are extensive, thus it is necessary to reinforce supervision of institutional investors' investment behaviors, intensify capital delegation responsibilities, and implement the effective performance assessment on fund managers, promote rational investment of fund managers, reduce risks, and positively develop governance role of institutional investors.

5 Conclusion

It can be observed from the above-mentioned analysis that shareholding of institutional investors exactly will improve corporate governance structure, so as to improve financial performance. After multiple years of development, Chinese institutional investors have certain scale with the development of capital market, but the effect in corporate governance is not enough, because institutional investors don't have enough cognition on participation in corporate governance. As a matter of fact, institutional investors in corporate governance can enhance corporate performance and it is mutually promoted with the development of institutional investors. Under the background of sound development in the capital market and improvement of governance in listed companies, it is necessary to cultivate the diversified institutional investors and develop the positive governance effect.

In this thesis, the author studied the relationship between shareholding of institutional investors and corporate performance, drew a conclusion that institutional investors can improve corporate governance. However, the author didn't conduct the in-depth study on specific performance of institutional investors in the corporate governance behaviors, so it is expected that the author will further discuss it in the future study.

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Executive Incentives, Innovation Investment and Enterprise Growth

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Abstract: In order to explore the relationship among the top management incentive, the innovation investment and the enterprise growth, this article takes the GEM listed companies as the research object, selects the data from 2014 to 2016 as samples, and applies multiple linear regression analysis. The results show that, (1)The executive incentive of payment and shareholding are both positively related to corporate growth. But the correlation between promotion incentive and corporate growth is not significant. (2)Either the implementation of compensation incentive or equity incentive is conducive to the promotion of investment on innovation projects, while promotion incentives have no significant effect on corporate innovation investment. (3)Innovation investment plays an intermediary role in the effect of executive incentive on enterprise growth.
Key words: Executive incentives; Innovation investment; Enterprise growth; Mediating effect

1 Introduction

Now China is in an important stage of economic transformation. Efforts to carry out innovation-driven strategies, to develop High-tech business, help improve China's capital market and promote the sustainable socioeconomic growth. With the development of technology, technological economy leaded by science is becoming a new form of economic development. Technological innovation has gradually become one of the ways for the enterprise to seek the long-term development. In the GEM market, which is dominated by high-tech enterprises in China, the demand for improving the ability of independent innovation is more intense.

Foreign and domestic scholars hold different views on the relationship between executive incentives and corporate performance.Mehran (Mehran, 1995) finds that CEO compensation incentives are the driving force behind CEOs' ability to improve company performance and corporate performance is positively related to CEO shareholding. Sesilt et al. (Sesilt et al., 2007) and Frye (Frye, 2001) find that companies provide employees with more equity incentives perform better.Kothari (Kothari, 2005) obtains empirical data from relevant companies in three countries: Higher level of executive incentives exists in enterprises with better growth ability, and the level of executive incentives is positively correlated with performance.Marianna et al. (Marianna et al., 2006) use panel data analysis to study the relationship between executive stock ownership and corporate performance in listed companies in the United States.The results proved that with the increase in the number of stock options held by executives, executive stock holdings will have a certain positive impact on corporate performance. Gasparyan and Gasparyan (Canarella G, Gasparyan A, 2008) show that there is a significant positive correlation between executive currency compensation and company performance.Some Chinese scholars believed that there is no significant positive correlation between executive compensation and corporate value. Due to the interference of external factors, the effect of China's listed companies on the compensation incentives of executives is not satisfactory, and it is necessary to further optimize the corporate governance mechanism to enhance the effect of executive compensation incentives (Zhou Yean, 2000; Wei Gang, 2000). Chen Xiaohong et al. (Chen Xiaohong et al., 2007) confirm that the growth of small and medium-sized companies is significantly positively correlated with management's salary and there is a significant U-shaped relationship with shareholding ratio, indicating that salary incentives and moderate equity incentives have a positive impact on the company's growth.Hou Jianping, Li Yunxin (Hou Jianping, Li Yunxin, 2015) divide executive incentives into compensation and equity incentives. After using EVA to measure performance indicators, it is concluded that executive incentives promote corporate performance, while corporate performance also promotes executive incentives to a certain extent.

Himmelberg et al. (Himmelberg et al., 1999) pointed out that in order to encourage managers to engage in more technological innovation activities, high-tech enterprises should pay more attention to the implementation of executive incentives. The conclusions of Lee et al. (Lee et al., 2005) indicate that different regions and industries have different characteristics, so the role of executive incentives in the technological innovation investment is different. In U.S. high-tech companies, the increase in executive compensation will prompt executives to "outsource" technology and equity incentive will encourage

senior executives to strengthen internal R&D efforts (Xue Y., 2007). Bulan & Sanyal (Bulan, Sanyal, 2011) argue that equity incentives are significantly positively related to the number of patents, and that the number of corporate patents will increase as the sensitivity of stock prices held by executives increases.In China, based on the data of China's GEM listed companies in 2009-2012, Yu Xueran, Hu Yan (Yu Xueran, Hu Yan, 2015) find that short-term remuneration and long-term equity play a certain role in promoting R&D investment.Chen Yan (Chen Yan, 2015) also confirms the view that executive incentives, which are measured in terms of shareholding and compensation, are positively affecting corporate performance. But Du Jian, Zhou Xin and Zeng Shan (Du Jian, Zhou Xin, Zeng Shan, 2012) found that the executive incentive mechanism is not the positive impact and technological innovation R & D investment level.

Du Yong et al. (Du Yong et al., 2014) point out that R&D investment is significant and positively related to a firm's profitability in China. Zhu Naiping et al. (Zhu Naiping et al., 2014) find that there is a significant positive correlation between R&D expenditures in innovation investment and corporate performance, and there is no significant correlation between the number of innovators and firm performance.

In summary, the review of relevant literature in this paper find:Whether it is foreign or domestic scholars, there have been many research results based on executive incentives, innovation investment and corporate performance.These research results show that there is a high probability that innovative R&D investment may have a dual identity, which may be the result of executive incentives or the cause of corporate performance improvement. In previous studies, most researches on executive incentive focused on compensation incentive and equity incentive. Our study will introduce promotion incentive, and take technological innovation as a mediator to explore the impact of executive incentives on GEM listed company's growth.

2 Empirical Predictions

Incentive theory points out that the implementation of effective compensation incentive by enterprise can improve the enthusiasm of managers. Managers will make more efforts to increase their own salaries and make decisions that are conducive to the growth of the company. Due to the separation of ownership and management, senior executives often choose conservative projects and give up high-risk projects in pursuing their own good. As an important incentive method, equity incentive can closely link the management personal interest with the cooperate interest, leading executives to consider the long-term development of the company. With the extension of tenure and the increasingly improvement of management capability, the returns required by executives are no longer limited to the increase in remuneration, but also the pursuit of non-remunerative incentives, especially the pursuit of promotion. When the company is difficult to evaluate the individual performance of the executives, the promotion incentives may have more advantages than the material incentives (Kato and Long, 2011). Based on the above analysis, we propose our first hypothesis:

H1: There is a positive correlation between executive incentives and enterprise growth.

Maslow's hierarchy of needs points out that companies meet executives' compensation demands can make them think their own interests are not threatened, and then their enthusiasm for innovation can be mobilized.Some foreign scholars believe that managers will reduce their investment in technological innovation because of their own interests. In recent years, most scholars in China have found that executive compensation incentive has positive effect on innovation input (Wang Yanni, 2011; Chen Xia, 2017). It probably related to China's policies.China's accounting policy provides that enterprises can capitalize eligible R&D expenses, so cooperate profit will not be significantly reduced. To some extent, this policy, encourages management to increase investment in technological innovation.To obtain high yield, those GEM listed companies with high-growth have strong dependence on future possibilities of investment, and appropriate executive incentives will encourage managers to increase their R&D efforts on high-yield products. So effective executive incentives can have positive impact on innovation investment.Based on the above analysis, we propose our second hypothesis:

H2: Executive incentives have positive effect on corporate innovation investment.

The high-tech companies in GEM listed companies account for a large proportion. For these companies, innovation is an important source of business growth. On the one hand, enterprises can provide differentiated products and services for users through technological innovation, improve new profit margin and gain persistent competitive edge. On the other hand,Enterprises can update equipment, increase production efficiency, reduce manufacture cost, and then obtain price advantage in the market.

Stable income and profit are the key to the sustainable growth of enterprise.Based on the above analysis, we propose our third hypothesis:

H3: Innovation investment is positively associated with enterprise growth.

Most of the companies listed on the GEM are technology-intensive enterprises. Technological innovation is beneficial to the company's long-term vitality. Implementing incentive measures for senior executives will lead managers to increase technological innovation when making decisions. Thus,innovation investment plays an important role in the process of executive incentives affecting corporate growth.Executive incentives can promote innovation investment, while investment in innovation can promote business growth.Based on the above analysis, we propose our fourth hypothesis:

H4: Innovation investment plays an intermediary role in the effect of executive incentives on enterprise growth.

3 Sample and Proxies
3.1 Research sample and data source
Our dataset is obtained from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company.We selects the initial sample of China's GEM listed companies from 2014 to 2016, including 283 companies after the screening process. We eliminate firms in the financial sector (banks, insurance, and other financial firms), as they are subject to different disclosure requirements in China. ST/PT firms are also excluded because their financial conditions are abnormal. Additionally, the key financial variables are winsorized at the 1st and 99th percentiles to avoid the influence of outliers. And we adapt SPSS22.0 and STATA14.0 to process the data and perform analysis.

3.2 Variable designs
Regarding how to evaluate enterprise growth, domestic and foreign scholars have put forward many different methods, but there is no uniform standard. In order to overcome the limitations of the single indicators, based on the summaries of existing scholars, this paper selects seven indicators that represent the company's financial status and future development potential and to construct a comprehensive evaluation system for corporate growth, including profit growth, growth rate of gross operating income, assets profit margins, return on equity, growth rate of total assets, net profit ratio and BM ratio. SPSS22.0 is used for factor analysis to calculate comprehensive index of corporate growth (*Growth*).

This paper describes the level of executive incentives in terms of compensation incentives (*Pay*), equity incentives (*Sto*) and promotion incentives (*Gap*). Executive compensation incentives (*Pay*) are measured by the natural logarithm of the total remuneration of directors, supervisors, and executives. Higher value indicates the better effect of incentives. To measure equity incentives (*Sto*), we use the percentage of shares held by senior executives in the total number of corporate shares. Following the literatures of Kale et al. (Kale et al., 2009) and Kini et al. (Kini et al., 2012), this paper uses the pay gap between non-chairman executives and the chairman of the board to measure promotion incentive (*Gap*). According to the practice of Wang Yanni (Wang Yanni, 2011), this paper selects the variable of R & D input / revenue of major activities to reflect the intensity of the company's innovation investment (*RD*). Based on previous literature, this paper selects the size of the company (*Size*), asset-liability ratio (*Lev*) and annual (*Year*) as control variables. And the size of the company is described by the natural logarithm of the number of employees at the end of the period.

3.3 Model
To examine the impact of executive incentives on corporate growth, executive incentives are used as independent variables, and cooperate growth is the dependent variable. The following model is established:

$$Growth = \beta_0 + \beta_1 Pay + \beta_2 Sto + \beta_3 Gap + \beta_4 Size + \beta_5 Lev + \beta_6 Dual + \varepsilon \qquad (1)$$

To examine the impact of executive incentives on innovation investment, executive incentives are used as independent variables, and innovation investment is the dependent variable. The following model is established:

$$RD = \beta_0 + \beta_1 Pay + \beta_2 Sto + \beta_3 Gap + \beta_3 Size + \beta_4 Lev + \beta_5 Dual + \varepsilon \qquad (2)$$

To examine the impact of innovation investment on the enterprise growth, innovation investment is used as an independent variable and enterprise growth is a dependent variable. The following model is established:

$$Growth = \beta_0 + \beta_1 RD + \beta_2 Size + \beta_3 Lev + \beta_4 Dual + \varepsilon \qquad (3)$$

In order to examine the moderating role of innovation investment in executive incentives influencing corporate growth, this paper adapts the method of Baron and Kenny (1986) to test the mediating effect and controls the impact of innovation on the basis of model (1). If the mediating effect exists, the influence of executive incentives on enterprise growth should be reduced. In other words, when β_1, β_2 and β_3 are reduced and the correlation is insignificant, the innovation investment is totally mediated. When β_1, β_2 and β_3 are reduced but the correlation is still significant, the innovation investment is partially mediated. Therefore, the following model is established:

$$Growth = \beta_0 + \beta_1 Pay + \beta_2 Sto + \beta_3 Gap + \beta_4 RD + \beta_5 Size + \beta_6 Lev + \beta_7 Dual + \varepsilon \qquad (4)$$

4 Empirical Methodology

Table 1 shows summary statistics of variables. The maximum value of executive compensation incentive indicators is 16.394, the minimum value is 13.924, and the standard deviation is 0.520. It indicates that there are certain differences in executive compensation incentive levels of China's GEM listed companies, which may be due to differences in the number of senior executives. The managers' shareholding ratio gap is large, but the average is 0.346 and the standard deviation is 0.186. This shows that the phenomenon of executive ownership is common and the ratio is relatively high. The average value of promotion incentive indicators is 12.633, the maximum is 14.338, and the minimum is 10.592, indicating that the pay gap of the top management is relatively large. The standard deviation of the investment index for innovation is 0.064, with an average of 0.074. From the data, it can be concluded that the GEM listed companies are highly valued in innovation investment and provide favorable support for the company to maintain a good growth. In addition, the company size and capital structure of different companies are quite different.

Table 1   Summary Statistics of Variables

variable	min	max	mean	sd	N
Growth	-1.014	1.349	-0.003	0.400	846
Pay	13.924	16.394	15.058	0.520	846
Sto	0.002	0.706	0.346	0.186	846
Gap	10.592	14.338	12.633	0.742	846
RD	0.005	0.371	0.074	0.064	846
Size	5.056	9.198	6.934	0.816	846
Lev	0.041	0.684	0.294	0.158	846

In model (1), the coefficient of executive compensation incentives and equity incentive indicators pass the significant test, indicating that greater compensation incentives and higher proportion of senior management shareholdings will lead to better enterprise growth. But the correlation between executive promotion incentives and corporate growth is not significant, indicating that the effect of executive pay gap on the company growth is not obvious. The regression coefficient of firm size is positive and significant at the level of 1%, showing that large firm size can generate economies of scale and bring more funds to the company, which helps the enterprise to increase its competitiveness. The regression coefficient of the asset-liability ratio is negative, and a 1% level of significance test is adopted, indicating that a high proportion of debt structure will limit the long-term development of the company.

Model (2) shows that executive compensation incentives and equity incentives, are significantly positively correlated with innovation investment at the 1% and 10% levels, respectively, indicating that both of them are positively related to innovation investment. That is, by increasing executive compensation incentives and equity incentives, companies can significantly improve the managers' work enthusiasm and promote their decision to increase investment in technological innovation. However, there is no obvious correlation between executive promotion incentives and innovation investment, which is inconsistent with H2. The asset-liability ratio has a significant negative correlation with innovation investment, which means that companies with high proportion of liabilities will have greater financial risks in the future and will reduce investment in innovation. There is a significant positive correlation between firm size and investment in innovation, indicating that large firms are more capable of research and development.

From the results of model (3), the regression coefficient of innovation investment is negative although it passes the significance test, indicating that there is a negative correlation between innovation

investment and company growth. So H3 is not valid. This may be due to the fact that most of the GEM listed companies are not mature enough in scale and have weak anti-risk capabilities, and that the investment in innovation tends to require a large amount of capital.

According to Baron and Kenny's method of verifying the mediating effect, by comparing the model (4) and the model (1), the regression coefficients of executive incentives for enterprise growth decreases, and the significance level of equity incentives drops from 1% to 5%, indicating that innovation investment plays an intermediary role in the effect of executive incentives on corporate growth.

In order to test the reliability of the regression results, this paper uses substitution variables to test the robustness of the above regression results. Scholars usually use two methods to measure innovation investment. One is the ratio of R&D expenditures divided by main business income, the other is the ratio of R&D expenditures divided by total assets. Therefore, this paper uses the latter to reexamine hypotheses. The results are consistent with the regression results above and further support the hypothesis.

Table 2　The Estimation Results of Regression Models

Variables	(1)		(2)		(3)		(4)	
Pay	0.017**	(1.55)	0.031***	(6.43)			0.015**	(1.01)
Sto	0.209***	(2.80)	0.019*	(1.68)			0.175**	(2.61)
Gap	0.007	(0.35)	-0.021(-2.11)				-0.011	(-0.53)
RD					-0.307*	(-1.69)	-0.442**	(-1.98)
Size	0.124***	(6.75)	0.010***	(3.44)	0.120***	(6.80)	0.121***	(6.53)
Lev	-0.439***	(-4.85)	-0.107***	(-7.65)	-0.509***	(-5.46)	-0.485***	(-5.19)
Year	Control		control		control		control	
_cons	-0.969		-0.218		0.436		0.726	
Adj.R^2	0.216		0.265		0.243		0.198	
Prob > F	0.000		0.000		0.000		0.000	
N	846		846		846		846	

Note: ***, ** and * represent significance at 1%, 5% and 10% level, respectively, with t-values in parentheses.

5 Conclusion

Based on the examination of the relationship between executive incentives, innovation investment, and corporate growth, this paper explores whether innovation investment plays an intermediary role in the relationship between executive incentives and corporate growth. The study shows that: (1) Executive compensation incentives and equity incentives have a significant positive effect on firm growth. Performance appraisal can link corporate interests with executive compensation levels, control the behavior of managers, increase the degree of effort of managers, and urge them to pay attention to the long-term development of the company and thus enhance the growth of the company. (2) Executive compensation incentives and equity incentives have a significant positive impact on corporate innovation investment, that is, the implementation of reasonable compensation incentives and equity incentives for senior executives can help enterprises to carry out technological innovation activities and increase the scale of innovation investment. (3) The investment in innovation has an adverse effect on the growth of the company. In theory, as the investment in innovation increases, the R&D intensity of the enterprise increases, and the production technology and efficiency of the enterprise will increase to some extent, thereby enhancing the enterprise competitiveness. (4) Innovation investment has a partial mediating effect on executive compensation incentives and equity incentives that affect corporate growth. Innovation input is the result of executive incentives, and it is also a factor that affects the growth level of companies.

Executive compensation incentives and equity incentives can guide management to increase investment in innovation, thus affecting the company growth.In view of the above conclusions, China's GEM listed companies should optimize corporate executive compensation structure and improve executive incentives. On the one hand, companies can link executive compensation with company performance, and appropriately increase the percentage of senior management holdings, and make full use of executive incentives to promote corporate growth. On the other hand, companies should combine executive compensation incentives and equity incentives according to their own status quo, set appropriate proportions, maximize incentives for senior executives, and further promote corporate

growth. For innovation investment, companies must strengthen their awareness of innovation, attach importance to innovation investment, and ensure the continuity of innovation activities.

In the future research, further improvements can be made from the following aspects: (1) Since the nature of different industries may influence the research results, the sample size can be increased and a comparative study can be conducted according to industry type. (2) Innovation investment indicators can be comprehensively considered, technical personnel can be included. (3) There is a lag in innovation investment, and future research can combine the lags in the investment in innovation with the regulatory effects to build new models.

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Study on Management of Entrepreneurship Education for College Students in China

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Abstract: College students' entrepreneurship education is one of the important topics in the current society, which is of great significance to the cultivation of innovative talents. This paper analyzes and summarizes the problems existing in the management of entrepreneurship education for Chinese college students, points out the correct orientation of the management of entrepreneurship education for college students in China, and the main contents of the management of entrepreneurship education for college students. Also, it puts forward the concrete countermeasures to improve the management of College Students' entrepreneurship education so as to provide valuable reference for the management of entrepreneurship education for college students in china.
Key words: College student; Entrepreneurship education management; Countermeasure research

1 Introduction

21st century is the age of "innovation". Competition worldwide is focused on the entrepreneurial strength and the level of competition. Innovation and entrepreneurship education has become an engine and power for socio-economic progress. Countries around the world are actively introduced policies to encourage and support innovation and entrepreneurial activities.

Wang et al. (Wang et al., 2005) Summarized the basic function of Chinese college students' entrepreneurship education management: changing employment idea, cultivate pioneering consciousness, cultivate and develop students' entrepreneurial ability, realize the life values of college students.Huang (Huang, 2012) Put forward the main content of Chinese college students' entrepreneurship education management including seven links, that entrepreneurship education mode selection management, risk management, business knowledge and skills reserves and social responsibility management, business incubation service socialization of management, business management, business process management, entrepreneurial culture. Xuan (Xuan, 2015) put the bottleneck of current Chinese college students' entrepreneurship education management summed up as three aspects. The emphasis on entrepreneurship education level is not high including wrong ideological understanding and entrepreneurship education atmosphere is not strong. The teaching system of entrepreneurship education still needs to be improved, including the curriculum system is not complete, lack of specialized teachers, teaching management matching degree is low. The social support for entrepreneurship education is not enough including the society is skeptical about the entrepreneurship of college students, and the support of entrepreneurship education is not enough. And she also put forward the corresponding countermeasures for these problems. To strengthen the management of entrepreneurial education leadership, optimize the teacher team construction, improve the management system, to strengthen the security service system, to set up for entrepreneurial education services department, the monitoring system of entrepreneurship education, to monitor all aspects of factors in the process of entrepreneurship education.

Jiang (Jiang, 2014) pointed out that currently there is no perfect management authority of the entrepreneurship education and entrepreneurial environment and entrepreneurial education management evaluation system is not sound. She suggested to establish specific and efficient coordination mechanism, to optimize the structure; Establishing scientific and reasonable evaluation index system, assessment of entrepreneurship education quality management. Jiang (Jiang, 2015) constructs the evaluation index system of the management of college students' entrepreneurship education According to her previous research, and provides a valuable reference for the future of entrepreneurship education management evaluation.

To sum up, the Chinese college students' entrepreneurship education management has received extensive attention of scholars, at the same time they also points out the bottleneck, the existing research results on the management of college students' entrepreneurship education for future in-depth study and how to promote the entrepreneurship education in colleges and universities management has played a guiding role, and provides a theoretical basis.

However, it should be pointed out that, at present China's government, society and university has

the policy support, capital support, the business place, the respect such as entrepreneurship competition for college students entrepreneurship provides a strong protection. But for entrepreneurship education management of culture idea, thought erroneous zone, such as soft power, the present theoretical system and framework is not perfect, countermeasure research lack of certain depth remains to be strengthened. Therefore, this article will take this as the center of gravity to launch the thorough research.

2 The Correct Positioning of Chinese College Students' Entrepreneurship Education Management

"On deepening the reform of the institutions of higher learning innovation entrepreneurship education implementation opinion" pointed out that we need to fully implement the party's education policy, insist on innovation leading entrepreneurship to create more employment opportunities initiatively to adapt to the economic development of the new normal to promote quality education as the theme. In order to improve the quality of personnel training as the core, we focus on innovative personnel training mechanism to improve the conditions and policy support for the support. To promote the combination of higher education and science and technology, economy and society, to speed up the training of large-scale, innovative spirit, the courage to join the practice of innovative talents team, improve the contribution of higher education to the steady growth of promoting reform and structural adjustment and improve the livelihood of the people. To build an innovative country, implementation, "the two" one hundred goals and the great rejuvenation of the Chinese nation the Chinese dream provide strong intellectual support.

It shows the college students' entrepreneurship education management that one of the main line, two strategic perspectives, the three major changes.

2.1 The main line

Expression of the State Council on innovation and entrepreneurship education for college students and positioning of the show that to entrepreneurship, innovation ability as the core competence of composite type, high-quality personnel training is the basic goal of the innovation and entrepreneurship education of college students, but also to deepen the reform of higher education important task. Therefore, the innovation and entrepreneurship education of college students is quickly integrated into the university personnel training system, and it has become a main line for the orientation and sustainable development of innovation and entrepreneurship education for Chinese students.

2.2 Two strategic perspectives

One is to innovate entrepreneurship education as the starting point, further promote the reform of higher education itself, improve the quality of education and teaching, cultivate talents to promote the economic development and innovation oriented country construction of entrepreneurial, occupation of talent quality bonus heights, and participate in the competition of the international market.

Second, implementation business elite (entrepreneurs: college students start their own businesses and entrepreneurship of inclusive education (post entrepreneurship educators) to promote college students' employment and enhance quality and entrepreneurship of through innovation and entrepreneurship education to improve the students' professional quality and professional ability.

2.3 Three major changes

1) To enhance the level of employment, quality of employment shift from raising the employment rate.

2) Transformation from traditional entrepreneurship education to entrepreneurship education and professional education.

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│  The first level: Potential entrepreneurs    │
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│  The second level: Post entrepreneurs        │
│         (entrepreneurs inside)               │
└─────────────────────────────────────────────┘
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┌─────────────────────────────────────────────┐
│  The third level: independent entrepreneurs  │
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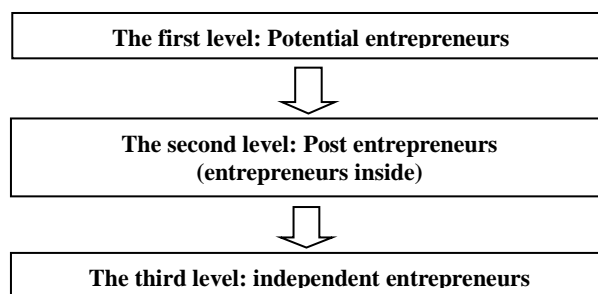
Figure 1   The Three Major Changes

3) The realization of the transformation from the cultivation of independent entrepreneurs to the cultivation of post entrepreneurs as the main, supplemented by independent entrepreneurs (Figure 1).

In the next 10 years, the goal of entrepreneurship education management in China is mainly based on post entrepreneurs.

The cultivation of entrepreneurial ability should not be free from the professional courses, but should be based on the professional teaching process of teaching. Taking entrepreneurship education into professional education can lead students to pay more attention to the development and reform of the professional field, so that innovation itself becomes a part of the subject knowledge.

3 The Main Contents of Chinese College Students' Entrepreneurship Education Management

At present, most of the myths about the sense of innovation and the ability to start a business in Chinese society are totally wrong. The sense of creativity and entrepreneurship is neither magic nor mystery. It is related to the ability of the entrepreneur. Entrepreneurship education of college students cannot simply be judged with the number of college students' business entity, or simply use the performance to the success of start-ups to judge; But with the level of the college students' entrepreneurial quality training to judge. Therefore, university students' entrepreneurship education should grasp the main body of uniting the content.

3.1 The cultivation of innovative consciousness

Innovation is necessary to create a talent. The cultivation of innovative consciousness and the starting point of the development to create talents. So, cultivating college students' innovative consciousness, it is a major historical responsibility of modern university (Figure 2).
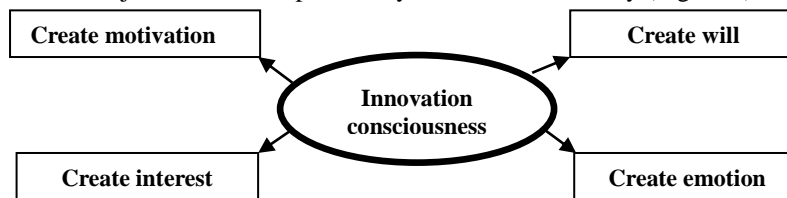
Figure 2　The Cultivation of Innovation Consciousness

3.2 The cultivation of entrepreneurship consciousness

Entrepreneurship refers to have find or create a new field, we are committed to creating new things to understand (new products, new markets, new production process or raw materials, a new method of organization existing technology), and be able to use various methods to utilize and develop them, and the ability to produce all kinds of new results. In general, entrepreneurial ability mainly includes: opportunity recognition and development capabilities, resource organization and management, strategic planning and management skills, relationship building and operating ability, risk identification and control ability, civil commitment ability. Cultivating college students' entrepreneurship is an important task of modern higher education.

4 Specific Measures to Improve the Management of Chinese College Students' Entrepreneurship Education

The primary problem of college students' entrepreneurship education is the education of values and beliefs, so that the majority of students firmly establish the Chinese dream of achieving the great rejuvenation of the Chinese nation, and the ideal and feelings of the way to make money. To this end, the management of College Students' entrepreneurship education should take the following ways and methods.

4.1 Carry out "the three clear" education of college students' entrepreneurial quality perfection

1) Let college students understand why to start a business.

Entrepreneurship is not to start a business. Business is in dealing with the pursuit of human development, so scientific and technological progress and economic prosperity, people's happiness, and social harmony are very important. Therefore, the essence of the college students' innovative consciousness and ability training is to nurture their attention and enthusiasm to solve the problem of social development, cultivating college students' sense of mission to solve the problem of social development. College students who have the sense of mission to solve the problem of social

development will focus on entrepreneurship. It is basic logic to cultivate college students' innovation consciousness and ability.

2) Let students understand "inputs and unremitting diligently" is the foundation of innovative entrepreneurial success.

When college students have a prosperity for the country and the people fighting feelings, has committed to the sense of mission to solve the problem of social development, as long as there is enough attentively, will be able to find and establish its think must to solve "the most important question. Establishing goals, be about to try (business actually don't need a perfect plan, plan can be as creative practice and gradually improve) is the beginning of an innovative entrepreneurial undertakings, the most important thing is to "adhere to the" next, the so-called "as long as kung fu deep, iron pestle ground into a needle". College students' innovation consciousness and ability cultivation education is to make college students believe that always pay attention to chase, you will change the world!

3) Let students understand "look ahead" is the basic rule of traction startup business sustainable development.

In the startup business, we often encounter questions about "can we succeed?", "can we earn money?". Actually, we don't have to answer them. But you must teach them to learn to "look ahead", "forward" must be filled with challenges. Success is to dare to meet challengers testimonials. Mr. Ma's word makes sense, that "compared with 15 years ago, we are great; but compared 15 years later, we are still a baby."

4.2 Adhere to the entrepreneurial quality education of college students "Five in one, overall progress " mode

The cultivation of college students' innovation consciousness and ability of entrepreneurship is a full range of systems engineering. The main terms, the cultivation of college students' innovation consciousness and ability of entrepreneurship should be "five in one and coordination" (Figure 3).
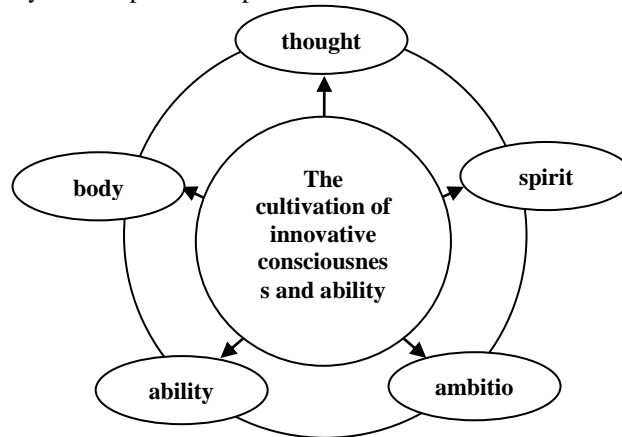
Figure 3   The "Five in One, Overall Progress " Model

4.3 Build a "3 and 6 ecosystem environment" of the cultivation of college students' entrepreneurial quality

A good entrepreneurial environment is the basic premise for college students' successful entrepreneurship, as good soil can have a good harvest. As the main body of the college students' innovative entrepreneurial leadership in government, enterprises and institutions of the subject of service (especially the financial institutions, the media), the main responsibility of colleges be short of one cannot. Especially in colleges as the main body of responsibility especially the position and role of: education of and colleges have to reform the existing model. Education quality of colleges is not only to let more employers complete the quality education, but also to strengthen college students' consciousness of entrepreneurship, and take entrepreneurial ability training. Colleges must reform the current teaching plan, and take venture education into a compulsory part. Also, self-employment rate of college students has to be included in the evaluation index system of colleges (Figure 4 and Table 1).
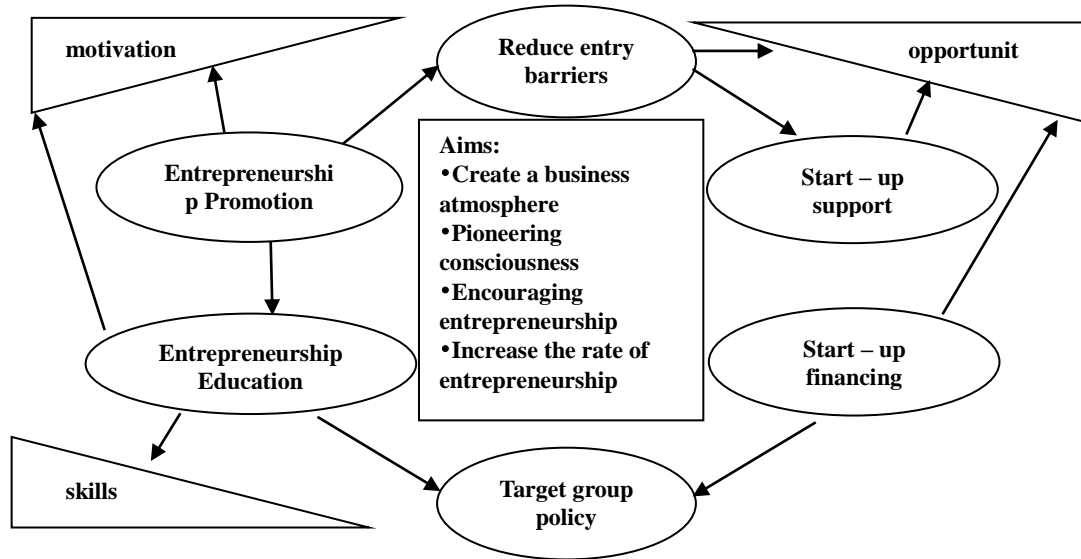
Figure 4   3 and 6 Ecosystem Environment

Table 1   The 6 Ecosystem Environment

Entrepreneurship education	Entrepreneurship education at all levels
Entrepreneurship Promotion	Create a culture of entrepreneurship and a positive attitude towards Entrepreneurship
Reduce entry barriers	Reduce the threshold of the enterprise
Start – up support	Support the creation of new enterprises, such as entrepreneurship, incubator, one-stop service
Start – up financing	Provide seed money and loans to new businesses
Target group policy	Special policies for special groups (e.g., young people, women, technology entrepreneurs)

5 Conclusion

College students' entrepreneurship education is the inevitable trend in the development of higher education. The current management of Chinese entrepreneurship education colleges is still at the exploratory introducing stage. There are still a lot of problems. This paper is based on the relevant research of entrepreneurship education management, summary of the current problems and the specific countermeasures of the scholars. We found that currently support for policy, funds, place, etc, have been gradually perfected. But for the understanding of entrepreneurship education in colleges and universities, the concept of entrepreneurship education management such as soft power remains are waited to be promoted. Therefore, this can be taken as a breakthrough, and the following conclusions are obtained:

1) We need to correct positioning for China's college students' entrepreneurship education management.

2) The cultivation of innovative consciousness and ability is the main content of Chinese college students' entrepreneurship education management.

3) The key to solve the current problem is to develop soft culture education, make the ideas into the life of the students

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Evaluation for Sustainable Development of the Integration on Internet Crowd Funding and College Student Entrepreneurship

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Abstract: Internet crowdfunding is increasingly becoming an important platform for college students to start their own businesses. There is bound to be a large number of unknown risks for new things. The evaluation of the sustainable development of the integration of internet crowdfunding and college student entrepreneurship is an important part of promoting the long-term development of innovation and entrepreneurship. This article clusters the keywords of the related literatures of Chinese Internet Crowdfunding and college student entrepreneurship, and then taps the core indicators of integrated evaluation. According to distance entropy, the weight of each index is obtained, and then the comprehensive evaluation value is obtained through geometric weighted average. The study finds that the current integration of Internet crowdfunding and college student entrepreneurship focuses on innovation and industry, while having lower expectations for the team, and there are more indicators across teams and innovation.

Key words: Internet crowdfunding; College student entrepreneurship; Clustering; Evaluation

1 Introduction

According to the 2013-2016 college student's employment and entrepreneurship-related data, the proportion of college students who start their own businesses after graduation has increased year by year, which has reached 4.6% by 2016. The investigation and analysis of college student entrepreneurship showed that the difficulty of college students' venture financing is an important factor that restricts the survival of most college students' entrepreneurial projects. The emergence of Internet finance, which complements traditional finance, enriching the financing channels for college students to start their own businesses, and increasing the chances of success of entrepreneurship. With the continuous deepening of the popularization of higher education in China, the employment of college graduates faces a grim situation. With the continuous development of Internet technology, human wisdom has been fully released. Some college students began to use the Internet to start their own businesses. They used the Internet platform in traditional industries to realize industrial upgrading and life values.

The "Thirteenth Five-Year Plan" outline proposes that we must integrate popular entrepreneurship and innovation into all areas of development, encourage multiple entities to develop new technologies, new products, new formats, new models, and create new engines for development. Popular entrepreneurship and innovations require financial innovation to provide risk dispersion and provide financing services. Equity crowdfunding, as a new financing method in the "Internet+" era, is an important form of financial innovation and an organic part of the capital market. It is also an important way to realize innovation and entrepreneurship, effectively link social needs and market resources.

Crowdfunding is a kind of innovation of traditional financing mode,it based on the development of Internet technology. Crowdfunding comes from a combination of concepts such as microfinance (Morduch J, 1999) and crowdsourcing (Brabham D C, 2008). As China's Internet crowdfunding market is still at an exploratory stage, there is no strict screening system. "An individual" in any corner of the world, as an investor or a financier, can participate in this platform. This leads to various risks such as uneven crowdfunding projects, opaque financials and lack of third-party supervision, and examples of failure of the crowdfunding projects are not uncommon. At present, the main problems concerning the integration of Internet crowdfunding and college student entrepreneurship are manifested in inadequate ideological understanding, lack of entrepreneurship education, imperfect entrepreneurial policies, imperfect financial system in science and technology, the weak ability of comprehensive tracking of the project, lack of continuity of funding supply, and more intense information competition, and so on.

Based on the method of co-word clustering, the paper focuses on the integration and development of crowdfunding and youth entrepreneurship, constructs a risk indicator system and indicator condensing model for youth entrepreneurship in the new era, and then determines the weights of various core indicators through distance entropy, and obtains the comprehensive evaluation value through geometric weighted average. From the perspective of the new era of youth entrepreneurship, the

research findings explore the general features and characteristics of youth entrepreneurial risks, and provide some reference for the implementation of China's innovation and entrepreneurship policy and the improving of the country's independent innovation ability. It also provides some ideas for a policy of promoting the healthy development of college student entrepreneurship.

2 Research Status Quo and Current Situation of the Integration of Internet Crowdfunding and College Student Entrepreneurship

Crowdfunding means a financing model that the sponsors of innovative projects publish projects based on online platforms and set the target amount of financing, and use social networks to raise funding for the general public. According to the form of returns, crowdfunding is divided into donation-based, incentive-based (product crowdfunding), loan-based (P2P lending), equity-based, and revenue-sharing. The scope of this paper is equity-based crowdfunding. In this model, the sponsor can obtain certain shares of the sponsor company based on the amount of funding. The typical representative of equity crowdfunding is the United States Angel list platform. There have also been several equity-based crowdfunding platforms in China. Equity crowdfunding refers to publicly micro-equity financing through the Internet. It can provide financing services for small and micro enterprises and entrepreneurs in a more flexible manner. It can meet the investment needs of the middle class and is considered to be the "twin sisters" of "double-invented". It is an important way that researching the current situation of young entrepreneurs who birthed after 1990s and promoting their innovation and entrepreneurship to improve the employment level of the entire society and promote economic and social transformation and upgrading.

At present, the classic models of entrepreneurial risks mainly include entrepreneurial potential theory model(Raab G, Stedham Y, Neuner M, 2005), entrepreneurial tendency evaluation model (Li ñán F,2008), entrepreneurial quotient model (Obschonka M, Silbereisen R K, Schmitt-Rodermund E, 2010), entrepreneurial quality assessment (Souitaris V, Zerbinati S, Al-Laham A, 2007). It also contains qualitative indicators and theories of many scholars for various fields and groups (Douglas E J, Shepherd D A, 2002; Douglas E J, Shepherd D A, 2007).

In 2017, the "China Crowdfunding Platform Rating Report" constructed a set of evaluation system, including 5 first-level indicators of enterprise background, operational capabilities, information disclosure, risk control and compliance, and influence, and 18 second-level indicators, 52 third-level indicators. While the evaluation target sare limited to the crowdfunding platform, and the crowdfunding platform adopts different standards in the review of the youth innovation and entrepreneurship project. On the one hand, it is not conducive to the scientific assess the strength of the youth innovation and entrepreneurship project, and on the other hand, it is not conducive to identifying the risk of youth innovation and entrepreneurship. Youth innovation and entrepreneurship uses internet crowdfunding to obtain various kinds of resource support, but core technology and business model innovation are necessary conditions for crowdfunding projects to continue to retrieving resources. The survival rate of entrepreneurial projects from government-recommended (57.1%) and personal professional interests (58.5%) is lower, while the survival rate of projects with core technologies (67.7%) is higher than that of projects without core technologies (63.6%). In the current Internet innovation and entrepreneurship project, examples of success mainly include new technology products and new farmers. Internet finance is a powerful pusher for the improvement of the current economic situation. However, whether there are hidden dangers behind the current prosperity growth and how risk factors are considered and controlled. What is the attitude of society towards the development of internet finance? At present, some practices are "buy tickets after getting in the car", because the Internet crowdfunding is a new thing, public expect is high, many communities. The government sometimes adopts a "high lift, gently drop" strategy when facing risk issues.

The level of financial development varies greatly in different regions, and Internet finance has broken the boundaries, and whether it has an impact on the coordinated economic development of each region. For one crowdfunding project, one investor, the risks are shared among the individual investors, but whether the total amount of risk which raised by the Internet crowdfunding is reduced. Comparing to the country's financial system, current overall size of Internet crowdfunding is still very small, with two orders of magnitude worse. However, the monitoring of funds raised by Internet crowdfunding is very difficult. Perhaps an immature innovative product can also obtain crowdfunding funds. After A and B rounds of burning money, the responsibility and development of the company immediately falls away.

Although the standardization of internet crowdfunding and the improvement of the supervision

system can certainly provide some risk prevention, the innovation and entrepreneurship of undergraduates are closely linked to risks. It is necessary to form a comprehensive understanding of the risks of innovation and entrepreneurship for undergraduates in the Internet, and then explore effective integration and healthy development of college students' innovation and entrepreneurship.

3 Policy Integrated Sustainable Evaluation Model
3.1 Co-word clustering mining core indicators
Because there are many indicators related to crowdfunding and college student entrepreneurship, the widely-collected indicators are as high as more than 100 indicators. We must achieve the reduction of indicators through factor reduction or clustering to find the core indicators and as a basis for the integration of evaluation indicator system.

Co-word analysis can find out the intimacy between words by counting the number of times a set of keywords (indicators) appear in the same document (CallonM, LawJ,Rip A, 1986),and then to explore the core indicators.

The integration of internet crowdfunding and innovation and entrepreneurship has made entrepreneurs more diversified in personality and quality. The operation of social relations and the improvement of external cooperation capabilities are more critical. Current team building and strategic planning can be supported by more data support and consulting services.According to the latest 210 Chinese documents from 2015 to 2017, extracting the high-frequency keywords and co-word Matrices of youth innovation and entrepreneurship in Internet crowdfunding.

Using the social network analysis tool Gephi, the high-frequency keyword co-word matrix was visualized, as shown in Figure 1. The size of the node characterizes the intermediate nature of the keyword, and the larger the node, the greater the "mediation bridge" role that the keyword plays in the network, and the greater the ability to link different keywords together, the more likely to become a key word for other research themes. The lines between the nodes represent the co-occurrence relationships between the keywords, and the thicker the lines represent the stronger the co-occurrence relationship between the keywords.

Figure 1 shows that team cohesion, market demand, target amount, and number of followers are the basic keywords. These indicators should be used for integrated evaluation, and the number of participants is more intermediary, indicating that the number of participants is a "bridge" for integrated evaluation, and the impact of many indicators needs to be reflected by the number of participants.
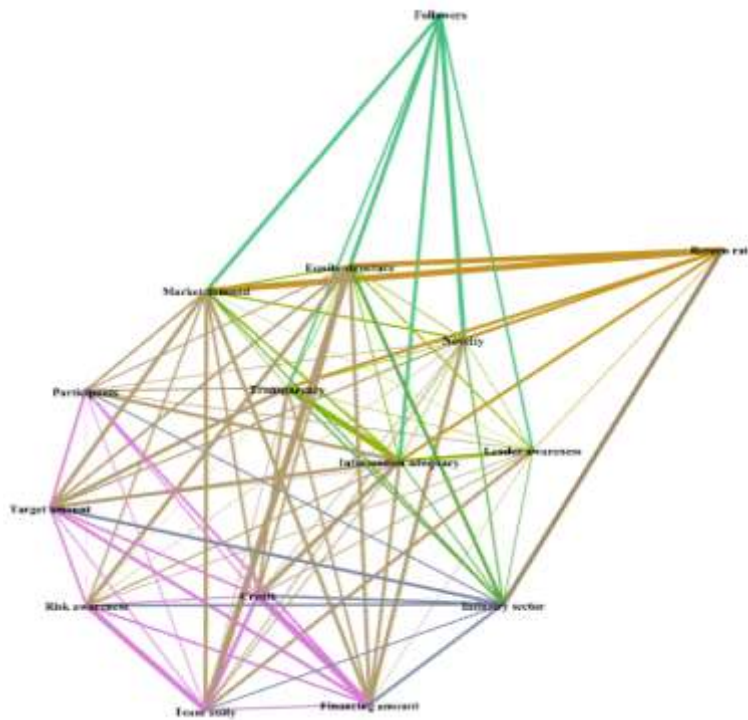
Figure 1　High-frequency Keywords Co-word Network

3.2 Entropy weight method determines indicator weight

According to the explanation of the basic principles of information theory, information is a measure of the degree of order of the system, and entropy is a measure of the degree of disorder of the system; if the information entropy of the indicator is smaller, the amount of information provided by the indicator is greater, and the greater the role it is played in comprehensive evaluation, the higher the weight should be.

The distance entropy (Guan Qingyun, Chen Xuelong, Wang Yanzhang, 2015) is the distance between the various units in the system measured by the Euclidean distance,and use the distance ratio to represent the probability of an individual appearing in the system, and the resulting entropy.

It is assumed that there are m sequences in the integrated set. There are p information units in each sequence that describe the sequence values of the integrated objects. The distance entropy of each sequence is calculated as follows:

$$d_{ij} = \sqrt{\sum_{k=1}^{p} (x_{ik} - x_{jk})^2}, \quad i,j=(1,2,\ldots,m) \tag{1}$$

The ratio of the distance to the sum of all distances in the sequence is calculated as the probability of occurrence of each information unit in the information entropy, from which the distance entropy of the sequence is obtained:

$$E_i = -\sum_{i=1}^{p} \frac{d_{ik}}{\sum_{k=1}^{p} d_{ik}} \cdot \ln \frac{d_{ik}}{\sum_{k=1}^{p} d_{ik}} \tag{2}$$

From the extremum of entropy, the closer the probability of occurrence of each information unit is, the greater the value of distance entropy is, the greater the distance entropy E_i, the smaller the discrepancy between each information unit and the optimal value, the closer to the best information unit. Based on the distance entropy, the entropy weight assignment method can be used to calculate the weight of each sequence. The entropy weight assignment method determines the index weights according to the size of the information load of each indicator. The size and quality of the information that the decision maker obtains from the information in the decision-making process and, which greatly influences the accuracy and credibility of the decision. The entropy value can be used to measure the amount of information. The smaller the entropy value is, the greater the variation of the indicator is, and the larger the amount of information is, the greater the role it plays in the decision, and the higher the weight. The entropy value that characterizes the importance of decision of sequence i:

$$e_i = -\frac{1}{\ln m} E_i \tag{3}$$

After normalization, objective weights of sequence iare obtained:

$$w_i = \frac{1 - e_i}{m - \sum_{i=1}^{m} e_i} \tag{4}$$

The determination of w_i is based on objective information. Therefore, it has strong objectivity and uses distance entropy to calculate entropy weight. It can effectively reflect the preferences and quality of information, and provides objective and scientific guarantee for the decision-making integrate information and weight.

3.3 Comprehensive evaluation

Since the integration of internet crowdfunding and college student entrepreneurship is a high-risk attempt, so the use of a weighted geometric average model is more appropriate. The weighted geometric average model is synthesized by multiplication and has a strong sensitivity to score differences between indicators. Once a certain indicator has a zero score, its comprehensive evaluation value is zero.

$$Z_t = y_1^{w_1} \cdot y_2^{w_2} \cdots y_t^{w_s} = \prod_{t=1}^{s} y_t^{w_s} \tag{5}$$

Where y_t is the No.t core indicator, a total of s items.

4 Evaluation of the Integration of Internet Crowdfunding and College Student Entrepreneurship

Crowdfunding is a new type of investment project,because of its individualized and diversified value pursuit, it is more matching with the core concept of the investor's transfer value of the customer.

For investors, the balance between the total value of the project and the total cost determines its final investment behavior.

According to the collected data, the weight of each indicator is calculated by distance entropy (as shown in Table 1). These weights can be used to evaluate the single project expectations, and can also be used to evaluate the development trend of integration of crowdfunding and college students' entrepreneurial.

Table 1   Weights of Core Indicators

No	indicator	weight	No	Indicator	weight
1	Project novelty	0.626659	9	Return rate	0.368507
2	Leader's awareness	0.266945	10	Total financing	0.4567406
3	Transparency of financial information	0.355056	11	Credit investigation	0.265812
4	Information richness	0.265381	12	Followers	0.465734
5	Equity structure	0.170212	13	Target amount	0.269029
6	Team unity	0.466712	14	Awareness of risk	0.365154
7	Market demand	0.664524	15	The number of participants	0.167318
8	Industry sector	0.265552			

From the above table, it can be seen that the weights of project novelty, transparency of financial information, and credit investigation are not high, while the industry sector, return rate, followers, Equity structure, and Awareness of risk are higher weighted, reflecting that in the integration of crowdfunding and college student entrepreneurship, the public has a high degree of attention to college students' innovation and entrepreneurship, but their actual investment willingness is not high. The investment intentions pay more attention to the evaluation indicators of traditional projects such as industry, market, and returns, while lower to team unity, leader's awareness, and target amount. This shows the public's concern about the entrepreneurial experience of college students.
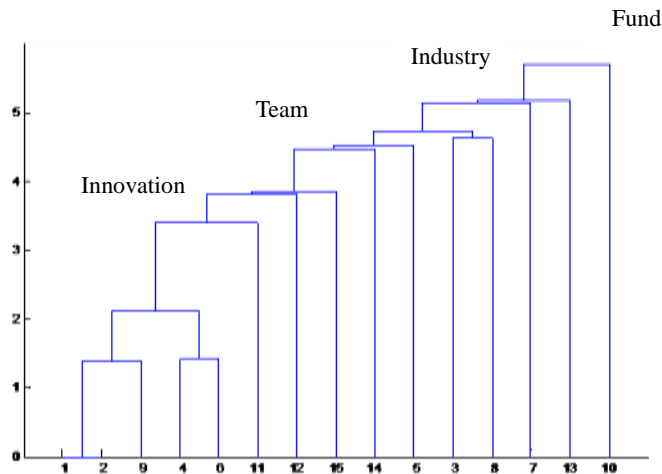
Figure 2   Co-word Network of High-frequency Keywords

Through hierarchical clustering (as shown in Figure 2), it is found that the topics are divided into four categories at the top of the hierarchy: innovation, team, industry, and fund. Among them, innovation involves project novelty, leader's awareness, information richness, team unity, and response rate of a project. The team involved the most factors, including team unity, information richness, credit investigation, followers, number of participants, awareness of risk, equity structure, and so on. The industry mainly involves the transparency of financial information, market demand, and industry sectors. The funds mainly relate to the total financing and the target amount. It is worth pointing out that due to the level of division, the factors involved in various aspects may exist in cross-cutting situations. For example, there are many crossover factors in terms of innovation and team.

5 Conclusion

Most crowdfunding groups in China are concentrated by 1980s and 1990s. The elites in the youth are actively innovating in all walks of life, stimulating more people to participate in the "national for entrepreneurship". The integration of internet crowdfunding and college student entrepreneurship is still in its infancy, and policy support, education, funding, and innovation are still being explored. Through this research, we can discover the key factors of the integration of internet crowdfunding and college student entrepreneurship through research hot-spots, so as to more reasonably evaluate the sustainability of youth innovation and entrepreneurship. Youth innovation and entrepreneurship in the crowdfunding of the Internet to achieve creative cohesion, capital accumulation, information gathering, from the reputation, financing, market and other aspects of coordinated development, will not let young people daunting entrepreneurial, but have good expectations and unbreakable faith.

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Real Earning Management and Firm Investment: Empirical Evidence from Manufacturing Sector of Pakistan

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Abstract: Stakeholders of the firms use financial statements to make decisions about their investments. The firms are using different earning management techniques to present a financial position of the firm which is not actual. Accrual management (AEM) is popular among policy makers to manage the earnings of the firm but recently more firms were using real earning management (REM) techniques to manage the earnings. REM is change in course of business to show results which are aligned with the management view of the company. It affects negatively on the different indicators of the firm and in the long run its consequences are dangerous. Firm made capital investments to align its goals with the overall strategy of the firm. As firm is involve in REM activities, so it is hypothesis of the study that firm will make more investments than in normal routine of business. The manufacturing sector of Pakistan is taken to study this trend. Panel data set is used to conduct this study for the period 2006 to 2015 from the manufacturing sector of Pakistan. OLS regression is used to check overall effect of REM on firm investment. The result of the study shows that firm which are increasing their sales with discounts to customer are making ineffective capital investments. This article points out to the academicians and policy makers to not only focus their energies only to detect AEM activities in the firm but also investigate REM activities of the firm.
Key words: Real earning management; Firm investments; Agency contract; Manufacturing sector

1 Introduction

The importance of financial reporting quality (FRQ) cannot be denied. The stakeholders of the firm are using these financial statements to decide about the future course of action with the firm. The most important factor to decide for the company is to decide about investment in the projects. The theory suggests that firm should invest in all those projects which have positive NPV and not to invest in those projects which destroy the value for the company (Myers, 1984). The firms with enough financial resources are also faces the dilemma of investing in those projects with suboptimal returns due to managers preference for projects or their self-wealth maximizing objective (Jensen, 1986). As the firm presents its internal situation to external stakeholders of the firm, it creates chances for the firm to invest only on those projects which are beneficial for the firm, so firm investment efficiencybe increased (Biddle et al., 2009). As quality of firm financial reporting quality improves it helps firm in two aspects, one is it reduces the information asymmetry between firm and its stakeholders and secondly it mitigate the risk of unprofitable and nonproductive investment made by the firm (Bushman et al., 2011). Real Earning Management (REM) is the alteration of best practices in the business to report results which benefits the management of the firm for a particular period (Roychowdhury, 2006). The firm level and executive personality characteristics influence the firm managers to engage in REM activities (Cohen and Zarowin, 2008). REM is the activity which can give incentive to the firm for the short period of time but in the long term it is regarded as an activity which damages the value of the firm and engage firm in those sorts of activities which destroy the value of the firm. The management of the firm with the help of REM activities mislead the users of the financial statements of the firm and by this they try to get private benefits for themselves (Wongsunwai, 2013).

This study is to ascertain how REM activities in the context of Pakistan's manufacturing sector effects the quality of investment made by the firm.　This study is unique in the sense that it is the first study in the context of South Asia, where it is questioned how REM is impacting the investment policy of the firm. Earlier this type of studies is conducted in the context of developed countries, but this is first of its kind of study, as per best of our knowledge. South Asia is important region of the world and quite a large number of middle income people lives there. So, this study will contribute in literature in a sense that it will tell readers that if South Asians firms are engaged in REM and if yes how it impacts the overall firm investment performance. The result of the study reveals that firms in Pakistan are doing both kind of REM activities i.e. by increasing sales through sales discounts and by overproduction. The REM through sales discounts induce firms to invest more, on the other hand through overproduction there is no relationship found between these two variables. The data is taken from 2006-2015, for

manufacturing sector companies of Pakistan. The OLS pooled regression is used to get the results for the study. The paper is compiled as follows. In the second section of the study there is Literature review and hypothesis development for the study, in the third section data and research methodology for the study is discussed. Fourth section there is discussion on results and in the last section of the study we present the conclusion of the study.

2 Literature Review and Hypothesis Development

The firms are generally involved in two kinds of earning management techniques i.e. Accrual Earning Management (AEM) and Real Earning Management (REM) (Healy and Palepu, 2001). In case of AEM firms manage their earnings by manipulating their earnings within the scope of Generally Accepted Accounting Principles (GAAP), on the other hand in case of REM firms manage their earnings by managing the actual business operations of the firm like delaying sales, producing more products, giving extra discount to debtors and many other real business activities. As laws become stricter and punishment become severe for management if they involve in earning management activities, so firms start to manage their operational activities to manage their earnings. After 2000 many academicians start focusing their attention on REM activities in the corporate world. Graham et al. (Graham et al.,2005),after his study on REM activities in USA reported that 80% of the executives in USA are willing to involve in such activities where real operating activities of the firm are compromised.

2.1 Real earning management

Roychowdary(Roychowdary, 2006), defined REM as "departure from normal operational practices motivated by managers' desire to mislead at least some stakeholders into believing certain financial reporting goals have been met in normal course of operations." The reasons why executives of the company are engage in REM is due to their personal benefits, to hide the bad performance of the company or to manage their earnings in such a way to lower the variability in earnings (Healy and Wahlen, 1999). The firms which are involve in REM face many economic consequences in future, as the debt holders of the firm require more rate of return on their capital (Zang, 2012). Cohen and Zarowen(Cohen and Zarowen,2008), research on the operating performance of the firm after seasoned equity offering and they provide evidence that future operating performance of the firms which are engage in REM declines more sharply than firms which are involve in AEM.

The firms which are involve in REM face stricter audit by auditors as detection of REM is more difficult and it needs a lot of scrutiny of the firms operational activities (Kim and Park, 2014). The firms after SOX are more involved in REM than in AEM due to pressure from regulators and difficult in detection of REM than AEM (Zang, 2012). The REM is an ongoing process and to manipulate earnings firm manage their activities in any time of the year, on the other hand AEM is mostly done at the end of the year. Chi et al. (Chi et al., 2011), are of the view that as regulations are more strict so executives are reluctant to engage in AEM and they prefer harder to detect earning management activity which is REM. In literature to detect REM three types of proxies are used, which are first used by Roychowdery in his seminal work on REM. These three proxies use sales manipulation, overproduction and discretionary expenses as variable of interest for the detection of real earning management. Arturo et al.(Arturo et al., 2017), study shows that environments where more focus is on individualism and uncertainty avoidance are negatively attracted to the real earning management activities, on the other hand environments where focus is on power distance are positively associated with the REM activities.

2.2 Earning management and firm investment

Modigliani and Miller(Modigliani and Miller,1958), in their seminal work argued that in a frictionless market the determinants of profitability and cashflow position of the firms determine the investment policy of the firms. The markets are not perfect and there are many factors which must be come into consideration for firms to decide about their investment policy. The main purpose of the firms to invest in the project or not to invest is to create value for the firm. The firms which are in the high growth stage need to invest money in the capital intensive projects to support the growth of the firm (Biddle et al., 2009). The firms instead of investing money to create value for the firm due to agency problem and moral hazard invest in value decreasing projects and adverse selection projects (Jensen, 1986, Myers, 1984). The firm investment efficiency improves as firm presents true picture of its activities to its stakeholders. As the quality of financial information improves which implies that firm is not involve in earning management activities results in lowering the information asymmetry which ultimately improves the quality of the investment made by the firm. Financial statements are important source of information for the stakeholders of the firm and the quality of these statements impacts the

quality of financial markets in the economy (Bushman et al., 2011). The quality of financial reports also impacts the cost of capital of the firm and as information asymmetry increases it impacts to raise the cost of capital for the firm. As firm is involve in REM activities it leads firm to invest inefficiently. The more earning management activities companies are involve in they lead them to over-invest (McNichols and Stubben, 2008). As the reporting quality of the firms improves the firm which is engage in underinvestment increase their investment to optimal level, on the other hand firm which is engage in overinvestment reduce their investment to optimal level, which create value for the firm (Chen et al., 2011). The other research in this area gives mixed results where some studies suggest that there is no relationship between accounting information and firm investment level while other result suggests that firm do more investment with earning management activities (Xu et al., 2012, Gilaninia et al., 2012). The studies on the matter point out that earning management activities increases the information asymmetry results in decrease in quality of the investment quality of the firm and it impacts negatively on the firm value.

2.3 Hypothesis for the study

The studies show that as firms are involved in the earning management activities their investment efficiency decreases and firms involves in such investments which are not creating value for the company. The firm is a bound by nexus of contract and if contract is violated than it damages the overall structure of the firm. There is possible information asymmetry between providers of capital and executives of company. This information asymmetry creates mistrust and firms' investment efficiency decreases. Real Earning Management is done by management to hide the true picture of events in firm from different stakeholders of firm and to get personal benefits. This conflict of interest between management and firm shareholders create agency conflict, this conflict leads to investment in such projects which are negative NPV projects or to not invest in positive NPV projects by the management. Financial statements are important source of information for different stakeholders and due to real earning management activities, the quality of financial statements compromised.

Roychowdary (Roychowdary, 2006), shows through his work that as firms are involve in REM, the firms are either involve in overproduction of products or providing cash discounts to increase sales or reduce the discretionary expenses of the firm to increase the firm profit. The firm which are involve in overproduction of products reduces their per unit cost of production which leads to decreases the overall cost of production of the company which ultimately results in increase of company profit for this period. The firm investors and other inside managers of the company are not aware of the company REM gets wrong signal by more production activity of the firm and they anticipate that in future firm prospects are bright. This wrong signal by overproduction activity leads firm to overinvestment in its capital projects. So, for this reason first hypothesis for this study is as follows:

H$_1$: Overproduction activity of the firm leads firm to do overinvestment

The firm managers at the end of financial year show their performance to the shareholders and if they miss some targets than managers may not get bonuses, or it ultimately leads to firing of firm management. REM activity helps management of the firm to show rosy picture of the firm affairs to the shareholders. The management to increase firm's sales gives undue discounts to its customers, which results in increase of sales for the company in this period and shareholders and other inside managers of the firm get a wrong signal that firm sales are improving and to meet these increase sales company must invest in more capital-intensive projects to support this increase in sales. On the other hand, this increase in sales is only artificial one and it cannot be sustainable for long period of time. So, based on this argument, we propose the second hypothesis for the study as follows:

H$_2$: Sales Discounts leads firm to do overinvestment.

3 Research Methodology

The research is conducted in the context of Pakistan. The firms are selected which are listed in the Pakistan Stock Exchange (PSX). Mainly firms are divided into different sectors in PSX, so the firms which lies in financial service sectors are not included into the data for this study. The main reason that financial firms are not included for this study is that the accounting and management style is different of financial firms from the other sectors, so it is not appropriate to include it in the same study. The data is taken from website of PSX for non-financial firms for the period from 2006 to 2015. The data which is not available from PSX website is gathered from websites of firms on website. The data is available for 329 non-financial firms after the final data is collected and final data set is of 218 firms

The variables for the study are divided into three categories i.e. dependent, independent and control

variables. The dependent variable for the study is investment made by the firm. The investment is calculated as investment made by firm in the capital resources. It is calculated as difference between Property Plant and Equipment of last two years scaled by lagged total assets. The regressor for the study is REM. For REM two type of proxies are used by different authors (Jerry et al., 2014). In this study Sales manipulation and overproduction are taken as proxies of REM to test the hypothesis of the study. The sales manipulation is calculated as follows:

$$\frac{CFO_{it}}{A_{it-1}} = \gamma_0 + \gamma_1 \frac{S_{it}}{A_{it-1}} + \gamma_2 \frac{\Delta S_{it}}{A_{it-1}} + \varepsilon \tag{1}$$

Where CFOit is Cashflow from operations lagged by assets. Abnormal CFO are calculated by mean of residuals from the equation 1 which shows that company is involved in activities to do extra sales by means of earning management activities. To measure the overproduction following equation is used.

$$\frac{PROD_{it}}{A_{it-1}} = \beta_0 + \beta_1 \frac{S_{it}}{A_{it-1}} + \beta_2 \frac{\Delta S_{it}}{A_{it-1}} + \varepsilon \tag{2}$$

Where PRODit is sum of COGS of this year plus change in inventory. The residual from this equation will tell us that if firm is involved in overproduction or not. The regression model for the study is as follows.

$$Inv_{i,t+1} = \alpha_0 + \alpha_1 REM_{i,t} + \alpha_2 Q_{i,t} + \alpha_3 Lev_{i,t} + \alpha_4 CFO_{i,t} + \alpha_5 Size_{i,t} + \varepsilon \tag{3}$$

Where Invi, t+1 is the capital investment made by the firm, REMi, t is the Real Earning Management proxies are used in two separate regressions. The other variables are control variables, where Qi, t denotes the Tobin Q to assess the growth opportunities of the firm, Levi, t is to see capital structure of the firm, CFOi, t is the cashflow generated by firm and Sizei, t is measured by taking log of assets which tell us about total size of the firm.

4 Results and Discussion

Table 1 panel 1 of the study presents the descriptive statistics for this study. First, we see the proxy variable for Real Earning management variables and it mean value is near to 0, which shows that average firm in the industry are not involve in real earning management. The intuition tells us that average firm is not involve in the REM, which we can understand by seeing the results of descriptive (Gunny, 2010).

Table 1   Descriptive and Correlation Matrix

Variable	Mean	S Dev	Min	Max	Inv	RM1	RM2	Lev	CFO	Q	Size
Inv	0.78	2.45	0.12	0.95	1						
RM1	0.05	0.66	0.03	0.11	-0.02	1					
RM2	0.03	0.61	0.02	0.08	-0.01	0.96	1				
Lev	0.29	0.25	0.00	0.78	-0.02	0.02	0.03	1			
CFO	0.09	0.67	0.04	0.17	0.09	0.68	0.56	-0.06	1		
Q	2.19	10.15	0.70	5.23	0.13	0.06	-0.04	0.12	0.07	1	
Size	13.47	5.45	7.42	19.29	0.25	0.07	0.04	0.08	0.10	-0.03	1

Inv is capital investment of the firm, RM1 is the proxy for REM through sales discounts, RM2 is REM through over-production, Lev is the debt to asset ratio, CFO is cashflow from operations, Q is the mkt to book value and Size is the size of the firm

The table 1 panel 2 presents result for correlation matrix between the dependent and independent variables for the study. In the study two type of independent variables are used one is main independent variable and others are control variables. The correlation between main independent variables and dependent variable is negative, which suggests that firms which are involve in REM are likely to invest less in the next year. Table 2 presents the results of the OLS regression. To estimate these results two type of REM measures are taken and Model 3 is run separately to get the results. To see how management is involve in REM activities and how its impacts the investment behavior of the firm. In the first scenario, we have run the Cashflow from Operation Model to see how firms which are engage in REM using discounts and incentives to customer conduct their capital expenditure activities. The results which are shown in first column of the table 2 indicates that sales discounts positively impact the investment activity of the firm and firms which are involve in REM using artificial sales discounts invest more. The one reason which we can see from the literature is that the managers which are responsible for investment activities are not aware of the fact that management is involve in earning

management and they invest more in future due to positive signals from the financial reports of the firm. The second proxy of REM which is overproduction activities of the firm, show no significant relationship with the investment activities of the firm. It indicates that firm which are doing REM using over production activity not affect the overall investment performance of the firm. This result can be seen in Column 2 of the result section of the table 2. The model P value shows that model is fit.

Table 2   Regression Result REM Impact on Firm Investment

	Sales Increase	Overproduction
Intercept	-0.288***	-0.161***
RM1	0.034**	
RM2		0.054
Lev	-0.023***	-0.043**
CFO	0.098***	0.076***
Q	0.121	0.051*
Size	0.081*	0.063**
F test (p value)	0.000	0.000
Adj R Square	0.19	0.14

***, **, * indicates significance at 1%, 5% and 10% significance level. All variables are same as defined in Table 1 of the study

Overall these results suggest that firms which are involve in REM activities through sales increasing activities through artificial means are more likely to invest more in the future, as the indication by more sales shows that firm need more resources in future to generate more sales. The other measure of REM i.e. overproduction not show any significant relationship with the investment and from this result we can infer that firms which are doing overproduction are taken as one of event and it has no impact on the future investment of the firm.

5 Conclusion

There is a lot interest among the researchers to check how earning management activities impact the effectiveness of firm overall performance in different aspects. After the accounting scandal of early 21st century, firms are more inclined to do earning management activities through the changes in real activities in the firm rather than doing it through AEM. The real earning management activities of the firm provide asymmetric information to the stakeholders of the company. Because of asymmetric information different stakeholders decide about the firm which is not in the best interest of the shareholders of the firm and firm investment efficiency is not at optimal level. In this study we have taken data from Pakistan manufacturing sector and check if Pakistan manufacturing sector is involved in REM activities and how it impacts the investment performance of the firm. To check REM two measures of REM are calculated in this study and it is ascertained that sales increase artificially through discounts and trade rebates impacts investment of the firm by increasing the investment of the firm in the subsequent period. The reason for more investment are attributed to wrong signal to different stakeholders due to REM activities which induce them to invest more to meet the future sales requirement. This impacts the investment efficiency of the firm and destroy the value of the shareholders of the firm. It is ascertained to the management of the firm to not involve in any kind of REM activities as it not impacts positively on the firm effective performance.

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The Research on Evaluation for the Independent Innovation of Biological Industrial Cluster

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Abstract: Independent innovation is the main source of cluster economic growth, and it is also the driving force of cluster development. Based on the combination of quantitative and qualitative research, theoretical research and empirical research, this paper deeply analyzes dynamic mechanism of the biological industry cluster independent innovation, constructs the evaluation model on this basis. A case study of biolake in Wuhan, through investigating the current situation of independent innovation in this industrial cluster, evaluating the ability of independent innovation by using the principal innovation analysis method, exploring ways to improve the independent innovation capability of industrial clusters from the aspects of establishing innovation alliances, broadening financing channels, improving government functions, forming talents and cultivating leading enterprises, in order to provide theoretical and practical guidance value for the sustainable development of the biological industry cluster.
Key words: Biological industry cluster; Independent innovation; Principal component method; Wuhan biolake

1 Introduction

The biological industry has become a new growth point in the global economy and a strategic demand for industrial development in various countries. It is also a strategic high-tech industry that has been competing for development in various countries in the 21st century. In recent years, China's biological industry clusters have shown rapid development, but compared with foreign mature bio-industry clusters, the overall competitiveness of China's bio-industry clusters is weak. Therefore, it is of great practical significance to study the independent innovation capability of biological industry clusters, in order to promote the sustainable and healthy development of China's biological industry clusters.

Research on industrial cluster innovation at home and abroad have made abundant achievements, and throughout the study of cluster innovation, there were more issues on how to implement the existing industry cluster technology innovation, improve the innovation performance and cluster competitiveness, but issues that related to the ability of independent innovation to promote industrial technology innovation and industrial upgrading were less involved. The existing literature also rarely mentioned the formation mechanism of the autonomous innovation ability of biological industry clusters, and most of them were theoretical framework studies, and there were few relevant empirical analyses. Based on previous studies, this paper deeply analyzes dynamic mechanism of the biological industry cluster independent innovation, constructed the evaluation model on this basis. A case study of biolake in Wuhan, Through the on-the-spot questionnaire survey and interview data of biolake in Wuhan, the impact of various influencing factors on the independent innovation ability of biological industry clusters is quantified, evaluate the independent innovation ability of biolake in Wuhan, on this basis, proposes countermeasures for capacity improvement, in order to provide reference and empirical support for improving the independent innovation theory of industrial cluster.

2 Construction of Evaluation Model for Independent Innovation Ability of Biological Industry Clusters

2.1 Analyses on dynamic mechanism of independent innovation of biological industry cluster

Some scholars have carried out a wealth of research on the dynamic of cluster innovation, representative views are shown as follow:Thomas Brenner (Thomas Brenner, 2001) used to set up a mathematical model to explore the dynamic factors for the evolution of the cluster, He believed that the memory of the cluster in seven power of innovation: cooperation between enterprises, enterprises rely on each other, the local capital market, human capital accumulation, informal communication, public opinion and local policy. Swann et al. (Swann et al., 2002) through the example analysis method, the dynamic mechanism of cluster innovation depicted as including the interaction of dominant enterprises, new enterprises to enter, enterprise incubation increase and climate, infrastructure, and cultural capital of

positive feedback system. Liu Hengjiang and Chen Jixiang described the dynamic mechanism of cluster innovation from two aspects: the excitation power and endogenous power. Motivation mechanism mainly referred to the clusters where the external environment on the cluster control and planning role, such as related policy and regulations, regional brand awareness, competitive environment; in addition to these external factors, there were some influencing factors from inside the cluster, such as complementary to the innovation of the network, the division of labor, for knowledge contribution degree, which was the impact of the fundamental factors of cluster innovation. Gao Daocai et al. (Gao Daocai et al., 2007) argued that the independent innovation dynamic system was composed of external power, peripheral motion and driving force of three subsystems, which outer driving force was the foundation, around power was the guarantee, inner driving force was the soul of innovation activities, at the same time, they restrict and promote each other, jointly promote individuals actively engaged in innovative activities.

Previous studies showed that the independent innovation activities may not be determined by the chance of a single factor, it is determined by the interaction of various factors, such as society, economy, science and technology, culture and policy. This paper argues that the independent innovation activity of the biological industry cluster is affected by the external factors and internal factors, its independent innovation dynamic factors are composed of source dynamic factors and environmental dynamic factors.

2.1.1 Source Dynamic Factors

Source dynamic factors, mainly refers to the existence of the biological industry cluster, which produce core power to biological industry cluster independent innovation, including the independent innovation ability of the enterprise in the biological industry cluster, the benefit pursuit of enterprise or innovation organization in the biological industry cluster, the incentive of innovation agents to generate innovative behavior, and the power of cluster subject collaborative innovation. It directly influences formation and quality of the independent innovation of biological industrial cluster.

2.1.2 Environmental Dynamic Factors

Environmental dynamic factors, refers to the biological industry cluster as a result of external factors on its own initiative to promote the role of innovation, including the pulling power of market demand, the driving force of technology, the pressure of market competition, the government's support, the influence of other environment, For example, the macroeconomic environment, cluster regional innovation resources, social and cultural environment, talent market conditions, financial market conditions, property rights, legal system environment and market economic system, etc..Through the interaction between the biological industry clusters, they have some influence on the formation, operation and duration of the biological industry clusters.
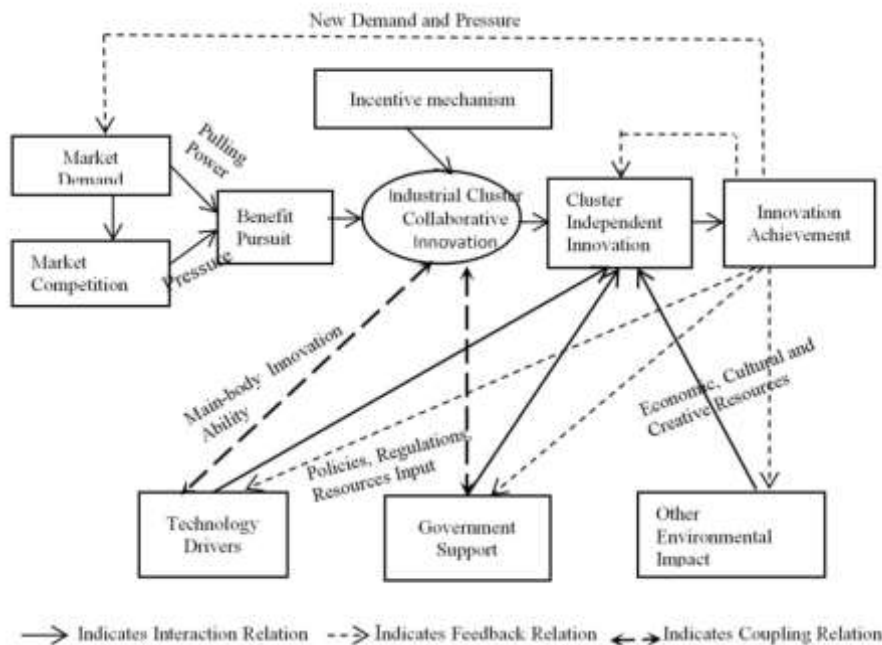
Figure 1   Biological Industry Cluster Independent Innovation Dynamic Mechanism

The dynamic factors and the environmental dynamic factors interact and influence each other;they have a huge driving force for the formation of the independent innovation of biological industry cluster, as shown in figure 1.

2.2 Design index evaluation of independent innovation ability of biological industry clusters

Based on the dynamic mechanism of independent innovation capability of biological industry clusters, and considering the availability of indicator data,the main factors that will influence the ability of independent innovation of biological industry clusters are roughly divided into four aspects: the ability of independent innovation clusters, the ability to invest in clusters of independent innovation, the ability of independent innovation of clusters, and the ability to support independent innovation of clusters.Based on this, the paper regards these four aspects as the first-level indicators for evaluating the independent innovation capability of biological industry clusters.This paper through researching the index system and framework of the evaluation index system of emerging industries and the evaluation of industrial innovation by major institutions in the world at home and abroad, referring to the main indicators of the OECD Biotechnology Key Indicators Analysis (2011 edition) and the main indicators of the comparison of biotechnology competitiveness and the theoretical research results of industrial innovation ability evaluation in Scientific American (2016 edition),combining the characteristics of China's biological industry innovation,The hierarchical system for constructing the evaluation of independent innovation capability of bio-industry clusters is shown in Table 1.

Table 1   Biological Industrial Cluster Independent Innovation Ability Evaluation Index

First-level indicators	Second-level indicators	Third-level indicators
Cluster independent innovation main body ability(A)	Cluster enterprise innovation ability(A_1)	Entrepreneurial innovation (A_{11})
		Technical staff ratio (A_{12})
		Total number of R&D institutions (A_{13})
		Cluster business sales revenue (A_{14})
	Cluster coordination management(A_2)	Cluster coordination management capabilities (A_{21})
Cluster independent innovation investment ability(B)	Cluster R&D funding(B_1)	Science and technology activities as a proportion of sales revenue (B_{11})
		R & D expenditure as a percentage of sales revenue (B_{12})
	Cluster R&D staff input(B_2)	Research and development personnel as a proportion of science and technology personnel (B_{22})
Cluster independent innovation output capacity(C)	Process innovation(C_1)	Process design capability (C_{11})
	Product Innovation(C_2)	Number of new products (C_{21})
		The proportion of new product sales revenue (C_{22})
	Knowledge innovation(C_3)	Number of patent applications for the year (C_{31})
		Number of invention patents of the year (C_{32})
Cluster independent innovation support capability(D)	Government performance(D_1)	Government policy preferences (D_{11})
		Government incentives (D_{12})
		Government investment (D_{13})
	Regional basis(D_2)	Industry-Academy-Study Collaborative Innovation Ability (D_{21})
		Regional Financial Services (D_{22})
		Regional human capital (D_{23})
		Regional Innovation Culture (D_{24})

2.3 Establishment of evaluation model for independent innovation ability of biological industry clusters

At present, there are dozens of comprehensive evaluation methods put forward at home and abroad, but they can be generalized into two categories: subjective empowerment evaluation methods and objective evaluation methods.Considering that there is some uncertainty about the influence of the index on the independent innovation ability of biologicalindustrial clusters, this paper uses principal

component analysis to evaluate the independent innovation ability of biologicalindustrial clusters.

In this paper, SPSS11.5 software is used to analyze the main components of industrial clusters 'independent innovation ability. Its specific operational steps are as follows:

(1) In order to eliminate the influence of the calculation results on dimension and magnitude of the index and ensure the rationality and scientificity of the calculation result, the original data shall be dimensionless processed in the same direction before the analysis, that is, subtracting the mean from the same variable and then dividing Standard deviation, sample mean and sample correlation matrix R = $(Z_{ij})_{pp}$.

$$Z_{ij=} \frac{x_{ij-\bar{x}_j}}{\sqrt{var(x_j)}} \tag{1}$$

$$\bar{x}_j = \frac{1}{n}\sum_{i=1}^n x_{ij} \tag{2}$$

$$var(x_j) = \frac{1}{n-1}\sum_{i=1}^n (x_{ij} - x_j)^2 \tag{3}$$

(2)Finding the eigen values and normalized eigenvectors of R.

Let$|R - \lambda E|$, solve the eigenvalue$\lambda_j$of the correlation matrix R such that$\lambda_1 \geq \lambda_2 \geq \cdots\cdots \geq \lambda_p$, Its corresponding feature vector isα_j, $\alpha_j = (\alpha_{1j}, \alpha_{2j}, \ldots\ldots\alpha_{pj})(j = 1, 2, 3, \ldots\ldots p)$, E is the identity matrix, the principal component$Y_j = \alpha_j \sum_{j=1}^p x_j$.

(3) Calculate the variance contribution rate of each principal component$a_i = \frac{\lambda_i}{p}$ and cumulative contribution rate$\sum a_i$. The variance contribution a_i of the principal component represents the proportion of the variance of the principal component in the total variance, that is, the information of the original n variables obtained by the i-th principal component in the total information；The cumulative contribution rate $\sum a_i$is the proportion of the cumulative amount of information extracted from the previous i principal components in the total information.

(4) Select the number of principal components. Usually, the number m of principal components is taken as the smallest integer that makes the cumulative contribution rate exceeds 75%. These numbers contain most of the information, and the rest of the main components can be discarded. Calculate the score of the main component, and calculate the comprehensive score of each evaluation object. The value obtained by SPSS 11.5 is actually a weighted average of the P principal component scores, which is based on the variance contribution rate of each principal component. The higher the composite score, the stronger the independent innovation ability of the sample. The composite score is positive or negative. If it is positive, it means that it is higher than the average level. If it is 0, it is the average level. If the score value is negative, it means that it is lower than the average level.

3 Research on the Evaluation of Independent Innovation Ability of Industrial Clusters in Wuhan Biolake

This paper selected 20 typical sample companies in Wuhan Biolake and used SPSS11.5 to analyze and calculate the following results:According to the observational variables KMO test and Bartlett test given in Table 3, the Bartlett'sχ^2value is 369.937, the level is significant, and KMO is 0.556> 0.5. It is basically considered that the sampled sample is sufficient, and the principal component analysis can barely be performed.

Table 2　KMO and Bartlett's Test Results

Kaiser-Meyer-Oilskin Test Results		.536
Bartlett sphere test results	χ^2	367.923
	Degree of freedom	168
	Significant level	.000

Table 3　Typical Sample Scores on the Five Principal Components

Enterprise	F_1	F_2	F_3	F_4	F_5
1	3.333	0.352	0.552	0.453	-0.935
2	0.405	-0.078	0.363	-0.841	2.630
3	-0.171	1.62	0.643	2.533	0.101

Continual Table 3

Enterprise	F_1	F_2	F_3	F_4	F_5
4	0.238	-1.483	0.687	0.475	1.423
5	0.087	1.081	0.019	0.260	-0.612
6	0.663	-0.131	1.086	-0.261	-0.870
7	0.158	0.777	0.493	-0.114	1.163
8	0.439	0.195	-0.568	-0.538	0.440
9	0.563	0.961	0.841	1.576	-0.218
10	-0.244	1.462	-0.832	1.145	0.339
11	-2.047	-0.558	2.929	-0.227	-0.921
12	0.183	0.741	0.331	-1.302	-0.352
13	0.044	0.412	-0.242	0.257	0.613
14	-0.559	-0.937	0.860	0.819	1.010
15	-0.814	1.937	-0.344	-1.931	0.521
16	-0.347	0.178	-1.070	1.129	0.130
17	-0.549	-0.102	0.867	0.100	-0.309
18	0.149	-0.991	-0.918	-0.788	-1.432
19	-0.408	-0.590	-1.574	0.476	-1.351
20	-0.837	1.170	-0.366	-0.757	-0.746

Calculate the cofactor correlation weights:

Table 4   Common Factors Corresponding to the Weight

	λ_1	λ_2	λ_3	λ_4	λ_5	Sum
Quotas	3.534	3.378	3.306	2.991	2.105	15.314
	F_1	F_2	F_3	F_4	F_5	
weights	0.228	0.218	0.214	0.193	0.137	1

Substituting the weight of each principal component into the comprehensive statistical expression, the final evaluation results of the independent innovation of Wuhan Biolake are shown in Table 5.

Table 5   The Final Evaluation Results of the Independent Innovation Capability of Wuhan Biolake

Enterprise	Score	Enterprise	Score	Enterprise	Score	Enterprise	Score
1	0.912418	6	0.185661	11	-0.043570	16	-0.033799
2	0.350681	7	0.109135	12	0.166888	17	-0.354773
3	0.949490	8	-0.022858	13	0.180520	18	0.725720
4	0.163508	9	0.790708	14	-0.218663	19	0.833457
5	0.24600	10	0.352254	15	0.137690	20	-0.261297

4 Evaluation and Analysis of Independent Innovation Ability of Industrial Clusters in Wuhan Biolake

The above analysis mainly uses the principal component analysis method to conduct an empirical study on the independent innovation capabilities of the 20 scale enterprises selected in Wuhan Biolake. The evaluation results are analyzed as follows:

4.1 The first principal component

The first principal component has the greatest load on the two indicators of cluster enterprise income and R&D institutions. Explain that these two indicators are the factors that play a key role in the rapid promotion of the independent innovation capability of Wuhan Biolake Industrial Clusters. Data show that the optical valley biological city R & D institutions are increasing. Many biopharmaceutical companies have R&D departments in various business divisions of the company, which provides a good technical cradle for the development and innovation of biopharmaceutical technologies, and also lays a good foundation for the original innovation of Wuhan Biolake.

4.2 The second principal component

The second principal component has the largest load on entrepreneurial innovation intentions, the

proportion of science and technology activities as a percentage of sales revenue, and the proportion of research and development activities as a percentage of sales revenue, it shows that the innovation and innovation input plays an important role in the improvement of the independent innovation capability of Wuhan Biolake Industrial Clusters. According to actual data, the average R&D expenditure for Wuhan Biolake is around 25%, which is far more than the R&D expenditures of other pharmaceutical industry clusters in Hubei Province, but compared with the related biopharmaceutical technology clusters abroad, the total investment in R&D of Wuhan Biolake is still insufficient.

4.3 The third principal component

The third principal component has a large load on such factors as cluster coordination ability, regional financial services, government incentive measures, government resources input, and the collaborative innovation capabilities of industry, universities, and research institutes. In terms of government and industry orientation, some aspects are relatively complete and have certain basic conditions for independent innovation and construction. In cooperation with scientific research institutions, Wuhan Biolake companies are located in Wuhan universities and colleges. Many companies are directly derived from universities or scientific research institutions, or are inextricably linked with them. These scientific research institutions are strong. The technological power and advanced technology research it possesses provide solid technical support and guarantees for improving the innovation capability and original innovation of Wuhan Biolake, but the collaborative innovation capability of industry, university, and research has yet to be improved.

4.4 The fourth principal component

The fourth main component is mainly loaded with the number of patent applications in the current year and the number of patent inventions in the current year, which reflects the impact of innovation output on the independent innovation capability of Wuhan Biolake.When Wuhan Biolake was started in 2008, the total industrial income was only over 6 billion yuan. In recent years, the growth rate of major economic indicators of Biological City exceeded 35%, by the end of 2017, industry income has exceeded 300 billion, ranking second in the country.

4.5 The fifth principal component

The fifth principal component reflects the impact of innovative human capital on the independent innovation capability of Wuhan Biolake, which is mainly reflected in regional human capital.Wuhan Biolake has a strong dependence on human technology. According to research results, the qualifications of the R&D department of Wuhan Biolake are basically at or above bachelor degree.

5 Conclusion

Based on studying the dynamic mechanism of independent innovation of biological industry clusters, this paper constructs the evaluation model of independent innovation capability of biological industry clusters, and takes Wuhan Biolake as an example to conduct empirical research.After more than 9 years of development, Wuhan Biolake has made remarkable achievements. However, there are still some problems in the external environment and internal mechanism of cluster independent innovation.Based on the above evaluation results of innovative capabilities, Wuhan Biolake can discuss how to optimize the external environment and internal innovation of biological industry cluster independent innovation from the aspects of establishing an innovation alliance, broadening financing channels, improving government functions, forming talents, and fostering leading enterprises. Mechanism, and how to promote the further improvement of the ability of independent innovation of biological industry clusters.

Acknowledgement

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Monetary Policy, Regional Financial Development and SMEs' Bank Borrowing

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Abstract: Financing for SMEs has always been a hot topic, based on the regional financial development and property rights, this paper constructs a multiple linear regression model to explore the impact of macro monetary policy on the bank borrowing of SMEs. The result on the sample of small and medium listed companies from 2010 to 2017 shows that in the period of tight monetary policy, the bank borrowing of SMEs will be impacted, and this phenomenon is more obvious in the private SMEs.Besides, this paper also studies the effect of monetary policy transmission from the perspective of regional financial development. The empirical result shows that during the period of tight monetary policy, high financial development will strengthen the monetary policy transmission mechanism.
Key words: SMEs; Bank borrowing; Monetary policy; Regional financial development

1 Introduction

SMEs play a crucial role in promoting the development of the national economy, enhancing regional competitiveness, and improving innovation capabilities. With the development of the financial market, the emergence of new financing methods has enabled SMEs to have more choices when financing, but it still faces the difficulties in financing. The small scale, poor guarantee capability, asymmetric information, and unreasonable funds allocation in the market make it difficult for SMEs to raise funds. In addition, the single financing channel is also one of the key factors. SMEs still rely heavily on traditional financing methods such as bank loans, but bank loans and other methods are deeply influenced by the macro factors. In particular, the monetary policy will impact the SMEs' bank borrowing, thus affecting their financing structures. Therefore, it is of great significance to research the monetary policy and its regional effect on the financing of SMEs.

For a long time, there are endless researches on the financing of SMEs. At the very beginning, people have studied the relationship between SMEs' micro characteristics and their financing behavior. Ciaran Macan (Ciaran Macan, 2010) and Susan Coleman (Susan Coleman, 2011) found that the owner's age, enterprise size, tangible activities, ownership structure and the scale of collateral are the important determinants of bank borrowing for SMEs. There are similar findings in China (Zhang Yingming, 2016). Later, some scholars gradually explore the relationship between macro factors and SMEs' financing. Kinga Mazur (Kinga Mazur, 2007) found that monetary policy will affect SMEs' finance, and the rise in interest rates is not conducive to the financing of SMEs. Robin (Robin, 2016) studied the relationship between the U.S. economic cycle and bank borrowing scale for SMEs, and found that the bank borrowing for SMEs' declined sharply during the period of economic recession. In China, Hu Guohui (Hu Guohui, 2017) also has the same conclusion, the bank borrowing of SMEs is greatly impacted during the economic recession.Later, Rao Pingui (Rao Pingui, 2013) and others began to study the impact of monetary policy, and found that in the period of tight monetary policy, the bank borrowing of SMEs is declined significantly. Zhang Hong's (Zhang Hong, 2013) study shows that in China, there is indeed a regional effect of monetary policy transmission. Xie Jun (Xie Jun, 2014) further studied the influence of regional conduction effects of monetary policy on the enterprise,the development of regional financial markets strengthened the mitigation effect of macro monetary policies on corporate financing constraints.But from the current research, few people have studied the impact of monetary policy on SMEs' financing from the perspective of regional financial development.

Based on the previous research, the following questions will be further discussed: First, whether monetary policy have an effect on bank borrowing for SMEs. Second, will this impact be different due to the nature of property right and regional financial development? The rest of the paper includes the following sections: literature review and hypotheses in section 2, research design is described in section 3, empirical results are presented in section 4, and section 5 is the conclusion.

2 Literature Review and Hypotheses
2.1 Monetary policy, property rights and bank borrowing for SMEs

The influence of monetary policy on micro enterprises is multichannel. First, the tight monetary policy will increase the uncertainty of future information, and this uncertainty will enhance the information asymmetry, which is detrimental to the financing activities of the companies (Khan and Watts, 2009). Secondly, under the tight monetary policy, the supply of money will decline,so the supply of credit will decline significantly.Therefore,the bank borrowing will be greatly impacted (Li Sihai, 2015), and the impact of SMEs will be more grievous (Hu Guohui, 2017). SMEs have always been in a disadvantageous position in financing, especially in bank borrowing.The asymmetric information and management risk make small and medium-sized enterprises face serious credit rationing. The tight policy will aggravate the credit rationing effect, which makes the bank borrowing of SMEs falling significantly.

Private enterprises will be discriminated against in bank borrowing,state-owned enterprises occupied a dominant place in financing (Cull, 2006). On the one hand, state-owned enterprises carry the will of the country and social responsibilities, their network of political relations is vast,and more resources are held in their hands. On the other hand, the government is the invisible guarantor of state-owned enterprises (Zhan Minghua, 2015), making the state-owned enterprises have the advantage of low default risk. In short, the financing environment of state-owned enterprises is obviously better than that of private. Therefore, it is deduced that the impact of private enterprises will be more significant in the period of tight monetary policy.

H1：In the period of tight monetary policy, the ratio of bank borrowing of SMEs will decline, and this phenomenon is more obvious in private enterprises.

2.2 Monetary policy, regional financial development and bank borrowing financing for SMEs

In the transmission of monetary policy, apart from the heterogeneity of enterprises, regional differences may also produce different effects on monetary policy. In China, the economic development level, the financial ecological environment, and the degree of opening to the outside world are not consistent in all regions. All of these may lead to regional effects in monetary policy transmission (Long Haiming 2011). The financial institutions in high financial development areas are not only numerous but and diverse in type, and also have rich financial resources. When monetary policy is tight, the financial institutions, which are at the core of monetary policy transmission, will play a crucial role.Because of the large financial institutions in the developed areas and the large amount of funds, the transmission of monetary policy will be faster and wider, which will make the scale and the cost of financing more flexible to the monetary policy (Li Sihai, 2015), that is, the reduction of credit funds will lead to a rapid increase in the cost of bank borrowing and a decline in the size of financing.Therefore, this paper holds that when monetary policy is tight, the development level of high financial market will strengthen the influence of monetary policy.

H2: There is a regional effect in monetary policy transmission, during the period of tight monetary policy, SMEs in areas with high levels of financial development will be affected more significantly.

3 Research Design

3.1 Sample and data

The sample employed for this study is the listed SMEs from 2010 to 2017, because the listed SMEs have representation to the SMEs, and their data are sound and true. In the data screening process, ST and ST* companies and companies with missing data were excluded, financial firms were also omitted. We finally got 3928 sample data, 491 samples. The financial data are derived from the CSMAR database in China., and the macroeconomic data are derived from the China Economic Net statistics database.

3.2 Variable construction

The main explanatory variable of this paper is monetary policy. There are many ways to define macro-monetary policy, this paper use Lu Zhengfei' method to define monetary policy, calculate the value of M2 growth rate minus the GDP growth rate and minus the CPI growth rate, and define the larger values of 2011,2014, 2016, and 2017 as tightmonetary policy period, and other years as monetary policy loosening period. In this paper, the market index is selected to replace the development level of regional finance for inter-group comparison.In addition, some related variables are controlled in this paper, table 1 shows the meaning of each variable and its calculation method.

3.3 Model

This paper uses fixed effects to test whether those factors have a significant impact on the company's various financing methods. The regression equation is as follows, where Yrepresents the dependent variable, β_0 is a constant, β_i represents a regression coefficient, and ε represents an error term.

$$Y = \beta_0 + \beta_1 MP + \beta_2 IndexFi + \beta_3 Size + \ldots\ldots + \beta_9 Operating + \varepsilon$$

In this paper, we use stata14.0 to test the sample data. In empirical research, it often causes endogenous problems due to missing of variables, so the Hansman test is performed before the regression, and the results show the p value =0, so the original hypothesis H_0 is rejected and the endogenous problem may exist. The fixed effect model is a common method to alleviate the endogenous questions, so the fixed effect model was used for regression analysis.

In addition to the endogeneity problem, multiple collinearity can also affect the regression results. Therefore, this paper uses the variance expansion factor VIF value to test the multiple collinearity of the independent variables. The results show that the VIF of each explanatory variable is less than 2, the maximum value is 1.74, the average value is 1.27, and it shows that there is no multiple collinear between the independent variables.

Table 1   Variable Description

Variable type	Variable name	Description of variable
Dependent variable	Bank borrowing(*Y*)	(short-term loans + long-term loans + non-current liabilities due within one year) / Liabilities
	Monetary Policy (*MP*)	Virtual variable，Take 1 when monetary policy tightens
	Net cash flow from operating activities (*Cashflow*)	Net cash flow from operating/Total assets
Independent variable	Shareholding ratio of the largest shareholder (*Top1*)	The proportion of the largest shareholder in the company
	Size (*Size*)	The logarithm of total assets
	Age (*Age*)	Age of the firm in years at the time of the survey
	Retained profits (*Accumulation*)	Undistributed profits /Total assets
	Tangible assets (*Tangible*)	(Inventory + Fixed Assets) / Total Assets
	Profitability (*Profit*)	ROA

4 Empirical Results

From table 2, it can be seen that the average bank borrowing ratio of SMEs is 13.62%, but the two levels of differentiation are serious, some companies even don't use bank loans for financing. This paper also calculates the equity financing ratio of these samples, the average value of equity financing reached 43%, shows that there do exist equity financing preference among listed SMEs in China. As can be seen from the internal accumulation level, the internal accumulation level of SMEs is generally low, with an average value of only 15%. This also reflects the actual situation of SMEs, that is, the internal funds of SMEs cannot meet the needs of their development. Apart from this, profitability and cash flow, they all meet the characteristics of SMEs.

Table 2   Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Cashflow	3928	0.0433	0.0750	-0.6702	0.4748
Top1	3928	0.3501	0.1475	0.0415	0.8649
Age	3928	2.3866	0.4890	0.0000	3.5835
Size	3928	21.7350	0.9247	18.5240	25.9794
Tangible	3928	0.3600	0.1637	0.0007	0.9481
Accumulation	3928	0.1508	0.1649	-2.8377	0.7123
Profit	3928	0.0448	0.0840	-2.8341	0.8631
Y	3928	0.1362	0.1391	0.0000	0.8588

The first column in Table 3 is the regression result for the whole sample, the coefficient is 0.00583(Significant at 5% level), indicating that bank borrowingt for SMEs declined significantly during the tightmonetary policy period.

The second and third columns are the results of private and state-owned SMEs. Compared with state-owned enterprises, the bank borrowing ratio of private SMEs has declined 0.00584(significant at the 5% level) during the period of tight monetary policy.

This paper uses the market-oriented development index drawn by Fan Gang to classify the level of regional financial development. It divides the financial development above the average into high-level

groups, and therest of it is divided into low-level groups. The fourth and fifth columns show that the bank borrowing of SMEs with high level of regional financial market development has decreased by 0.0051 (significant at the 5% level), while others has declined 0.00497. In times of tight monetary policy, financial developed regions are more responsive to monetary policy adjustments. The results in Table 3 validate Hypothesis 1 and Hypothesis 2.

Table 3   Impact of Monetary Policy on SMEs' Bank Borrowing Financing

Variable	Total	Private	State-owned	High financial development	Low financial development
MP	-0.00583**	-0.00854**	0.00306	-0.0051**	-0.00497
	(-2.44)	(-2.06)	（-0.3）	(-2.02)	(-1.44)
Cashflow	-0.120***	0.00575	-0.179**	-0.109***	-0.116***
	(-6.40)	（0.17）	(-2.13)	(-4.79)	(-3.29)
Top1	0.0838***	0.111**	0.117	0.0264	0.210***
	4.03	（3.07）	（1.52）	(-0.98)	(-5.96)
Age	-0.0264***	0.0153***	0.0450**	-0.0263***	-0.0329**
	(-4.16)	（3.5）	(2.59)	(-3.48)	(-2.69)
Tangible	0.192***	0.282***	0.0971**	0.181***	0.180***
	(13.99)	(20.51)	(2.81)	(-10.4)	(-7.51)
Accumulation	-0.0470***	-0.219***	-0.126***	-0.0284*	-0.0898***
	(-3.46)	(-12.91)	(-3.78)	(-1.71)	(-3.63)
Size	0.0357***	0.0373***	0.0254***	0.0368***	0.0317***
	(11.55)	(15.17)	(3.99)	(-9.71)	(-5.5)
Profit	-0.140***	-0.205***	0.0441	-0.144***	-0.192***
	(-7.17)	(-5.46)	(0.88)	(-6.34)	(-4.19)
_cons	-0.626***	-0.789***	-0.517**	-0.639***	-0.520***
	(-7.00)	(-6.46)	(-3.23)	(-7.84)	(-3.91)
F	32.75	66.34	14.92	23.44	16.46
R2	0.2872	0.3456	0.3840	0.1796	0.2433
N	3928	3472	456	2390	1538

t-Statistics in parentheses. *, **, *** Statistically significant at the 90%, 95% and 99% level of confidence

5 Conclusion

In sum, the empirical results in this paper shows that: in the period of tight monetary policy, the borrowing financing of SMEs has been impacted, which is more obvious in private enterprises. Meanwhile, the monetary policy transmission has a regional effect, and the high financial development level will strengthen the transmission mechanism. This study enriches the microscopic evidence of monetary policy transmission mechanism, and confirms that the monetary policy transmission has regional effects.

The research of this paper has certain enlightenment meaning for the financing decision of SMEs the tight monetary policy will impact the bank borrowing, so SMEs can make use of trade credit and other ways to raise funds. More importantly, SMEs should improve their financial management system and make reasonable financing plans, choose financial methods according to the changes of macro monetary policy and optimized financing structure continuously. The monetary policy transmission will produce regional effects due to the difference of the financial development level. Therefore, the government should not only focus on the overall situation, but also consider the imbalance between the regions in accordance with the reality of our country, and try to formulate the structural monetary policy and enhance the scientificity of the monetary policy.

Future research can explore the impact of monetary policy on SMEs' financing from different perspectives. This paper uses virtual variables to represent changes in monetary policy, the subsequent

research could also find better standards to measure monetary policy.In addition, the dynamic adjustment of the SMEs' financing structure is also a topic to be further studied.

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Research on the Mode and Path of Construction of Wuhan Industrial Innovation Center

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Abstract: As an experimental area of comprehensive innovation reform, formulating and implementing the planning of the Wuhan Industrial Innovation Center (WIIC) has become a very necessary and urgent task. This paper analyzes the mode for the establishment of global science and technology innovation centers (STIC)under the premise of an in-depth understanding of the development status of industrial innovation centers all over the world. Based on a comparative analysis of Wuhan, Chicago, and Beijing, the modechoice of building WIIC was derived.Simultaneously, based on the phased characteristics of local development, the path of WIIC was analyzed. The conclusions of this paper can be used as a reference for the relevant industrial policies.

Key words: Wuhan industrial innovation center; Science and technology innovation center; Mode selection; Path analysis

1 Introduction

China has entered an era of vigorously promoting comprehensive innovation.The construction of a STIC or industrial innovation center (IIC) has become an important task for all over the country to carry out comprehensive innovation reform experiments.The country has given Wuhan a major mission to take the lead in comprehensively innovating and reforming experiments. Wuhan has foundations, conditions, and advantages to speed up construction.

The IIC refers to cities or regions with regional innovation and extreme nuclear function that are rich in industrial innovation resources, intensive in industrial innovation activities, and clustered by emerging industries.Some scholars used case analysis to study the typical IICs in the world. Cooke (Cooke, 1992) conducted a comparative study of the regional STIC in the Basque Country of Spain, the Emilia-Romagna of Italy, and Wales of the United Kingdom, summing up the successful experiences of the regional STIC.Henton and Held (Henton and Held, 2013) pointed out that Silicon Valley STIC has innovative destruction and evolutionary functions and formed a complete innovation ecosystem.Asheim and Alsaksen (Asheim and Alsaksen, 2002) used Norway as an example to discuss the role of IIC in knowledge transfer and innovation clusters.Research on Asian STICs such as Bangalore (Chaminade and Vang, 2008) and Japan (Fukugawa, 2008) also had important reference value. Some Chinese scholarsenriched the theoretical research on global STICs from a global perspective. Zhong Hua et al. (Zhong Hua et al., 2012) inspected the concept of the global STIC and the distribution pattern of the world theoretically. He took 12 STICs in the world as the research objects and conducted an in-depth analysis of its innovation and development practices.Du Debin and DuanDezhong (Du Debin and Duan Dezhong, 2015) analyzed the spatial distribution pattern of global STIC through data on the 100 most innovative cities in the world and analyzed the decisive factors that affect the growth and development of global STIC.Some China's advanced cities were taken as examples to explore the path of building STICs under China's national conditions. Zhao Hong (Zhao Hong, 2014) and Zhang Yun (Zhang Yun, 2015) discussed the path of Beijing's construction of STIC.Xu Hongqiang(Xu Hongqiang, 2015) proposed the ideas and measures for building a world-class STIC in Shenzhen from the perspective of Shenzhen-Hong Kong innovation economic circle.

It can be seen that the research of IIC has already had relatively rich results and can be used as a reference for the research of this topic.At the same time, it can also be seen that relevant research all over the world mainly focuses on case analysis and empirical analysis. There is a lack of research on the standards and path of IICs.In particular, the publicly published research results concerning WIIC are still missing, and this is exactly what this paper is about.

2 The Mode Choice of Wuhan Industrial Innovation Center
2.1 Global industrial innovation center development mode
Global IICs have the following four modes of development.
2.1.1 Market-driven Mode
Market-driven mode mainly uses market forces to drive the development of IIC. The World STICs represented by Western developed countries represented by New York and London are "natural development modes" that strengthen internationalization factors and market forces.This is a market-driven type.Among them, New York City is the center of the United States economy, finance and trade.In the United States national innovation system, the federal government implements a weak intervention policy.They believe the direction of technological innovation and the numberof capital and manpower that should be determined by the market.
2.1.2Government Guidance Mode
Tokyo STIC is a typical representative of the government guidance mode.From the 1970s onwards, Japan proposed a "technology-based nation" policy, vigorously supported its own R&D of scientific and technological innovations. The government has established a good science and technology innovation environment for Tokyo by formulating scientific and technological innovation plans, supporting the development of emerging industries, providing an external environment that supports innovation, and improving innovation and infrastructure.
2.1.3 Government-market Dual-drive Mode
The government-market dual-drive mode is based on the joint efforts of the government and the market to drive the development of industrial innovation centers.For example, Saxony, Germany, has the strongest economic strength and highest degree of industrialization in the five eastern states.
In the process of industrial innovation, there are three ways in which Saxony government supports companies. The first is financial support. Some start-up high-tech companies can get state government funding support and investment subsidies at the initial stage. The second is research and development support.The state government supports enterprises to cooperate with universities. The third is service support.The government helps the company to enter the market rather than manipulate and control the market.Under the mode of joint government and market, the development of industrial innovation in Saxony, Germany, has made great achievements.
2.1.4 Ecosystem mode
Business-oriented type. As the successful establishment of a high-tech company in Bangalore made it the center of India's information technology, it is known as the "Silicon Valley of Asia".Bangalore has gathered a large number of top global software companies and many top global information industry giants. It has formed a technological innovation system that uses companies as the main body of innovation.

Rely on human resources type.Tel Aviv relies on strong human resources, positioning itself in the global demand for technological innovation market, focusing on the design of innovative products, thereby attracting the participation of global multinational companies' R&D departments and high-end R&D talents, forming a benign urban technological innovation cycle.

University-driven type.Universities play a crucial role in the innovation system of Silicon Valley. They mainly provide talents and knowledge for the various entities in the system, so that knowledge, information and resources can be flowed and transmitted in the network.
2.2 The mode choice of Wuhan industry innovation center
Chicago is the international benchmark for Wuhan to construct IIC. Wuhan once had the reputation of "Oriental Chicago".Both of them are the largest cities in the central region. They have large rivers and large lakes, and they have convenient transportation. They are home to universities and research institutes, both of which were once the steel industry towns and face industrial transformation. In the process of development in Chicago, the government, as a sponsor, establishes a non-governmental organization to widely link resources and operate by market means to ensure the sustainable development of the organization.Chicago upholds the principle that the government does not interfere too much with the business activities in the industry. The government's control measures are mainly directed at market conduct.Wuhan can use Chicago as a benchmark, strengthen government guidance, highlight market leadership, and create an innovative, upgraded version of Eastern Chicago.

Beijing is the domestic benchmark for Wuhan to construct IIC.They are all clustered by universities and scientific research institutes.Beijing, as the capital of China, has inherent advantages in policies and resources. Under the premise of playing a market role, the government supervises and

guides the economic development.Driven by the market and the encouragement of the government, the world's top 500 companies have competed in Beijing and many local innovation and entrepreneurship companies have emerged.Wuhan can use Beijing as a reference to summarize and learn from its experience in building a STIC.

Based on the above benchmarking, Wuhan's construction of an IIC can choose the dual-driven mode of government and market, while focusing on fostering industrial innovation ecosystem.

3 Path Analysis of Wuhan Industrial Innovation Center

The general evolution path of foreign IICs is: capital technology intensive stage, innovation resource accumulation stage, and innovation ecosystem development stage.Some regions can go directly to the second stage across the first stage.Wuhan is at the early stage of the accumulation of innovative resources. The development stage of Wuhan Industrial Innovation Center can be divided into three stages, as shown in Figure 1.
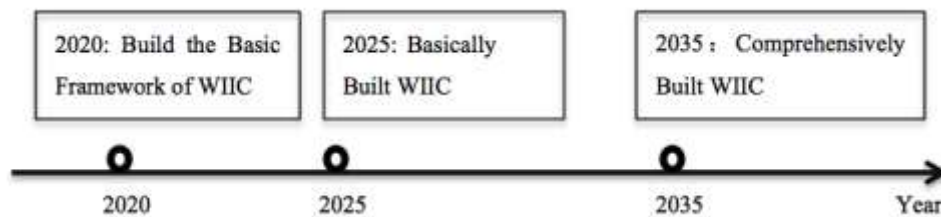
Figure 1   Development Stages of Wuhan Industrial Innovation Center

3.1 Overall layout

Wuhan Industrial Innovation Center locates and layouts according to "2 Valleys 2 Circles 3 Centers". From the perspective of regional layout, it is divided into the core area, the expansion area and the radiation area of the IIC.The core areas of the IIC include the East Lake Independent Innovation Demonstration Zone and Wuhan Economic and Technological Development Zone. The development zone of the IIC includes:Surrounding "Optics Valley" Industrial Innovation Circle, Central University Innovation Circle, Create Valleys Group, Airport Port Economic Development Zone.The radiation area refers to the radiation to the whole city and Wuhan City Circle through the core function of the core area and the expansion of the extended area.

From the industrial layout point of view, focus on the construction of three major industrial innovation centers. Build a new generation of Information Technology IndustrialInnovation Base (Center) and become a global leader in next-generation information technology. Build a Life and Health IndustrialBase (Center) and become a leader in domestic life and health industrial technology.Build an Intelligent Manufacturing Industrial Innovation Base (Center) and become a leader in domestic intelligent manufacturing industrial innovation.

3.2 Two valleys

3.2.1 Optics Valley

Completed international standards and patent-intensive areas.In 2020, we will strive to create more than 100 international standards, and the number of PCT international patents will strive to exceed 1,000 and enter the first domestic phalanx.

Create a world-leading corporate headquarters base. In 2020, the world's top 500 companies and world leaders in the establishment of R&D headquarters, sales headquarters, and manufacturing headquarters in "Optics Valley" will strive to reach 1,000.

Cultivate the international union of photoelectric information industry.To promote the international development of Optics Valley's optoelectronic information industry alliance and attract optoelectronic information companies with global influence.

3.2.2 Create Valley

Build Offshore Innovation and Entrepreneurship Center (OIEC) for overseas scientific and technological talents.With the approval of the Wuhan Free Trade Zone as an opportunity, accelerate the pilot work of Wuhan OIEC in the Free Trade Zone.

Create a diversified International Entrepreneurship Base (IEB).To establish an IEB that integrates the students' entrepreneurial park, technology business incubator, creative space, and innovation and entrepreneurship center.

Enhancing the World Image of " China Create Valley " in Wuhan.Strengthen cooperation with

Wuhan Optics Valley and Silicon Valley, Wuhan and Chicago.Further explore cooperation with world-class parks to build R&D centers and cooperation parks, set up mutual bases, and set up joint venture funds.

3.3 Two circles

3.3.1 Surrounding "Optics Valley" Industrial Innovation Circle

Build the Surrounding Optics Valley "optoelectronic plus" industry innovation platform.Photoelectron as a link and carrier, through the optical perception, optical interconnection, optical computing, optical display, optical energy and other means to achieve interconnection of all things, and promote the optoelectronic industry and other industries cross-border integration development.

Cultivate the Optoelectronic derivatives and supporting industrial belt surrounding Optics Valley.Focusing on the upstream and downstream industrial chain of optical fiber cables, optoelectronic devices, lasers, communication systems, software, and other industrial leading enterprises, create a creative space for small and micro enterprises in related industries.

To create a "one-core, multi-polar" bio-industrial innovation circle surrounding Optics Valley.It is centered on the "Wuhan National Biological Industry Base" in East Lake Hi-tech Zone, creating the core area of the entire industrial chain of the life and health industry.

3.3.2 Central University Innovative Economy Circle

The construction of WIIC needs to give full play to the advantages of science and education resources and the advantages of knowledge innovation in institutions of higher learning in China, and promote innovation at the source,which is shown in Table 1.

Table 1   Central University Innovative Economy Circle

Central University Innovative Economy Circle	Carrier	Industry
Wuhan University Huazhong University of Science and Technology Central China Normal University	Along Luoyu Road Innovation Economic Circle	722 Technology Startup Incubator, Beacon Innovation Valley	Information Technology, Cultural Creativity Robots, 3D Printing, High-end R&D Life and health Cultural Creativity
Wuhan University of Technology		WHUT Wisdom Valley, Intelligent Transportation Technology Innovation Base, Information Industry Base, etc.	New Materials, Transportation, Information Technology, Cultural Creativity
Huazhong Agricultural University South-central University for Nationalities Wuhan Textile University	Along South Lake Innovation Economic Circle	Integration of Wisdom Valley Internet Industrial Park, Wuhan Creative Place, South Lake Creative Industrial Park	Modern Agriculture Cultural Innovation
Huangjia Lake University Town		Qingling Ecological Science Park, Hubei University of Chinese Medicine Health Industry Park	High-end Industry and R&D, Life and Health Industry
China University of Geosciences		China Jewelry Valley	Jewelry, Finance

3.4 Three centers

3.4.1 New Generation of Information Technology Industrial Innovation Center

Focusing on the development direction of the mobile Internet and Internet of Things industry, lay out a complete industrial chain and innovation chain for optoelectronics, optical displays, integrated circuits, geospatial information, and intelligent terminals. Create an innovation center for optoelectronic manufacturing and build a new generation of information technology industrial innovation bases.

3.4.2 National First-class Life and Health Industrial Innovation Center

Focusing on drugs, medical devices and health services targeting major diseases, deploy biomedical and medical devices, precision medical services and services, health care and bio-agriculture industrialization projects and innovative institutions. Develop new business forms for biological services

and health services and build a domestic first-class life and health industry innovation base.
3.4.3 National Important Intelligent Manufacturing Industrial Innovation Center
Focusing on the innovative direction of deep integration of new generation information technology and manufacturing technology, we will deploy industrial projects and innovative carriers such as sensors, industrial software and high-end CNC machine tools, robots, marine engineering equipment, and aerospace equipment, and build an important intelligent manufacturing IIC in China.

4 Conclusion

Based on the academic achievements and practical experience of the predecessors, this paper summarizes the four development modes of the global industrial innovation centers, including market-driven mode, government guidance mode, government-market dual-drive mode and ecosystem mode. According to the comparative analysis of Wuhan, Chicago and Beijing, the development model suitable for Wuhan to construct an industrial innovation center is selected, namely the dual-driven mode of government and market, while also focusing on fostering industrial innovation ecosystems.

According to the experience of developing industrial innovation centers in other regions, the path of Wuhan Industrial Innovation Center was obtained, namely the "2 Valleys 2 Circles 3 Centers" path. Including Optics Valley, Create Valley, Surrounding "Optics Valley" Industrial Innovation Circle, Central University Innovative Economy Circle, New Generation of Information Technology Industrial Innovation Center, National First-class Life and Health Industrial Innovation Center, National Important Intelligent Manufacturing Industrial Innovation Center.This paper also gives suggestions and measures to achieve this overall layout.

In the future, Wuhan will strive to basically establish an industrial innovation center around the overall layout of the "2 Valleys 2 Circles 3 Centers" path in 2025. And in 2035, the goal of fully building Wuhan Industrial Innovation Center with international influence will hopefully be completed.

Acknowledgement

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Influence Factor Analysis of Industrial Science and Technology Innovation Alliance Based on System Dynamics

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Abstract: As a new organization form of industry-university-research collaborative innovation, the industrial science and technology innovation alliance is an important carrier to implement the national innovation-driven strategy and build China's technological innovation system.Based on the current situation of the industrial technology innovation alliance development, this paper discusses the causality of the industrial science and technology innovation alliance development, uses system dynamics to simulate the relationship among enterprises, government, and University-Research party, draws conclusions and makes suggestions for the development of China's industrial technology innovation alliance.
Key words: Influence factor; Industrial science and technology innovation alliance; System dynamics; Governmentfunding; University-research party

1 Introduction

December 2006, China's Ministry of Science and Technology, China's Ministry of Finance, together with other 3 departments, carried out the pilot work of the industrial science and technology innovation alliance, which aims to ensure legally-binding contracts, andform a collaborative technological cooperation between joint development, complementary advantages, benefit sharing, and risk sharing.

Recent years, Domestic and foreign researches have focused on the connotation, operation mode, mechanism, risk sharing, and performance researchs. Industrial science and technology alliance have been divided into equity or non-equity alliances(Rothaermel,2001).Enterprises in alliance face more risks than independent companies in pursuing the maximization of their own interests(Das,2007).There are types of conflict influencing factors in the alliance,which means that governments, universities, and scientific research institutions must establish a collaborative innovation network based on profit sharing(Li Feng,2014). Performance evaluation indicator systems has been established to analyze alliance performance(Pan Donghua,2013).From the perspective of subjective utility, a performance evaluation index system based on the alliance operation process has been constructed (Tan Jianwei, 2017).

There are few studies from the perspective of system dynamics, however the use of system theory to analyze the structure and operating mechanism of the coalition is of great significance to the stability of the industrial science and technology innovation alliance.

2 Development Status of China's Industrial Science and Technology Innovation Alliance

Industry technology innovation alliance pilot work contact group is supportedbyChina's ministry of Science and Technology, in order to deepen the union pilot work, promote the communication between the union organization, communication and cooperation.This article analyzes the development status of China's industrial science and technology innovation alliance based ontheregistered 150 pilot alliances.

From the perspective of geographical distribution, the industrial science and technology innovation alliance has basically covered the whole country.According to the location of the sponsor or governing unit of the coalition, 150 pilot alliances were classified, of which 68 were Beijing pilot coalitions, accounting for 45.33% of the total; followed by Shandong,Hubei and Shanghai(Figure 1).
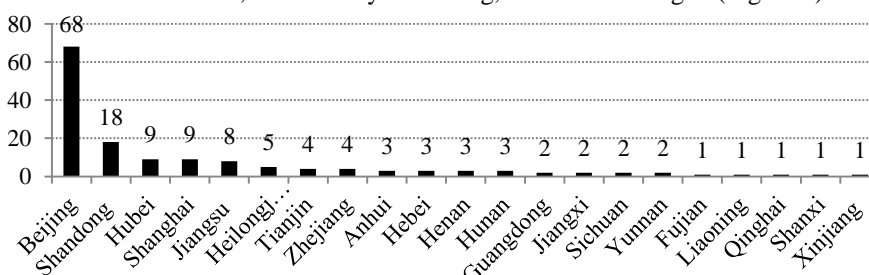
Figure 1   Regional Distributionof Pilot Alliances

From the perspective of technical field, the alliances cover agriculture, forestry, animal husbandry and fishery,etc. among which there are 33 alliances for agriculture, forestry, animal husbandry and fishery industries, accounting for 22.00% of the total;23 biotechnology and pharmaceutical technology industry science and technology innovation alliances, accounting for 15.33% of the total.
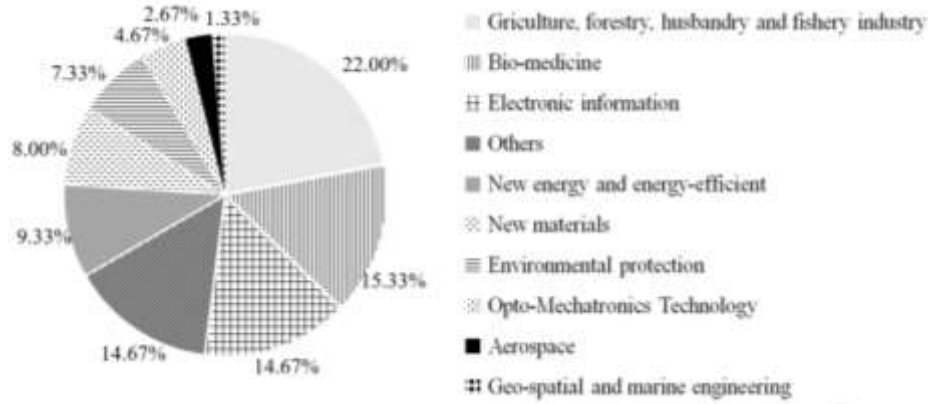
Figure 2　Industry Distribution of Pilot Alliances

Table 1　Activity of Pilot Alliances in 2014-2017

	Activity	2014	2015	2016	2017
Higher	Quantity	36	56	29	24
	Percentage of the evaluated alliance (%)	31.03%	44.80%	29.00%	23.76%
	Percentage of total (%)	24.66%	38.36%	19.86%	16.44%
High	Quantity	37	34	23	22
	Percentage of the evaluated alliance (%)	31.89%	27.20%	23.00%	21.78%
	Percentage of total (%)	25.34%	23.29%	15.75%	15.07%
General	Quantity	29	18	30	35
	Percentage of the evaluated alliance (%)	25.00%	14.00%	30.00%	34.65%
	Percentage of total (%)	19.86%	12.33%	20.54%	23.97%
Poor	Quantity	14	17	18	20
	Percentage of the evaluated alliance (%)	12.07%	13.60%	18.00%	19.80%
	Percentage of total (%)	9.59%	11.64%	12.32%	13.70%

Data source: China association for industrial science and technology innovation

From 2015 to 2018, The secretariat of the China Industry Technology Innovation Alliance Association continued to organize the activity evaluation work and evaluated the pilot allianceswithcomplete information. The evaluation indicators include 3 first-level indicators (establishment and operation of alliance organizations, collaborative innovation activities of the alliance, effectiveness of the alliance in stimulating the development of the industry)and 20 second-level indicators. The evaluation results are shown in Table 1.

Industrial Science and Technology Innovation Alliance has covered most of China and involves a diversified technical field. China's industrial technology innovation alliance has achieved a certain degree of development, but there are still some problems: (1) The alliancesare unevenly distributed. The Beijing pilot coalition accounts for 45.33% of the total, while Liaoning, Qinghai, Shanxi, and Xinjiang have only one pilot coalition in underdeveloped regions. (2) The quality of the development of China's industrial science and technology innovation alliances is not high. The participation rate of activity evaluation is about 75%, indicating that some pilot coalitions areneglected; the proportion of higher and high activity was only about 50%, and it showed a further downward trend.

3 Model Construction

System dynamics gradually reveals causal relationships between system elements through the establishment and control of mathematical models.The constituent elements of the industrial technology innovation alliance, a complex relationship between enterprises, academics and the government, meet the structural requirements of dissipative nature. Therefore, the use of system dynamics to simulate the industrial science and technology innovation alliance can reveal the interest relationship in the alliance (Liu Linzhou, 2012). System structure theory has been used to analyze the operating mechanism of the industrial science and technology innovation alliance system (Xiong Li, 2017). Internal variables such

as trust, speculative behavior, will lead to greater volatility (Yuan Yijun, 2013), IT capabilities affect the performance of the alliance as well (Yang Chen, 2014).

This paper summarizes the industrial technology innovation alliance as three main elements: enterprises, university-research party, andgovernment, then summarizes the relationships among them:
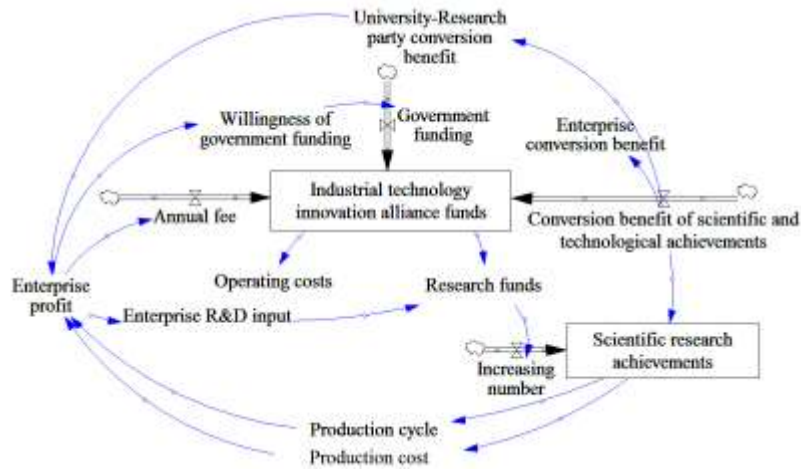
Figure 3   Inventory Flow Chart of the Industrial Science and Technology Innovation Alliance

(1) Relationship between enterprises and university-research party:1)Enterprises need to pay the annual fee for joining regularly, and the annual fee removes the remaining part of operating expenses as research funds.2) The increase of enterprise profits will increase the investment of enterprise R&D funds, some of which will become alliance research funds through the establishment of alliance projects.3)The investment of scientific research funds will increase the achievements of university-research party.4)With the increase of the achievements of scientific research institutions and the progress of production technology, the production cycle of enterprises' products is shortened and the cost of products is reduced, which can further increase the profits of enterprises.

(2) Relationship between enterprises and government:1) Government can provide policy support, funding, and coordination of the internal relations of industrial technology innovation alliances for enterprises, which will help improve the transformation of the results of enterprises and alliances and increase corporate profits. 2) Increasing in corporate profits will bring vitality to the development of the industry, which will increase the government's willingness.

(3) Relationship between government and university-research party: Government's increasing willingness to fund the alliance will help university-research party obtain more research funds and further enhance the ability of university-research party to transform their achievements. The increasing in research capabilities of the Alliance will also help increase government funding.

To sum up and improve the above three causal relationships, the system dynamics inventory flow among three elements of the industrial technology innovation alliance can be obtained (Figure 3).

The industrial science and technology innovation alliance involves many subjects, and the interest relationship is also complicated. This article will focus on examining the impact of the role of government and university-research partyplay in the alliance on companies. Assuming that product demand equals output, corporate profits can be expressed as (1):

$$W = d\frac{p-c}{R} \cdot a + I \tag{1}$$

$$S = S_0 + \beta\frac{P-P0}{P0} + \gamma e^{\delta\frac{m0}{m}} \tag{2}$$

where W is the profit of the company; p is the price of the product; c is the production cost of the product; d is the demand for the product; a is the annual fee paid by the company; I is the income of the company's achievements.S is usedto analyze the role of government funding for the coalition, $0 \le S \le 1$.Government has a basic investment intention $S_0$for industrial technology innovation alliances, $0 \le S_0 \le 1$.

Assuming that the government funding intention has a positive correlation with corporate profits and the number of scholars' research achievements. The specific relationship is shown in equation (2). Among them, α, β and γ are parameters that reflect the impact of corporate profits and academic achievements on government funding intentions; P is corporate profits, P_0 is the initial profit of the company; $\delta < 0$ is the parameter; m is the number of achievements of the research party, and m_0 is the

number of initial results of university-research party.

The impact of the research institute of the Industrial Science and Technology Innovation Institute on the company's performance is to increase the profit of the company by reducing the production cost and production cycle. The specific relationship is shown in equations (3) and (4):

$$c=0.5+\lambda_1\frac{b1}{m^{\theta_1}} \tag{3}$$

$$r=(0.5+\lambda_2\frac{b2}{m^{\theta_2}})*r_0 \tag{4}$$

where r is the production cycle, r_0 is the initial value of the production cycle, assuming that the production cost and production cycle are reduced to at most 50%; λ_1, λ_2 are constants, $0<\lambda_1<1$、$0<\lambda_2<1$; b_1、b_2 are parameters, indicating the degree of influence of academic research results on product cost and production cycle, the larger the value, the higher the degree of impact.

4 Parameter Setting and Simulation Analysis

This paper simulates the corporate profits and discusses the influence of government funding intentions and university-research party achievements on the development of enterprises in the industrial technology innovation alliance. Due to the limited data acquisition, we extract the government funding intention as a government factor; extracts the impact of the academic research results on product cost and production cycle b_1, b_2 as the academic research influencing factors, and formulates four simulation programs, as shown in Table 2.

Table 2   Parameter Scheme

	Government funding intention (S)	Quality	Quality of research results	
			Impaction production cost (b_1)	Impact on production cycle (b_2)
Plan 1	0.7	high	2	2
Plan 2	0.3	high	2	2
Plan 3	0.7	low	8	8
Plan 4	0.3	low	8	8

Through simulation calculations, the profitability of the company under the four plans can be obtained in Figure 4.
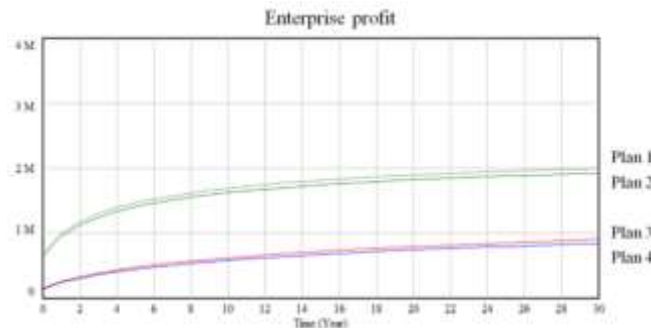
Figure 4   Profit Graph of Four Plans

From the above figure, we can draw following four conclusions:

(1) The four schemes all make contribution to the improvement of corporate profits, indicating that the government grants and the university-research party achievements are indeed positively related to the growth of corporate profits.

(2) The profit growth rate of the four schemes in the initial period is greater in the later period, which shows that the initial impact of the government subsidy and the quality of the university-research party on the industrial technology innovation alliance enterprises is greater than the later.

(3) Comparing the profits of Plan1 and Plan 2，the enterprise profits of Plan3 and Plan4，when the quality of university-research party achievements is at the same level, the profits of enterprises with high government-funded willingness are higher.

(4) The profits of Plan1 andPlan2 after the simulation are higher than those of Plan3 and Plan4, that is, the effect of the quality of academic achievements on the profits of the enterprises is higher than the effect of the government subsidies on the profits of the enterprise.

5 Conclusion

In response to the conclusions of this paper, the following recommendactions are proposed for the development of China's industrial science and technology innovation alliance:

(1) Improve the initial support of the alliance. The government subsidy has a positive effect on the industrial science and technology innovation alliance. Since this kind of benefit is a diminishing marginal return, the government should pay more attention to the new industrial technology innovation alliances, increase financial support, guide scientific research plans,play a coordinating role for new alliances, andappropriately reduce financial support for relatively stable and relatively mature alliances.

(2) Absorb high-qualityuniversity-research parties. From the conclusion of this paper, we can see that the quality of research results is more obvious than the government's funding, and it has a greater role in promoting the development of industrial science and technology innovation alliances. Therefore, the alliance should actively seek cooperation with academic research institutions, especially to attract high-level institutions of higher learning, scientific research institutions, to reduce the dependence on government support funds.

(3) Improve the ability of independent innovation of enterprises. Government funding and university-research party can increase corporate profits to a certain extent, but this effect has a law of diminishing marginalization. Alliance enterprises cannot rely too much on other members of the alliance. They should increase R&D funding, attract high-tech talent, seek cooperation with academic research institutions, cultivate and reserve talents, enhance their own scientific research capabilities and independent innovation capabilities, and enhance their core competitiveness.

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Research on the Improvement of Industrial Innovation Environment in Wuhan

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Abstract: Nowadays, innovation has become a driving force behind the national economic development and an effective way to promote social advancement. This paper probes into the three factors in industrial innovation environment, namely policy environment, industry environment and talent environment. Some tentative suggestionsfor improvingthe industrial innovation environment in Wuhan are also put forward in the paper. It is pointed out that relevant policies should be introduced to emphasize and cultivate the subject of industrial innovation and retaining talents should be the top priority in innovation environment.
Key words: Improvement; Industrial innovation environment; Wuhan; Suggestions

1 Introduction

Environment for innovation plays a vital role in carrying out innovative activities. A favorable innovation environment can improve innovation openness degree(Gao Wei, 2016) and provide the innovators with more opportunities (Li Jun & Chen Hansong, 2010). Till now there are a great number of researches on the topic of innovation environment all over the world. Alberto Hurtado (Alberto Hurtado, 2010) examined the internal environment of innovation in the organization by conducting a qualitative research in five different companies. Erickson (Erickson,1996) discussed the influence of national innovation systems on management behavior and he pointed out that national innovation environment by its nature may vary from country to country. Xu Tingting and Wu Hecheng (Xu Tingting and Wu Hecheng,2013) built an evaluation system to analyze the regional innovation environment in Jiangsu province with a result showing distinct differences in innovation environment in different parts of the province. Zhang Zongyi and Zhang Ying (Zhang Zongyi and Zhang Ying,2008) used Data Envelopment Analysis (DEA) to analyze the impact of innovation environment on the efficiency of regional innovation, and the result of the research indicated the impact was a significant one. Based on an empirical study on the relationship between innovation environment and performance, Zhou Jingkun and Duan Zhongxian (Zhou Jingkun and Duan Zhongxian,2013) found out that the high level of entrepreneurship would have a positive effect on innovation environment. To summarize, there are abundant studies on innovation environment, but till now most of the researches center on the innovation environment in first-tier cities or in technical companies. Besides, practical and detailed measures to improve innovation environment are often not provided in the current researches. In this paper, essential factors of innovation environment are discussed, a comparison between the innovation environment in Wuhan and that in Beijing is carried out and some tentative suggestions on the improvement of innovation environment in Wuhan are put forward.

2 The Status Quo of Industrial Innovation Environment in Wuhan

According to the research conducted by Tsinghua university TusPark research institute for innovation, policy environment, industry environment, talent environment, R&D environment, financial environment and intermediary market environment are 6 central elements in evaluating innovation and entrepreneurial environment. In this paper, the status quo of industrial innovation environment in Wuhan is approached from 3 different angles (out of the 6 central elements mentioned above), namely policy environment, industry environment and talent environment. Furthermore, a brief comparison of the industrial innovation environment in Wuhan and that in Beijing is made to identify gaps and provide ideas for further improvements.

Beijing, the center for cultural and business activities, is also one of the leading cities of innovation. Electronic information, bio-medicine, artificial intelligence and R&D are regarded as industries with local advantages. In Beijing, there are 92 universities and colleges with 235318 graduates in the year of 2017. There are 12388 high-tech enterprises in Beijing in 2017, accounting for nearly 20% of all the

high-tech enterprises national wide. There are about 200 maker spaces in the city and more than 150 business incubators and science parks.

In Beijing, the innovation policies are rather loose in order to foster innovation and entrepreneurship in industries with competitive advantages. The local fiscal and taxation policies are favorable to innovative business, which contributes a lot to the forming of a cluster of high-tech enterprises in Beijng. The Zhongguancun National Demonstration Zone, with a history dates back to the early 1980s, is a very good example of innovation business in Beijing. Recently innovation funds are established for innovation projects, providing discounted interest rates and equity investment to create a better innovation environment and ease financial pressure at the same time. In Zhongguancun or other demonstration zones in Beijing, a closely cooperation of universities, research institutions and enterprises are greatly encouraged. A great number of policies are made to attract, retain and motivate innovative talents. According to the figures on its official website, Zhongguancun, a national S&T innovation center, has a rather big talent pool. There are about 40 colleges and universities, more than 200 national scientific institutions, approximately 67 state-level laboratories, more than 50 national research centers and about 29 overseas student pioneer parks in the demonstration zone.

Wuhan, one of the 25 most promising cities in China, is a very important industrial base featuring high-tech manufacturing industry, automobile, biological engineering and logistic & cargo industry (as is shown in Table 1).

Table 1   Industry Development in Wuhan and Beijing

City Comparison	Industry Development
Beijing	Electronic information, bio-medicine, artificial intelligence and R&D, etc.
Wuhan	High-Tech manufacturing industry, automobile, biological engineering and logistic & cargo industry,etc.

Recent years there are several policies formulated in favor of industrial innovation, for example, policies to encourage investment in innovation, policies to encourage the establishment of national, provincial and municipal innovation platform and policies to subsidize the investment in patents. Favorable policies contribute to the formation of several industrial clusters in Wuhan, such as Optical Valley, Dongfeng Auto Town, Yangluo Development Zone and so on. There are 2827 high-tech enterprises in Wuhan in 2017 with a growth of 29.9% than in previous years. The added value of high-tech enterprises is about 267 billion yuan with a 13.3% growth. In 2017, the total number of granted patents for invention is 25528, and the total value of technical contracts is 60.32 billion yuan. Wuhan is also a city with abundant talents. There are 84 universities and collegeswith 290000 graduates in the year of 2017.

All the above figures give us a brief introduction of the current situation of industrial innovation environment in Wuhan and Beijing. It is undoubtedly that Wuhan, with various kinds of talents, is a promising city in favor of industrial innovation. The industrial innovation environment in Wuhan is positive and stimulative, but the gap between the innovation environment in Wuhan and that in Beijing is still huge. Beijing, as a scientific and cultural center, boasts more high-tech enterprises with high renown. Besides, the industrial innovation environment in Beijing embodies a close cooperation between enterprises anduniversities and colleges. For example, there are about 40 colleges and universities in Zhongguancun national demonstration zone, including some world-renowned universities such as Tsinghua University and Beijing University providing top students for the enterprises. However, the colleges and universities in Wuhan are not that relevant to the local industrial innovation. The number of graduates in Wuhan in 2017 is larger than that of Beijing, however, there are just 2827 high-tech enterprises in Wuhan which just accounts for only 10% of the total number of high-tech enterprises in Beijing (as is shown in Figure 1).
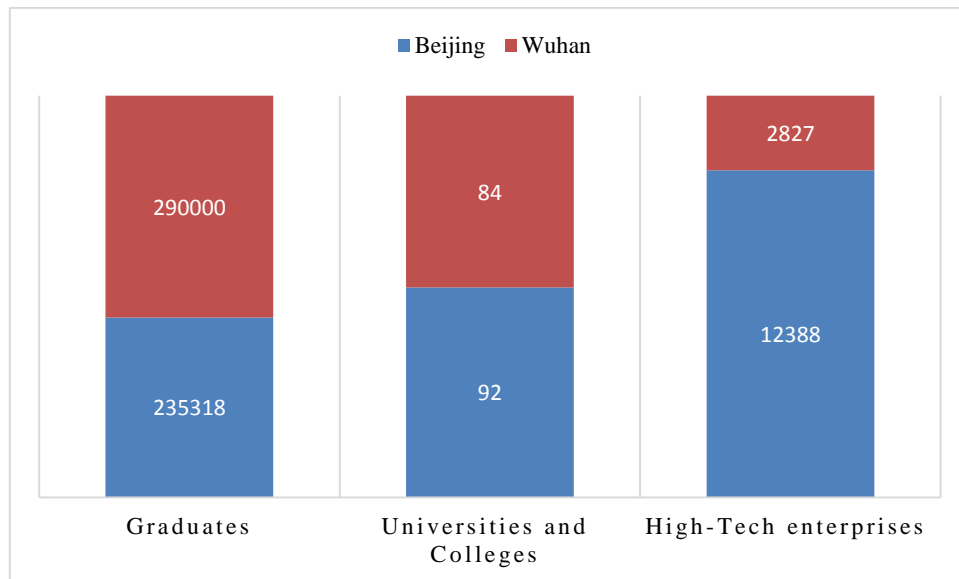
Figure 1　A Comparison between Wuhan and Beijing in the Aspects of Graduates, Universities and Colleges and High-tech Enterprises

3 Suggestions for Improving the Industrial Innovation Environment in Wuhan

3.1 To improve the policy environment for industrial innovation in Wuhan

A good and favorable policy environment can attract trans-regional investment and creative talents, which is quite decisive in regional industrial innovation. Recent years, a range of innovation policies are formulated to promote enterprises innovation, such as "Qingtong project", "Chuanggu project" and "10 policies for enterprise innovation". However, when compared with other cities, there is still a long way to go to improve the local policy environment. First, Relevant policies should be introduced to emphasize and cultivate the subject of industrial innovation, encourage the establishment of innovation platform and form strategic alliance with other research centers or universities. Second, Intellectual property protection should be strengthened and certain technical standards need to be formulated in the local policies to ensure the innovative activities are carried out in an orderly way.

3.2 To improve the industry environment for industrial innovation in Wuhan

In Wuhan,high-tech manufacturing industry, automobile, biological engineering and logistic & cargo industry are the industries with local advantages. First, in order to be more competitive in the national or world market, the range of the local industry should be widened and more potential industries could be explored. Second, the industrial structure should be optimized and the industrial planning could be reinforced. Third, more innovation platforms need to be built for those enterprises in need. Last but not least, a close cooperation and interaction between enterprises and universities should be established, which will be a win-win choice in the future.

3.3 To improve the talent environment for industrial innovation in Wuhan

Talent is a fundamental factor in industrial innovation in Wuhan. How to retain and recruit talents is and will be the top priority in innovation environment. Talent environment has been greatly improved in Wuhan recently, some policies such as "Housing voucher project for talents", "settling-down policy for university students" are formulated aiming to retain talents. However, when compared with other cities such Beijing, Shanghai or Shenzhen, the development status for talents in Wuhan is still not that desirable. In order to retain and attract trans-regional talents, Intellectual property protection should be strengthened. Furthermore, appealing offers should be provided to attract promising talents. Specific talents that are specially needed in the economic development in Wuhan should be introduced on purpose.

4 Conclusion

Innovation has become a decisive factor behind the national economic development and an effective way to promote social advancement. This paper probes into the industrial innovation environment from three different aspects, namely policy environment, industry environment and talent environment. Among the three factors discussed in the paper, talent environment is a vital factor in

industrial innovation in Wuhan and how to retain talents should be the top priority in improving innovation environment. Furthermore, favorable policy environment and the introduction of potential industries are also very practical steps to improve the industrial innovation environment in Wuhan.

Acknowledgement

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Research on Financial Competitiveness of Listed Companies in the Chip Industry: Empirical Test Based on the Factor Analysis

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Abstract: Based on the financial data of Shanghai and Shenzhen Stock Exchanges from 2014 to 2016, this paper employed the Stata software as a statistical tool to construct the major factor that influenced the financial competitiveness of the chip industry through factor analysis, and obtained the matrix of component score coefficients, so as to measure and evaluate the financial competition for the chip industry. The study found that: profitability was the key factor; and there was still a big gap in the financial competitiveness of various companies in the industry, which was in turn weakened by the industry's performance in profitability, operating and development capacity, and the debt repayment abilities. Based on this, this paper proposed some suggestions, such as strengthening international cooperation and broadening international market as well as implementing technical innovation operating mechanism.

Key words: Chip industry; Financial competitiveness; Factor analysis; Empirical research

1 Introduction

In the 2017 report of the 19th national congress of the CPC, General Secretary Xi pointed out that "innovation is the primary driving force for development" and put forward the strategic requirement of "accelerating the construction of a strong manufacturing country and the development of advanced manufacturing".As the representative of the highest level of micro-manufacturing in the world, chip manufacturing is the core and cornerstone of the development of the information age. In recent years, with the increase in the penetration of smartphones and the promotion of the downstream application market, the demand in China's chip market has continued to be sustained, high-speed, and stable. Meanwhile, a series of supporting policies for the chip industry have been released. For example, the State Council issued the "Outline for Promoting the Development of the National IC Industry" in 2014, and implemented the program in the form of a national integrated circuit industry investment fund to provide support at the fund level (Li Fang, 2014); the Council also issued "Made in China 2025" in 2015, which mentioned that the China's chip self-sufficiency rate need reach 40% by 2020 (Meng Qingfeng, 2016), indicating the development direction of China's chip industry. At present, in face of the increasingly ferocious competitive environment at home and abroad, the chip industry needs to improve its competitiveness as the key strategic emerging industry in China. In particular, financial competitiveness is certain knowledge and innovation-centered integrated ability in favor of the exertion of corporate sustainable competitive advantages and a kind of competitive force that acts on controllable corporate financial resources after the high-efficient integration of overall business financial ability. Therefore, evaluation on the financial competitiveness of listed companies in this industry also arouses wide attention from the social public.

Currently, many scholars have carried out the research on the financial competitiveness of the chip industry. Xi Yongqin used the revised "diamond model" to explore the factors that influenced the competitiveness of integrated circuit industry based on seven dimensions (Xi Yongqin, 2015). Li Wei adopted the analytic hierarchy process to build a performance evaluation system for the chip industry on the basis of EVA (Li Wei, 2017). Based on the above, this article wielded the stata software as a statistical tool and adopted the factor analysis method to extract the main factors affecting the financial competitiveness of the listed companies in the chip industry through combining the results of the quantitative analysis, and thus to obtain a formula for evaluating the financial competitiveness of enterprises.Therefore, the objective assessment was achieved, and based on the Wilcoxon signed rank, the robustness analysis was conducted upon the empirical part of the paper. On this basis, it provides targeted recommendations for the development of China's chip industry.

2 Chip Industry Financial Competitiveness Factor Analysis

2.1 Research design

2.1.1 Research Subject and Method

This paper took 80 chip companies in the concept plates of the Shanghai and Shenzhen Stock Markets as research objects, removed missing data samples, and finally selected 60 listed companies of the chip industry as samples. Meanwhile, due to the availability of data, this paper took the period from 2014 to 2016 as the sample interval in the empirical analysis. In order to avoid data of a certain year affecting the reliability of the sample, the average of the three-year data was used as the research data. The basic principle of the factor analysis method is based on the internal correlation of research variables. The variables with high correlation are aggregated into the same type, and the correlation between different types of variables becomes low. Each type of variable actually represents a common factor.

This paper employed the stata software as a statistical tool to transform multiple financial indicators affecting the financial competitiveness of the chip industry into a few unobservable comprehensive indicators(He Xiaoqun, 2012), explore the main factors affecting the financial competitiveness of listed companies in the industry, and obtain a comprehensive score for each company so as to measure their financial capabilities.

2.1.2 Indicator selection

Corporate financial competitiveness is an integrated evaluation system. Based on relevant theories concerning corporate financial competitiveness, this paper adheres to the comprehensiveness, scientificity and equilibrium principle in indicator setting in combination with the data of listed companies in chip industry, constructs corresponding financial competitiveness evaluation indicator system from the dimension of debt paying ability, business operation ability, profitability and development ability and chooses the current ratio, quick ratio, cash ratio, total asset turnover, working capital turnover, return on assets, return on equity, operating profit ratio, ratio of profits to cost, revenue growth rate, and total asset growth rate as the variables for factor analysis. The variables are set as Table 1.

Table 1　Variable Settings

Category	Variable Name	Variable Definition
Solvency	current ratio	X1
	quick ratio	X2
	cash ratio	X3
Operating capacity	working capital turnover	X4
	total asset turnover	X5
	return on assets	X6
Operating capacity	return on equity	X7
	operating profit ratio	X8
	ratio of profits to cost	X9
Development ability	total asset growth rate	X10
	revenue growth rate	X11

2.2 Factor analysis

In order to eliminate the influence of the dimensional relationship among variables and the difference in data size and improve the comparability of the data, the original data is standardized using the stata (similarly hereinafter) and the analysis program is set, and Table 2 and Figure 1-2 are obtained in proper order.

Table 2　KMO and SMC

Variable	KMO	SMC
X1	0.6444	0.9987
X2	0.6103	0.9989
X3	0.7638	0.9768
X4	0.3534	0.1198
X5	0.4998	0.5077
X6	0.6758	0.8903
X7	0.6983	0.8600
X8	0.6680	0.8891
X9	0.6409	0.9011
X10	0.4866	0.3553
X11	0.1718	0.1064
Overall	0.6463	-

Table 2 lists the results of KMO and SMC. The KMO sampling fit measure is used to measure the correlation of the indicator, and the SMC is used to observe the linear relationship of the indicator (Zhang Hui, 2012). In this analysis, KMO=0.646>0.6 indicates that the indicators have certain correlations and are suitable for factor analysis. The SMC values of most variables are greater than 0.5, and those of the current ratio, quick ratio, cash ratio, and ratio of profits to cost are all greater than 0.9, indicating that the linear relationship between the indicators is strong and is suitable for factor analysis. The data in Table 3 shows the variance contribution rates and cumulative sums of the common factors. In general, the extraction criterion is to extract the common factor with an eigenvalue greater than 1. Stata analysis results show that the first four common factors satisfy the conditions, and their variance contribution rates are 32.21%, 27.52%, 11.73%, and 9.71% successively, and the cumulative variance contribution rate after rotation reaches 81.16%. Therefore, the first four common factors are extracted and it is representative and strongly explained.

Table 3   Total Variance Explained

Component	Eigenvalue	Difference	Proportion	Cumulative
Component 1	3.5426	0.5159	0.3221	0.3221
Component 2	3.0267	1.7369	0.2752	0.5972
Component 3	1.2898	0.2215	0.1173	0.7145
Component 4	1.0682	0.1693	0.0971	0.8116
Component 5	0.8989	0.1791	0.0817	0.8933
Component 6	0.7199	0.4171	0.0654	0.9587
Component 7	0.3028	0.2256	0.0275	0.9863
Component 8	0.0772	0.0237	0.0070	0.9933
Component 9	0.0535	0.0336	0.0049	0.9982
Component 10	0.0197	0.0191	0.0018	0.9999
Component 11	0.0006	0.0	0.0001	1.0000

As shown in Figure 1, combined with the inflection point of the curve in the gravel chart and its corresponding horizontal and vertical coordinates, it can be seen that the eigenvalues of the first four common factors are greater than 1 with steeper slope, which indicates more intuitively that it's reasonable and strongly supported to extract the first four common factors.
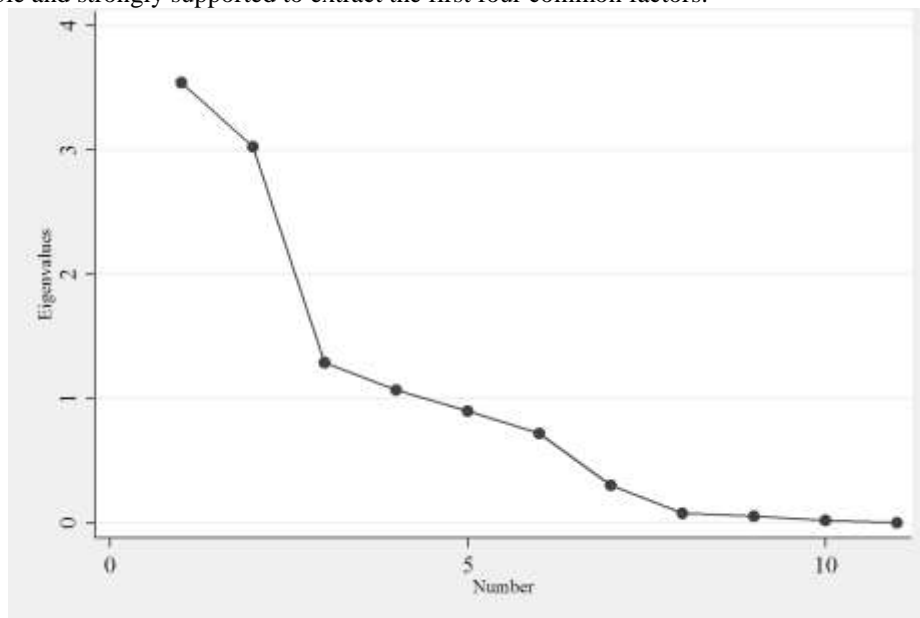
Figure 1   Scree Plot

Table 4 reveals the component matrix after rotation. The maximum factor variance method is used to rotate the initial factor load matrix. After the rotation, the load of the indicators on the common factor becomes larger, which can more reasonably represent the degree of influence of the indicator on the common factors and give more naming explanation to the common factor variables.

According to the rotated component matrix table, the indicators can be grouped into four main factors. The first main factor has a larger load on *X6、X7、X8、X9*, indicating that it reflects the profitability of the enterprise. Hence it is defined as the profitability factor; the second main factor has a large load on *X1、X2、X3*, showing that it reflects the solvency of the enterprise, so it is defined as the solvency factor; The third main factors has a larger load on *X4、X5*, representing that it basically reflects the operational capability of the enterprise, thus it is defined as the operational capability factor; and the fourth main factor has a relatively large load on *X10、X11*, indicating that it stands for the company's ability to develop, therefore, it is defined as the development capacity factor

Table 4   Rotated Component Matrixa

Variable	Component 1	Component 2	Component 3	Component 4
Zscore(*X1*)	-0.073	0.988	-0.046	-0.020
Zscore(*X2*)	-0.071	0.989	-0.055	-0.022
Zscore(*X3*)	-0.020	0.984	-0.108	-0.034
Zscore(*X4*)	-0.047	0.054	0.656	-0.039
Zscore(*X5*)	-0.054	-0.272	0.805	0.028
Zscore(*X6*)	0.911	-0.156	0.144	0.140
Zscore(*X7*)	0.881	-0.116	0.113	0.154
Zscore(*X8*)	0.888	-0.092	-0.219	-0.117
Zscore(*X9*)	0.851	0.222	-0.316	-0.084
Zscore(*X10*)	0.382	-0.012	0.296	0.564
Zscore(*X11*)	-0.098	-0.040	-0.164	0.874

The load map can make the degree of aggregation between each variable and the degree of its influence on the four main factors appear more intuitive in the coordinate system, as shown in Figure 2.
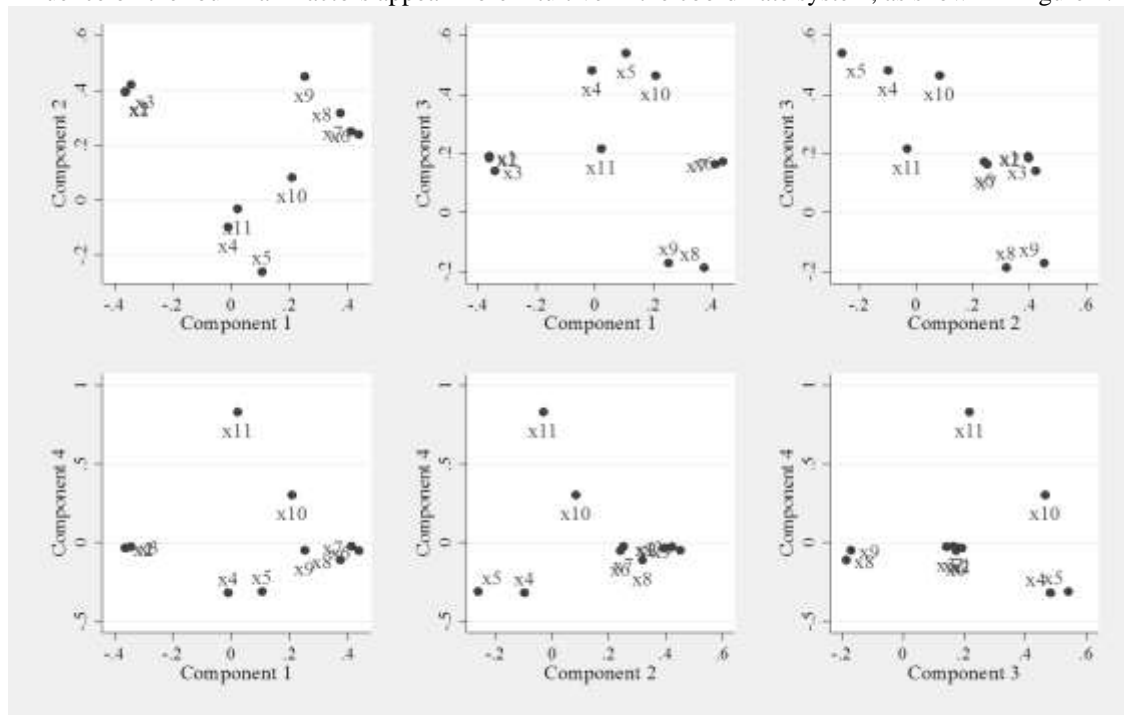
Figure 2   Component Loadings

According to Table 5, the relevant equations can be drawn, and the scores of each factor are:
*F1 = 0.009 * X1 + 0.010 * X2 + 0.024 * X3 + 0.025 * X4 + 0.016 * X5+ 0.280 * X6 + 0.269 * X7 + 0.271 * X8 + 0.263 * X9+ 0.101 * X10 - 0.094 * X11*
*F2 = 0.333 * X1 + 0.333 * X2 + 0.326 * X3 + 0.094 * X4 + 0.001 * X5 - 0.001 * X6 + 0.008 * X7 -0.031 * X8 + 0.066 * X9+ 0.063 * X10 - 0.007 * X11*
*F3 = 0.079 * X1 + 0.072 * X2 + 0.035 * X3 + 0.513 * X4 + 0.584 * X5+ 0.133 * X6 + 0.111 * X7 -*

0.123 * X8 – 0.165 * X9+ 0.208 * X10 - 0.198 * X11
F4 = 0.023 * X1 + 0.022 * X2 + 0.011 * X3 - 0.076 * X4 - 0.037 * X5+ 0.054 * X6 + 0.072 * X7 - 0.146
* X8 - 0.097 * X9+ 0.459 * X10 + 0.797 * X1

Taking the variance contribution rate as the weight of each main factor, then the formula for calculating the composite score can be obtained as:

F = (0.3221 * F1 + 0.2752 * F2 + 0.1173 * F3 + 0.0971 * F4) / 0.8116

According to the load capacity of each main factor, the comprehensive score is:

F = 0.131 * X1 + 0.130 * X2 + 0.126 * X3 +0.107 * X4 +0.087 * X5+ 0.136 * X6 + 0.134 * X7 - 0.062
* X8 + 0.091 * X9+ 0.146 * X10 + 0.027 * X1

Table 5   Component Score Coefficient Matrix

	Component			
	1	2	3	4
Zscore(*X1*)	0.009	0.333	0.079	0.023
Zscore(*X2*)	0.010	0.333	0.072	0.022
Zscore(*X3*)	0.024	0.326	0.035	0.011
Zscore(*X4*)	0.025	0.094	0.513	-0.076
Zscore(*X5*)	0.016	0.001	0.584	-0.037
Zscore(*X6*)	0.280	-0.001	0.133	0.054
Zscore(*X7*)	0.269	0.008	0.111	0.072
Zscore(*X8*)	0.271	-0.031	-0.123	-0.146
Zscore(*X9*)	0.263	0.066	-0.165	-0.097
Zscore(*X10*)	0.101	0.063	0.208	0.459
Zscore(*X11*)	-0.094	-0.007	-0.198	0.797

Therefore, we can obtain the comprehensive evaluation scores and rankings of the listed companies in China's chip industry. The specific results are shown in Table 6:

Table 6   Score Summary both of the Top 10 and Last 10 Enterprises

Company	F1	Rank	F2	Rank	F3	Rank	F4	Rank	F	Rank
NSD	2.723	1	0.563	8	1.422	4	3.752	1	1.545	1
BJJZ	-1.406	59	6.572	1	0.240	20	0.451	9	1.506	2
DRZB	2.640	2	1.134	4	-0.658	47	-0.970	59	0.924	3
ZRKJ	1.154	9	2.014	2	-1.035	54	-0.968	58	0.680	4
SAGD	2.389	3	0.232	11	-0.987	53	-1.029	60	0.547	5
ZGGF	-0.064	31	-0.084	16	4.097	1	0.521	8	0.530	6
YJKJ	1.555	4	-0.138	19	0.479	17	-0.004	21	0.486	7
DLGF	1.385	6	-0.133	18	0.147	25	-0.487	42	0.345	8
DZJG	1.180	8	-0.330	39	1.024	8	-0.613	51	0.326	9
AYSC	1.090	10	-0.190	24	0.264	19	-0.192	28	0.286	10
TJSY	-0.682	43	-0.671	59	-1.205	59	1.684	5	-0.369	51
KQDZ	-1.080	55	-0.419	54	0.909	10	-0.677	52	-0.397	52
BFHC	-0.898	49	-0.357	44	-0.691	48	0.283	13	-0.427	53
HWDZ	-0.927	50	-0.361	46	-0.340	33	-0.550	49	-0.480	54
CDKJ	-1.068	54	-0.558	57	-0.395	35	-0.002	20	-0.526	55
ZYGF	-0.990	52	-0.360	45	-1.140	58	-0.094	26	-0.552	56
QZGD	-1.226	57	-0.234	26	-0.561	43	-0.535	48	-0.559	57
XSKJ	-0.064	30	-0.979	60	-2.612	60	0.069	17	-0.618	58
DHRD	-1.371	58	-0.494	56	-0.478	39	-0.507	45	-0.662	59
KLY	-2.090	60	-0.420	55	-0.461	38	0.111	16	-0.790	60

2.3 Result analysis
2.3.1 Overall analysis on the ranking results

As can be seen from the vertical comparison, the financial competitiveness ranking *F* has a significant correlation with the profitability factor *F1*. Except for the abnormal situations of individual companies (BJJZ、ZGGF、XSKJ), the profitability factors of the other companies are almost matching with their comprehensive ranking, which shows that the profitability is a key indicator for measuring the financial capacity of an enterprise and also is a concentrated expression of its financial competitiveness. Investors believe that listed companies with continuous profitability advantages have more investment value (Chen Lei, 2010). And enterprises should also focus on improving their profitability and guarantee the sustainable and stable development of enterprises in order to enhance their financial competitiveness.

After analyzing the scores of various factors and the overall score, there are 26 companies getting positive scores for the profitability factor *F1* and operational capability factor *F3*, accounting for 43.3% of the total sample, which indicates that in the chip industry, the volumes of companies with strong profitability and companies with weak profitability are almost the same. However, in terms of solvency factor *F4* and development capability factor *F4*, the number of companies with positive industry scores is only 12 and 19, respectively, revealing the weak overall solvency of the industry, high financial risks and weak abilities in the overall development. By descriptive statistics analysis, under the premise of the standardization of raw data, the minimum value of the operating capability factor is -2.61184 and the maximum value is 4.096681, meanwhile the solvency capability still has a minimum value of -0.97898 and a maximum value of 6.57188, which explains that there is a significant difference in the operating capacity and solvency of each company. From a comprehensive view, the performance of the chip industry in terms of profitability, operating capability, development capability, and solvency ability has been weakened successively and there is still a certain gap between the financial competitiveness of various companies.
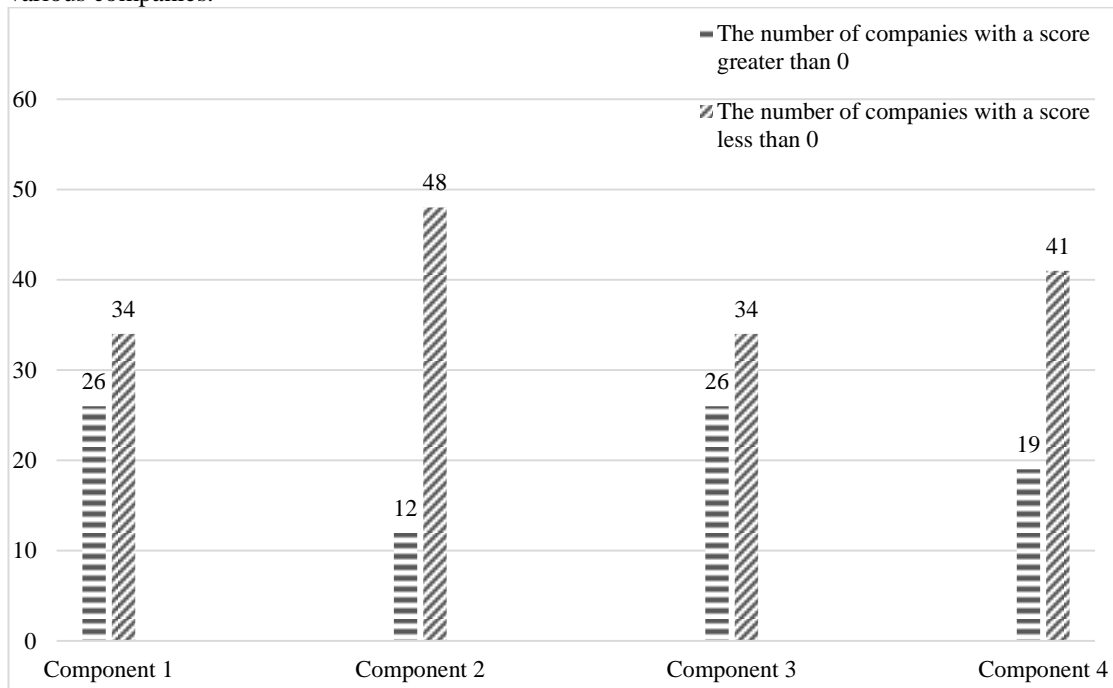
Figure 3   Company Score Distribution Map of the 60 Samples

2.3.2 Analysis of abnormal situations in individual companies

From the score summary table, it can be clearly seen that individual companies have abnormalities between the overall financial competitiveness scores and rankings of various factors. For example, BJJZ ranks among the best in comprehensive scores, but its profitability factor*F1* ranks at the bottom. Through further comparison with the original data, this article finds that BJZZ's current ratio, quick ratio, and cash ratio indicators are as high as 55.772, 52.003, and 27.588, respectively. Meanwhile the weights of the indicators in calculating the composite score F are 0.134, 0.133, and 0.129, respectively, which are also relatively large, so that the overall ranking of the company is higher; the score of its profitability factor is low for the four indicators, including return on assets, return on net assets, operating profit ratio,

and total asset growth rate, which count a lot in calculating the score of the profitability factor *F1* and their values are 0.28%, 0.89%, -18.26%, and 1.37%, respectively, all staying at the bottom of the industry. Although there is no shortage of operating funds, the company's profitability is one of the factors directly affecting its solvency based on the sustainability of the company's development. If there is no higher profitability as a guarantee, strong solvency will not last for long, so the company should be vigilant and focus on improving its profitability.

2.4 Robustness test

In order to test the accuracy and reliability of the foregoing conclusions, the following robustness tests were conducted: as shown in Table 7, some of the indicators in the original variables were replaced, and the factor analysis was performed on the selected samples using the indicators after substitution to obtain a comprehensive ranking of the companies. The Wilcoxon signed rank test was conducted on the rankings of companies before and after the indicator replacement and the main conclusions were as follows.

Table 7   Indicator Settings

Original indicator	Robustness test indicators
Cash ratio	Assets and liabilities
working capital turnover	Account receivable turnover rate
Revenue growth rate	Net profit growth rate

Table 8   Non-parametric Test

Z	-.738b
Accuracy significance (dual-side)	0.465

According to the statistical test results shown in Table 8, the two-sided significance level is 0.465>0.05, and then it is considered that after the partial indicators are replaced, the evaluation result is not significantly different from the evaluation result under the original indicators, that is, the study is considered to be statistically robust and the empirical conclusion has strong reliability.

3 Development Suggestions in the Chip Industry

3.1 Expansion of the international market in the chip industry

The promotion of the "One Belt, One Road" policy has provided a good international environment for the development of the chip industry (Tang Yanli, 2016). China's chip industry should actively promote cooperation between companies and foreign research and development institutions, and learn the research and development experience in the high-end chip manufacturing from European and American countries. (Lin Zhangyue, 2016) At the same time, chip companies can actively expand the international market and improve the overall development capability of the industry by leveraging the downstream advantages of the industrial chain and integrating international resources.

3.2 Implementation of the technical innovation operating mechanism in the chip industry

China's high-end chip devices have limited self-sufficiency, and many high-end core technologies are still in the research and development stage (Li Lei,2008). Therefore, listed companies in the chip industry should adhere to the market-oriented concept of technological innovation, increase technological innovation and research and development investment, formulate and implement a complete, standardized, and efficient research and development management system, and always attach importance to the cultivation of technical personnel and the development of research and development teams (Bai Quanwang, 2014). Besides, they should grasp the high-end chip manufacturing process, form innovative technologies and products in the chip industry and promote the commercialization of scientific and technological achievements (Qian Chunhua, 2012), and rely on technological innovation capabilities to enhance corporate profitability and investment value so as to develop the financial competitiveness of the enterprise.

4 Conclusion

This paper selects the financial data from 2014 to 2016 of 60 companies in the chip industry in the Shanghai and Shenzhen Stock Markets as samples, and wields stata as the statistical software for factor analysis. The research shows that the four main factors affecting the financial competitiveness of the

chip industry are profitability, solvency, operational ability, and development capability, in which the profitability is a key indicator affecting the financial competitiveness of the company; the performance of the chip industry in terms of profitability, operational capacity, development capacity and solvency was weakened in proper order. From a comprehensive perspective, the support to the chip industry which is a strategic emerging industry in China, should be strengthened to promote its development. The companies with weak financial competitiveness can be active through effective mergers and acquisitions within the company, strengthening international cooperation and expanding the international market, as well as improving the technical innovation operating mechanism in order to promote the overall development of the chip industry.

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Efficiency Evaluation and Status Quo Analysis of Government-supported Key R&D Project: A Case of Liuzhou City in China

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Abstract: In China, local government tends to implement key R&D project to support the industrial innovation of the region, especially in the field of generic technology and high tech. This paper takes Liuzhou City as an example, conducts an efficiency evaluation based on DEA model,and analyzes the status quo and the hindering factors of Liuzhou's government-supported key R&D project via questionnaire analysis.The research shows that the most important obstacle factors of key R&D project are lack of funding, lack of policy support and unstable market environment.
Key words: Government-supported key R&D project; Technological innovation; DEA; Liuzhou city

1 Introduction

Government-supported key R&D project is a kind of government dominant program aiming at solving critical, systematic, strategic, prospective and generic technology required from the regional development (Zhao Fugang, 2009). Government-supported key R&D project focuses on great technological innovation activity with specific goal and particular target, and an important way to enhance regional comprehensive competitiveness (Li Linqiong, 2011).

There are some researches on government-supported R&D project. ĐuroKutlača described the application of a multicriteria-based evaluation and selection procedure of R&D project proposals submitted for financial support within the framework of the GIP (ĐuroKutlača, 1997).Chang P L formulated a quality management model for research institutes performing government-supported R&D projects (Chang P L, 1998).Hsu F M presented an alternative approach for assessing the relative efficiency of government-sponsored research and development projects (GSP). A three-stage approach employing data envelopment analysis to evaluate efficiency and Tobit regression to control external variables was applied to 110 projects over 9 years (Hsu F M, 2009). Euiseong Kim measured the R&D efficiency by employing data envelopment analysis (DEA) and applied Tobit regression method to find the determinant of R&D efficiency (Euiseong Kim, 2011).Ryu Y analyzed the successful factors and performance level of government-supported Creative R&D Program in Korea, a regression analysis was conducted based on the result of questionnaire (120) on researchers who participated in the program (Ryu Y, 2013).

Liuzhou is an industry city located in the west China, and is with strong advantages in the manufacturing industries such as automobile and pharmacy (Yu Huan, 2016). Recent years, Liuzhou initiated a lot of key R&D projects answering to the strategic need of the local economic development (Liu Yi, 2014). Liuzhou municipal government stick to some principles while implementing key R&D projects, which are as following: (1) combining key R&D project with huge engineering project; (2) highlighting the main body position of enterprise; (3) triggering multi-channel funding mechanisms; (4) relying on the strategic alliance. So, the government-supported key R&D project exert multiplier effect and spill-over effect in innovation driven development of Liuzhou City.

It is necessary to conduct a review about the efficiency, effectiveness and hindering factors of the implementation of Liuzhou's government-supported key R&D project in recent years.

2 The Efficiency Evaluation of Liuzhou's Government-supported Key R&D Project

We here select 13 Liuzhou's government-supported key R&D projects started in 2013,and employ DEA (Data Envelopment Analysis) to conduct evaluation of efficiency of each project. These projects covers the technological fields of pharmacy，advanced manufacturing, iron, modern agriculture, etc., which are noted as P1, P2, …, P13 respectively.

We set 3 input variables (total investment, R&D fund, patent application), and 1 output variable (profit).

Construct DEA Model as follows (ε is the non-Archimedean infinitesimal):

$$(D_{\varepsilon})\begin{cases} \min[\ \theta - \varepsilon(\hat{e}^T s^- + e^T s^+)], \\ \sum\limits_{j=1}^{n} \lambda_j x_j + s^- = \theta x_0, \\ \sum\limits_{j=1}^{n} \lambda_j y_j - s^+ = y_0, \\ \lambda_j \geq 0,\ j = 1, \cdots, n, \\ s^- \geq 0, \\ s^+ \geq 0. \end{cases}$$

The input-output data and the efficiency evaluation results are shown in Table 1.

Table 1　The Input-output Data and the Efficiency Evaluation Results

Project	efficiency	profit（10000 RMB）	total investment （10000RMB）	R&D fund （10000R MB）	patentapplicati on（item）
P1	0.199	3199.49	28629	1200	33
P2	0.047	330	11160	600	26
P3	0.714	7274	13568	1000	13
P4	1	10328	13800	1000	1
P5	1	5710	6990	800	3
P6	0.728	4778	9478	600	5
P7	0.483	844.76	3383	500	0
P8	0.196	1422	11700	600	21
P9	0.383	1247	4341	321	3
P10	0.647	2790	5289.15	600	10
P11	0.540	2845	6800	600	2
P12	1	12138	27560	600	15
P13	1	4316	8356	500	0

The evaluation results show that: (1) There are tremendous efficiency differences among projects; (2) Only 4 projects reach the efficiency frontier; (3) Many projects present very low efficiency such as P1, P2 and P8.

3 Status Quo Analysis of Liuzhou's Government-Supported Key R&D Project: A Perspective of Enterprises

Liuzhou's government-supported key R&D project is a typical triple helix process, i.e. the coordination of government, enterprise and university, in which enterprise is the main body of the implementation (Leydesdorff L, 2013). So we distributed 80 questionnaires oriented to the enterprises undertaking the Liuzhou's government-supported key R&D projects and get 48 effective respondents. We design two types of questions. The first parts are Likert scale questions, and the second parts are multiple choices questions.

As to Likert scale questions, question 1: Are you satisfied the support of the local government in the implementation of key R&D project? The response is shown in Figure 1. The figure indicates that 19% of the respondents are very satisfied with the local government support, and 48% of the respondents are fairly satisfied with the local government support.
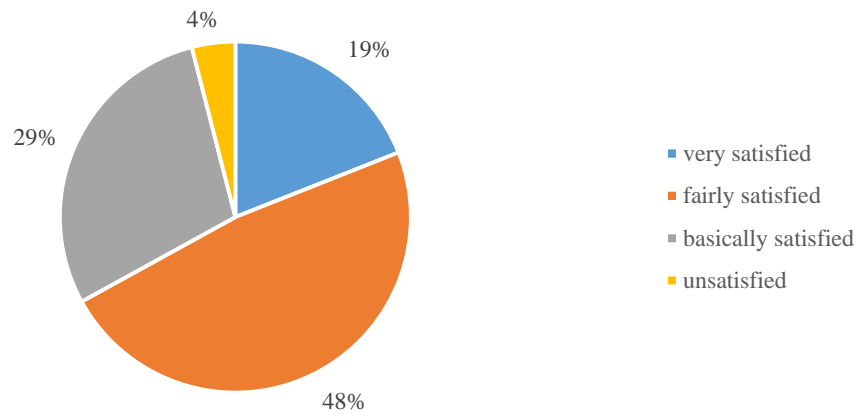
Figure 1   Question 1 Results

Question 2: Are the key R&D projects helpful for your company's development? The response is shown in Figure 2. So we can see that the key R&D project is totally helpful for the companies.
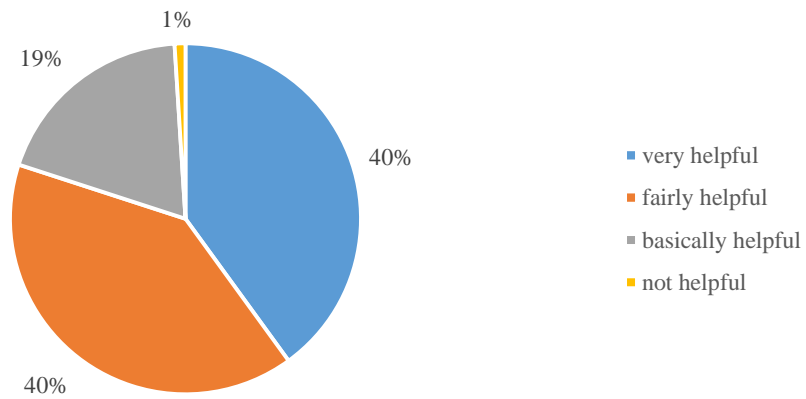
Figure 2   Question 2 Results

Question 3: Is your company's technology sufficient for the implementation of key R&D projects? The response is shown in Figure 3. We can see that still 10% companies' technology is not sufficient.
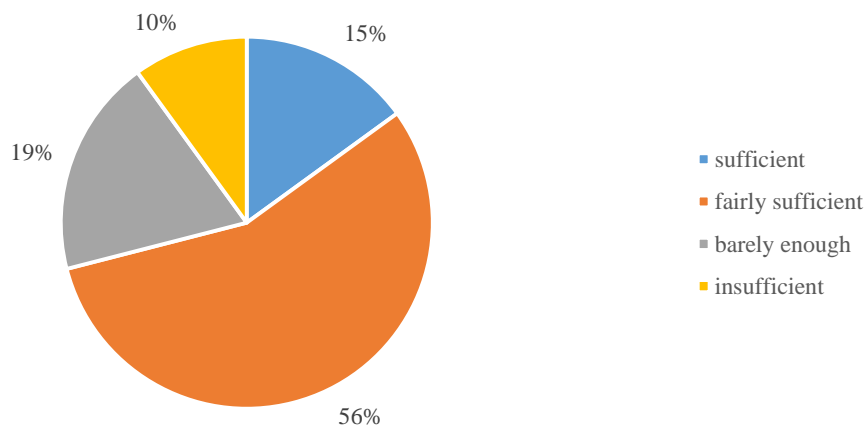
Figure 3   Question 3 Results

Question 4: Are your company's talent personnel sufficient for the implementation of key R&D

projects? The response is shown in Figure 4. We can see that still 19% companies' talent personnel are not sufficient.
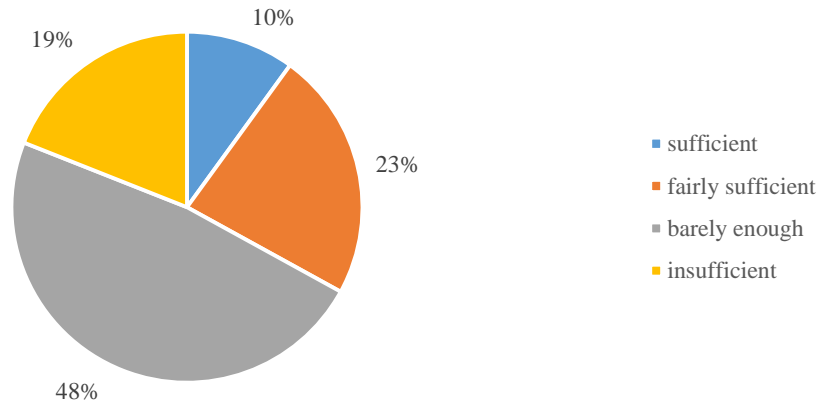
Figure 4   Question 4 Results

As for multiple choices, the typical one is: What are the main obstacles of key R%D project implementation in enterprise. The alternatives are: A-Lack of R&D personnel, B-Lack of funding, C-Communication obstacle, D-Weakness of the government policy, E-Difficulties of IP protection, F-Instability of industry environment, G-Insufficiency of coupling of technology and market, H-Weakness of marketing, I-Weakness of technology sustainability, J-Complexity of project coordination, K-the others. The results are shown in figure 5. The figure indicates that B, C, D and F and the most important obstacles to the implementation of Liuzhou's government-supported key R&D project in the perspective of enterprises.
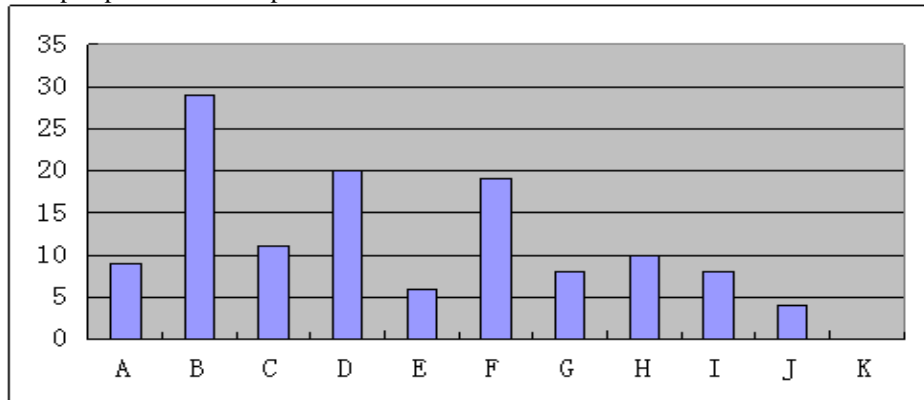
Figure 5   The Obstacles of Liuzhou's Key R&D Project Implementation

4 Conclusion

The study shows that the Liuzhou's key R&D projects have a relatively satisfied efficiency with the huge differences among various projects, and they are helpful for the local enterprise's technological innovation and business development. The research also indicates that the most important obstacle factors of key R&D project are lack of funding, lack of policy support and unstable market environment.

The countermeasures to raise the efficiency include: (1) Enforce the cooperation among enterprise, university and government; (2) Recruit more talent personnel to enterprise; (3) Improve the industrial innovation environment.

Acknowledgement

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Political Gene, R&D Investment and Corporate Innovation Performance: An Empirical Study

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Abstract: Under the new normal economic background, innovation is an important strategy for the transformation and upgrading of Chinese metal products industry. This paper takes the listed companies of Metal Products Industry from 2014 to 2016 in Shenzhen and Shanghai Stock Exchange as the research object. This article constructs multiple linear regression models to empirically testing the impact of corporate political gene on innovation performance and examining the intermediate effects of R&D investment of the two. The study finds out that the two dimensions of corporate political gene, namely the ownership structure of enterprises and the political connections of senior executives, have a positive effect on corporate innovation performance. R&D investment has incompletely intermediate effects in the above process.

Key words: Political gene; Innovation performance; R&D investment; Metal products industry

1 Introduction

1.1 Research background

It is widely acknowledged that technological change and innovation are major drivers of economic growth and lie at the very heart of the competitive process. Under the background of the long-term implementation of the planned economic system in China, the relationship between the enterprise and the government is close. The bond between the two is usually linked through the company's political gene which can be explained as the ownership structure of the company and the political connections of senior management. The political gene of an enterprise determines the acquisition of political resources which are related to the enterprise's innovation decisions and ultimately affect the innovation performance of the enterprise (Wang Yanyu, 2014).

1.2 Literature review

Scholars at home and abroad have been studying the influence of political association and corporate performance for a long time, but the results have been mixed for positive and negative effects. Some scholars think that social capital obtained through political connections will have a positive effect on corporate performance (Li, 2008).The private enterprise datashows the political association of senior executives has positive influence on enterprise performance (Tang Linxia, 2015). Some scholars use real estate companies as a sample to conclude that political connections will weaken the performance level of enterprises (Yang Dongjin, 2013). Some studies have pointed out that there are risks in the social capital that enterprises have. The rent-seeking costs that companies need to pay for acquiring political resources may squeeze the company's R&D resources and have a curse effect on corporate performance (Yuan Jianguo, 2015).The existing literature is mostly limited to the relationship between the political association of senior executives and corporate performance. There is less discussion on the ownership structure of the enterprise whichisthe other dimension of the political gene. The focus of the research is mainly on the financial performance of the enterprise. The attention to the innovation performance of an industry is still insufficient, which is obviously not consistent with the national conditions of China's vigorous implementation of the innovative development strategy.In this context, it is necessary to explore the relationship between political gene and innovation performance.

1.3 Research strategy

The article is organized as follows. The next section contains the theoretical deduction and hypothesis. This section introduces the theory underlying the article and proposes hypotheses. The third section contains a description of the data source and the variables used in the empirical analysis. Besides, the model used in the article is also introduced. The fourth section empirically explores the role played by political gene in explaining the innovation performances of mental products firms in a regression framework. The concluding section summarizes the main empirical findings and proposes relevant suggestions.

2 Theoretical Deduction and Hypothesis

2.1Political Gene and Corporate Innovation Performance

Enterprise innovation activity is a long-term sustainable process that requires enterprises to obtain resources from both internal and external sources. Relying on China's special capital market situation, political gene can be objectively measured from the two dimensions of ownership structure and executive politics.Because of the long-term planned economic system in Chinese history, the controlling shareholders of many listed companies are state-owned.Since political gene is the link between corporate governments and an important way for companies to obtain social capital, companies with political gene can acquire more political resources to some extent.In addition to government resources, state-owned holding companies can also get more support in financing (TseJiazhi, 2014). Corporate executives have a major impact on strategic choices, especially resource allocation decisions, and the impact on corporate R&D investment is particularly significant. In state-owned enterprises, corporate executives tend to be more innovative in seeking innovative opportunities, increasing innovation and improving performance.Based on the above analysis, this paper considers that enterprises with political gene is beneficial to enterprises to improve their innovation performance. Therefore, the first hypothesis is following proposed:

H1a: There is a significant positive correlation between corporate ownership structure and innovation performance

H1b: There is a significant positive correlation between executive political correlation and innovation performance

2.2 Corporate R&D investment and corporate political gene

Based on the above-mentioned literature, we can discover the path of the political gene's impact on the company's innovation performance is indirectly achieved through R&D investment. R&D investment represents the company's strategic commitment to innovation and the degree of emphasis.At present, most empirical studies have shown that companies with political gene is more likely to obtain loans. The loans can be invested to the introduction of personnel and the purchase of equipment to improve the innovative level. Besides,enterprises with political gene is more likely to receive government subsidies and policy support. The increase in government investment can significantly promote innovation activities in high-tech industries (Wang Yuanhe, 2015). In addition to financial factors, the senior executive of the company attaches importance to the introduction of talents.Attracting more innovative talents for enterprises and increase the investment of R&D personnel.Since ownership structure and executive political connections bring more social capital to enterprises, enterprises have the ability to meet the salary requirements of high-tech technical talents, attract more innovative talents for enterprises, and increase investment in R&D personnel.Therefore, the second hypothesis is following proposed.

H2: There is a significant positive correlation between R&D investment and corporate political gene.

2.3 The mediating effect of corporate R&D investment

R&D investment is the distribution of resources for innovation and determines the success or failure of innovation activities. The reasons for the influence of political genes on innovation performance can be explained by both the ownership structure and the political connections of executives. The amount of innovative resource allocations ultimately leads to differences in innovation performance.Resource allocation is a necessary link for corporate executives to identify external political network resources and act on innovation outcomes. R&D investment is the resource allocation of enterprises for innovation and plays an important role in innovation performance. In the decision-making process of resource allocation, the ownership structure has important influence on various decision-making activities. State-owned holding companies have advantages in accessing social resources, so they have more funds to invest in R&D. On the other hand, the government has control and often considers the social environment or policies in decision-making, which may affect the allocation of corporate resources.Because of the discretion of business executives, their behavioral and psychological characteristics can affect the resource allocation decisions of the company (Chen Jiawen, 2016). Exploring the influence of corporate political relations on the process of enterprise innovation is conducive to understanding the mechanism of political genes affecting the innovation performance of enterprises. Therefore, the third hypothesis is following proposed.

H3：R&D investment has intermediate effects between political gene and corporate innovation performance.

3 Data and Methodology

3.1 Sample selection and data sources

This paper selects listed companies in the metal products industry in Shenzhen and Shanghai Stock Exchange from 2014 to 2016 as the research object, and the data mainly comes from the CSMAR database, the WIND database, the company's annual report and the patent search website of the State Intellectual Property Office. Excluding companies with incomplete information disclosure and ST processing, we obtained a total of 36 listed companies' data from 2014 to 2016. All data processing in this paper was completed with Stata 14.0.

3.2 Method

This paper mainly includes the regression of political genetic variables on innovation performance, which includes the mediating effects of R&D investment on political gene and innovation performance.We draw lessons from the former researches and designed the following models:

$$Patent_{it} = \beta_0 + \beta_1 State_{it} + \sum_{k=1}^{n} \lambda_i \times Control_{it} + \varepsilon_{it} \tag{1}$$

$$Patent_{it} = \beta_0 + \beta_1 PC_{it} + \sum_{k=1}^{n} \lambda_i \times Control_{it} + \varepsilon_{it} \tag{2}$$

$$INRD_{it} = \beta_0 + \beta_1 State_{it} + \beta_2 PC_{it} + \sum_{k=1}^{n} \lambda_i \times Control_{it} + \varepsilon_{it} \tag{3}$$

$$Patent_{it} = \beta_0 + \beta_1 State_{it} + \beta_2 PC_{it} + \beta_3 INRD_{it} + \sum_{k=1}^{n} \lambda_i \times Control_{it} + \varepsilon_{it} \tag{4}$$

Where:

$Patent_{it}$ is the technical innovation performance of firm i at time t;

$State_{it}$, PC_{it} are dummy variables represent corporate ownership structure and executive political association of firm i at time t;

$INRD_{it}$ is a mediator that represents R&D input intensity of firm i at time t;

$Control_{it}$ are the controlled variables, which is the scale of the company(Size), return on net assets(ROE), asset-liability ratio(LEV), shareholding concentration(LS), managerial ownership ratio, (Manager) year of company establishment(Age) and regional marketization index(Region).

ε_{it} are random error terms with the usual assumptions.

4 Results

4.1 Descriptive statistical analysis

From the descriptive statistics are shown in Table 1, the average value of the innovation performance of the explained variable is 0.01. The result shows that the average number of patent applications per million yuan of assets in the current year is 0.01, and the minimum value exists as 0. We can find out that the innovation performance of metal products industry is relatively low and there is a big gap between different companies.The average R&D investment intensity is 3%, which reflects the strong innovation input characteristics and there is a large gap between the R&D input intensity of enterprises.The average shareholding ratio of the largest shareholder is 35%, which indicates that the sample company's major shareholder has a relatively small shareholding, and the shareholding ratio is between 9% and 81%. The span is large, but the shareholding is generally relatively dispersed. The average degree of marketization of enterprises is 83%, indicating that 83% of enterprises are in a market-oriented region.

Table 1　Variable Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
Patent	0.01	0.02	0.00	0.09
State	0.14	0.35	0.00	1.00
PC	0.21	0.41	0.00	1.00
INRD	0.03	0.02	0.00	0.11
Size	22.01	1.04	20.26	25.55
ROE	0.05	0.08	-0.33	0.28
LEV	0.41	0.18	0.15	0.90
LS	0.35	0.13	0.09	0.81
Manager	0.07	0.12	0.00	0.44
Age	17.36	5.00	7.00	36.00
Region	0.83	0.37	0.00	1.00

4.2 Regression analysis

Table 2 shows the regression analysis results. It indicates the hypotheses proposed in this paper have all been verified. It can be seen that there is a significant positive correlation between innovation performance and political gene. After joining the R&D investment intensity, there is no significant correlation between executive political relations and innovation performance. Although the ownership structure and innovation performance of enterprises are still significantly correlated, the level of correlation is significantly reduced. R&D investment intensity is still significantly related to innovation performance at 10%. It means R&D investment has incomplete intermediation between the two.

Table 2   Regression Analysis Statistics

Variables	Patent	Patent	INRD	Patent
	Model 1	Model 2	Model 3	Model 4
State	0.011** (2.04)		0.0145** (2.09)	0.010* (1.93)
PC		0.007* (1.74)	0.018*** (3.62)	0.005 (1.34)
INRD				0.141* (1.85)
Size	-0.005** (-2.32)	-0.003 (-1.60)	-0.007** (-2.52)	-0.005** (-2.14)
ROE	0.011 (0.52)	0.001 (0.03)	-0.029 (1.09)	0.005 (0.26)
LEV	-0.002 (0.02)	-0.009 (-0.86)	-0.042*** (-3.00)	0.004 (0.35)
LS	0.018 (1.53)	0.022* (1.88)	-0.012 (-0. 79)	0.024**(2.05)
Manager	-0.002 (-0.14)	-0.012 (-0.97)	-0.040**(2.45)	-0.009 (-0.72)
Age	-0.001* (-1.85)	-0.000 (-1.15)	-0.000 (1.07)	-0.000 (-1.52)
Region	0.005 (1.23)	0.003 (0.85)	-0.003 (-0.60)	0.008*(1.80)
Constant	0.116*** (2.77)	0.072** (2.02)	0.190*** (3.52)	0.097** (2.24)
Observations	108	108	108	108
Adj R-squared	0.10	0.10	0.33	0.15

*** significant at 5%; ** significant at 5%; * significant at 10%, T-scores in brackets.

5 Conclusion

5.1 Research conclusion

This paper relies on corporate gene theory as a framework to explore the relationship between corporate political gene and innovation performance, and to examine the intermediary role of R&D investment in it. We regress the panel data of 36 listed companies in Chinese metal products industry from 2014 to 2016. The research results of this paper manifests political gene in a significant positive impact on the innovation performance from the ownership structure of companies and the political connections of senior executives.R&D investment has an incomplete mediating effect on political gene and innovation performance. The link of "political gene—investment in R&D—innovation performance" reflects the potential path of corporate innovation and shows that R&D investment plays a key role in it. The indirect link of "political gene-innovation performance" illustrates the state-owned holding property of enterprises and the social network income of senior executives need internal transformation to function on the innovation results (Shu, 2012).

5.2 Suggestion

In order to further improve the level of enterprise innovation and enhance the ability of independent innovation, the following suggestions are proposed:

(1) Establish good and healthy relations between the government and enterprises.

(2) Enterprises should rationally allocate resources in accordance with their actual conditions.

(3) While implementing the political strategy, attention should be paid to the integration with the market strategy.

5.3 Research prospects

We shall increase the number of samples, extend the research to the whole industry and subdivide political genetic variables in further research.

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Innovative Cultivation of Translators for Traditional Chinese Architecture Texts

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Abstract: Traditional Chinese architecture is highly favored by construction enthusiasts, artists, Chinese culture enthusiasts, and some scholars around the world. It is very urgent to cultivate translators with qualified competence in translating traditional Chinese architecture texts. The Aesthetic Approach has been adopted as the research method of this study. Based on the theory of Translation Aesthetics, this paper analyzes the aesthetic aspects of the traditional Chinese architecture texts from the aspects of beauty of fuzziness, beauty of logicality, and beauty of image, as well as the strategies that should be taken concerning the innovative cultivation of the translators. This paper holds that in addition to the necessary bilingual competence, professional competence and aesthetic capability are all indispensable to a qualified translator. Both of these abilities are indispensable in all aspects of translation aesthetic practice.
Key words: Innovative cultivation; Translators; Traditional chinese architecture; Translation aesthetics

1 Introduction

Traditional Chinese architecture text refers to the text that introduces, disseminates, records and preserves contents concerning the traditional Chinese architectures. Although traditional Chinese architecture is highly favored and concerned by construction enthusiasts, artists, Chinese culture enthusiasts, and some scholars, books and literatures on traditional Chinese architecture written in foreign languages are rarely found to be published, so does its translation studies. In China, there is almost no uniform standard or norm for the translation of traditional Chinese architecture, and no relevant professional bilingual dictionary on traditional Chinese architecture terms has been published until now. One of the major reasons for this gap is that the number of translators being qualified in translating traditional Chinese architecture texts is quite few. It is very urgent to cultivate translators with qualified competence in translating traditional Chinese architecture texts.

Translation Aesthetics theory emphasizes both the scientific and artistic aspects of translation and can be applied to different kinds of texts, while various text types may require different kinds of aesthetical standards. It aims to represent the aesthetical aspects of the original texts in the target language, and it emphasizes bilingual transformation which makes the comparative analysis method as the major approach in Translation Aesthetics. (Fu Zhongxuan,1993) Under the perspective of Translation Aesthetics, translation process is an aesthetic activity in which "aesthetic subject (the translator) converts one kind of aesthetic object (the source text) into another kind of aesthetic object (the target text) through aesthetic medium (translator's aesthetic consciousness)" (Fu Zhongxuan, 1993) According to the definition, all the aesthetical aspects are based on the source texts. The translators read the source texts and their aesthetic consciousness will be aroused based on the aesthetic object they are reading, and a target text will be produced by translators through representation of the aesthetic aspects of the source texts.

Translation studies and Architecture studies have been said to have the same Aesthetic origin, both of them are providing aesthetic products to readers and appreciators. The difference is that translation products are collection of words while architectures are piles of building materials. Nevertheless, attaching the aesthetic attribute to their productions that can be perceived by the readers is their common aim. (Zhang Lingqian, 2013) Thus this paper will study on the cultivation of translators for traditional Chinese architecture texts by adopting the method of Aesthetic Approach.Following this trend, the traditional way of cultivating translators has been unable to meet the new requirements of translators: representation of the beauty of the source text. Under the guidance of Translation Aesthetics, analysis on the aesthetic features of the traditional Chinese architectural texts is the ability translators should have, and it is also of great significance for guiding the cultivation of the translators on these types of texts. The theory of Translation Aesthetics has raised new and higher requirement for the cultivation of traditional Chinese architecture texts translators. Based on Translation Aesthetics, this paper explores

the aesthetic characteristics of traditional Chinese architectural texts, and proposes some tips on the innovative cultivation of translators' capabilities.

2 The Aesthetic Aspects of Traditional Chinese Architecture Texts
2.1 Beauty of fuzziness
　　Fuzziness is said to be as an "objective attribute" of human language. (Mao Ronggui, 2005) As for Translation Aesthetics, fuzziness or artistic fuzzy languages refer to the language with vague and broad semantic denotation, which is regarded as precision in a higher level since they leave space for readers to think of and digest with their own imagination. The beauty of fuzziness has been regarded as "sense of mystery" by western artists. (Liu Miqing, 2016) When first reading such texts, readers will be difficult to understand them for a while; however there exists a force to attract them to continue reading, until suddenly be enlightened. At this point, fuzziness can be seen as an artistic means and artistic state, such as polysemy, ambiguity, and pun, which could produce an unexpected artistic effect. (Mao Ronggui, 2005) Uncertainty and fuzziness are said to be the main beauty of Chinese grammar system. Subject is often omitted in Chinese sentences; such structure has been called as a beauty of Chinese. Having no subject in the sentence is not only making the sentence to be concise, but also producing an enticing uncertainty, since they bring readers closer, giving the reader a sense of intimacy. (Liu Miqing, 2011)
　　In Chinese traditional architectural texts, the appearance of fuzziness phenomenon not only reflects the hazy beauty of Chinese architectural culture, but also stimulates readers' imagination. For example, some of the architectural terms tend to be fuzzy: "Xieshan", "Xuanshan", "Yingshan", "Niutui". (Lou Qingxi, 2008); any readers without any knowledge of traditional Chinese architectures will be confused by those terms if they never resort to the dictionary. Taking the term "Tiao" as an example; literally, it means "jump". The doubt on how the "jump" has been used in denoting the traditional Chinese architectures arouse the readers' interests to know more about it. Actually, "Tiao" is "an upward projection or tier of a bracket set outward or inward". (Liang Sicheng, 2001) And after a better understanding on it, the readers will be amazes by the wisdom of Chinese people.

2.2 Beauty of logicality
　　There are large varieties of traditional Chinese architectures in different shapes, showing different characteristics according to different functions and different levels of occupants. When introducing the traditional Chinese architectures, how to classify them in an orderly manner by using clear and logical language in the texts has become a major difficulty for relevant scholars. However, traditional Chinese architecture texts have always tried to keep the languages to be logical and organized, so that the well-arranged and rigorous wording provide readers with a clear logicality and rational thinking, reflecting the logicality beauty of traditional Chinese architectures.In addition to the logical relationship between texts and paragraphs, Chinese architectural texts are also logically arranged at the sentence level and have a stronger sense of reasoning to make readers feel the logical beauty of traditional Chinese architectures. For instances:
　　Curved roof and curved eave lines with four raised roof corner, the house is like a bird, flying toward the clouds with head raised high. And the big house roof would seem light in weight and graceful, instead of being clumsy. (Lou Qingxi, 2008)
　　In this case, the causal relationship is clearly presented to readers. Expressing the beautiful lines and shapes of the roof, the conditional sentence has expressed the reason why the big roof is light and practical. The characteristic that the curve of the roof is upturned is not only of aesthetical significance, but also has the practical significance of reducing the load has been presented clearly and logically.

2.3 Beauty of image
　　In translation aesthetics, image is considered as the combination of the subjective sentiment of the author and the external object or the incarnation of the text. (Liu Miqing, 2005) That is to say, the author expresses the subjective wishes by means of objective things, and combines emotion with scenery. In traditional Chinese architectural culture, there are also some traditional images that are proud by Chinese people, which are also reflected in the architectural texts. For instance, the Chinese dragon represents the emperor and the holy, the phoenix symbolizes riches and honor, while the tiger symbolizes the invincible might and power.
　　Almost all parts of the buildings within the Forbidden City described in the texts are decorated with Chinese dragon, and various forms of dragon are presented, like "sitting dragon", "creeping dragon", "two dragons playing with a pearl", and "coiled dragon". Different dragons are in different postures

with various type of beauty, some are static while some are dynamic. However, all these dragons have expressed the dignity and rights of the owner of the house.

3 An Innovative Cultivation of Translators

Translating Aesthetic Subject means the people involved in the process of translating aesthetic practice, that is, translators. (Liu Miqing, 2016) Under the guidance of aesthetic experience and aesthetic theory, the aesthetic subject conducts a series of aesthetic activities, taking source text, one of the translation aesthetic objects, as the center, to complete the translation activities. In which aesthetic subjects will experience a series of translation aesthetic psychological process, as shown below:
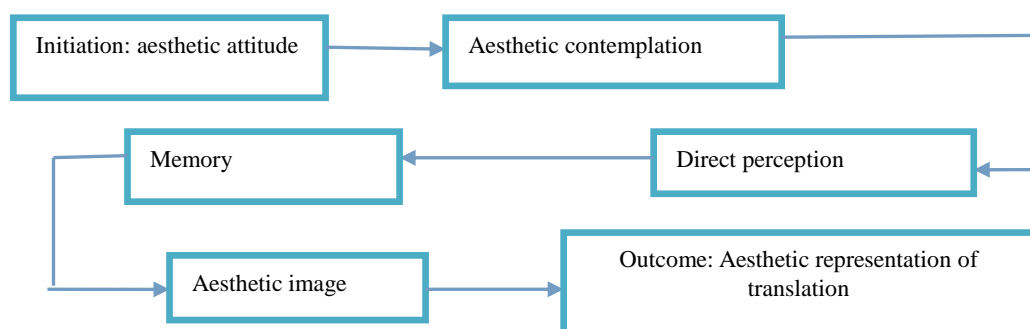
Figure 1   The Diagram Form of Aesthetic Psychological Process of the Aesthetic Subject (Liu Miqing, 2016)

It can be seen from the form above that the translating subject needs to master certain kind of ability to participate in the above conscious and unconscious mental activities necessary for translation. As in the process of English translation of traditional Chinese architecture texts, the translator needs to have certain capabilities, like solid bilingual competence and professional knowledge of traditional Chinese architecture. And the final aesthetic representation requires the translator to have sufficient English skills and aesthetic capability to adjust the target text until a perfect version comes. Therefore, if the translator wants to be able to perfectly represent the beauty of the source text in the translation, he must first have the following abilities:

3.1 Bilingual competence

A qualified translator must have qualified bilingual competence. The language competence mentioned here not only refers to the phonetic structure, lexical, grammar, sentence structure, and textual meanings of a language, but also includes appropriate use of the language in specific contexts. As Liu Miqing has indicated in his book *On Translation Aesthetics*, language competence plays a paramount role in translation.(Liu Miqing, 2011) Such competence include: (1) accurately grasp of the meaning of the source text, including the decoding of semantic information and aesthetic information; (2) the mastery of the optimal representation of source text in the target language in pragmatics; (3) language competence is the initiator of the translation aesthetic activity, as well as the prerequisite for the entire psychological activity of the translation subject. What's more important here is that bilingual competence refers to the language competence concerning both the source language and the target language. In the process of English translation of traditional Chinese architectural texts, both English and Chinese are bound to be involved in.

When translating traditional Chinese architecture texts, the translator should first have a higher level of Chinese, be able to read and appreciate Chinese traditional architectural texts, understand the connotations and denotations of the texts, and sense the aesthetic information contained in the texts. Also, the translator shall be proficient in English as well and shall be able to represent all the meaning and aesthetic information contained in the source text. A translator unqualified in Chinese is difficult to find the aesthetic information and pragmatic meaning implied in the source texts. And if his English is not proficient enough, it is difficult or even impossible for the translator to represent the aesthetic information of the source texts to let the target readers have the same feeling on the beauty of Chinese architecture and Chinese philosophy contained in the traditional Chinese architectural texts with that of the original readers. Therefore, a higher bilingual competence is a prerequisite for translators on translating traditional Chinese architecture texts.

3.2 Professional competence

The main purpose of traditional Chinese architectural texts is to introduce and inherit the traditional

Chinese architectural techniques, architectural skills, and decorative means and so on. As for the description of the complicated Chinese traditional architecture technique, it is inevitable to use some professional terminology. Qualified bilingual competence shall never be the last competence needed for a translator. Professional competence is also another important ability that must be mastered by the translators, since traditional Chinese architectural texts usually concern technical information and special terms. For some translators who might not be able to understand any specialized architectural terms, it is even more difficult for them to reasonably represent the meaning or the aesthetic value of the source text in the target text. Besides, with the development of the modern construction industry, the development and promotion of traditional Chinese architecture has been impacted, making the number of masters being proficient in ancient Chinese architectural terms be on the decrease, let alone experts with both proficiency foreign language and knowledge on ancient architectural terms, which results in the former stated dilemma faced by the English translation of traditional Chinese architectural terms.

Translation of the terms is the prerequisite and foundation for translating the Chinese traditional architecture. The premise of translating a term is that the translator shall have a fully understanding on the denotations and connotations of the terms, which objectively requires the translator to have certain professional knowledge so as to accurately understand and translate the most critical and core technology terminology of traditional Chinese architectures.

Therefore, as a qualified translator, it is important to know the corresponding professional knowledge when carrying on the traditional Chinese architectural texts translation. The translator shall not only be responsible for himself as a translator but also for hundreds of millions of readers, be responsible for the traditional Chinese architecture. If the professional knowledge of a translator is lacking, it is bound to produce the low-level mistakes in the translation, resulting in mistranslation, which cannot faithfully convey the true meaning of the source text, let alone elegantly represent the aesthetic aspects of the source text.

3.3 Aesthetic capability

Aesthetic capability is the ability of people to accept, transmit, store, process, transform and regenerate aesthetic information, forming from life practice, aesthetic practice, learning and training, and it is human specific. (Liu Miqing, 2016) As far as the translators are concerned, they need to be able to identify and understand the aesthetic information of the source text, and then through a series of processing and transformation, the aesthetic information of the original language shall be represented in the target language. Aesthetic capability is embodied in aesthetic comprehension, aesthetic imagination, and aesthetic creativity. After the translator has grasped the overall information of the aesthetic information of the source text, he depicts the scenes, images and impressions of the written words in his mind and creatively reproduces the artistic value of the source texts through the imagination of the aesthetic subject. A translator with high aesthetic capability can quickly, completely and profoundly grasp the aesthetic qualities of the aesthetic object and can accurately describe and interpret the aesthetic object. (Liu Miqing, 2016) For translators lacking in aesthetic capability, they may not be able to accurately detect and analyze the aesthetic information of the source text, let alone representing them in the translation. It is evidently that aesthetic capability is of great importance to the translator.

Instead of the function of introducing the traditional Chinese architectural technology, traditional Chinese architecture text also contains its profound aesthetic values. Its aesthetic characteristics are represented in the language structure, word meaning, textual connotations of the source language, as well as hyper texts (meanings beyond texts). Under the premise of aesthetic comprehension, the translator must grasp the overall aesthetic structure of the source text from the part to the whole. After grasping the aesthetic information of the source text, the translator is required to process and transform the aesthetic information in the brain. During this period, the translator's aesthetic imagination is involved in. After reading the original text, the translator's mind will portray all the elements including the scene, the picture, the plot, the process, the events, and the characters involved; then the translator needs to comprehend the meaning and implied meaning therein, as well as the cultural features. After the overall idea of the source text has been shown in his brain as a whole, the translator needs to exert his most important capability, the aesthetic creativity, to creatively represent the "aesthetic images" formed through imagination in his mind in the translation. Through personal experience and aesthetic contemplation, the translation will be modified until an optimized translation is achieved. Therefore, in the practice of translation, Aesthetic comprehension, Aesthetic imagination, and aesthetic creativity are all inevitable capabilities required for the translator; they role together, supplement each other, and penetrate the whole aesthetic translation practice from beginning to the end. The translator should fully develop these three kinds of capabilities, give full play to them in the practice of translation, and never

stop on the path of seeking better translations.

4 Conclusion

Traditional Chinese architecture is the crystallization of Chinese national wisdom for thousands of years. It is the embodiment of ancient Chinese science and technology progress in the construction industry. Understanding and promoting traditional Chinese architecture is an inevitable choice for understanding and carrying forward the traditional Chinese architectural culture and exploring the essence of traditional Chinese architectural techniques. Architecture is a material carrier of a nation's culture, and embodies the philosophical spirit and ethical ideas of the nation. To interpret them correctly and completely is of vital importance to carry forward China's ancient culture and spirit and enhance our international influence and competitiveness.

According to the empirical study on the Chinese traditional architecture texts, the book*Traditional Architectural Culture of China* (Lou Qingxi, 2008), some of the major beauty qualities of traditional Chinese architecture texts have been found, such as beauty of fuzziness, beauty of logicality, and beauty of image.The translation aesthetic subject is the main bearer of the translation task, and plays a subjective role in the completion of translation aesthetic practice. In addition to the necessary bilingual competence, professional competence and aesthetic capability are all indispensable to a qualified translator. Both of these abilities are indispensable in all aspects of translation aesthetic practice. For those translators engaged in the translation of traditional Chinese architecture texts, they can look up from these three perspectives, find out their deficiencies and improve their comprehensive quality and capability as a qualified translator.

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Reform of Rural Land Property Rights System, Integrated Urban-rural Development and Rural Vitalization in China

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Abstract: Reform of rural land property rights system is to promote the free flow of rural land resources, connect and aggregate urban capital, talent, technology and other factors so as to achieve rural vitalization under integrated urban-rural development. This paper analyzes the problems existing in the reform of rural land property rights system in China, such as the inadequate implementation of the mortgage function of land management rights, the difficulty of issuing certificates for housing estates (farm houses), and the small scope of rural collective construction land equivalent to the implementation of the marketetc. The direction of the next step of reform is to fully implement the separation of the "three rights" of rural land. For the housing land and collective construction land, we must break through institutional barriers, accelerate the empowerment and establish a reasonable interest distribution mechanism.

Keywords: Rural vitalization; Separation of three rights; Collectively owned construction land; Compensated pull-out

1 Introduction

The Chinese government has proposed to implement a rural revitalization strategy with a view to realizing industrial prosperity, ecological livability, rural civilization, effective governance, and affluent life in rural areas. This round of rural vitalization takes a radical path which aims to build a community of urban and rural development. The key to the success of this path lies in the achievement of the free flow of urban and rural resources.Land is not only the most fundamental and important resource element in rural areas but also the link of gathering people, wealth and other resources (Musole Maliti,2009). At present, the biggest obstacle to the free flow of land resources is problems regarding property rights. The unclear rural land property rights along with the incomplete empowerment and the immature market restrict the free flow of land resources.

There are three main types of land resources in rural areas: contracted land, homestead and collectively owned construction land. Overall, the reform of the rural land property rights system based on "three types of land"is progressing steadily, and the mobility of land resources has increased, but there is still a certain distance from realizing the free flow of rural land resources between urban and rural areas. To fully realize the free flow of land resources in rural areas and optimize the distribution, it is necessary to make breakthroughs in the legal level, reforms and innovations in the system as well as exploration and practice in ways to attain goals on the basis of collective ownership of land. Based on the reform practice in Wuhan and other regions, this paper focuses on the problems and causes of the reform of rural land property rights system in China, and proposes the reform direction and path of the three types of land in the future.

2 The Importance of Reform of Rural Land Property Rights System

2.1 The reform of rural land property rights system is the precondition of invigorating the rural idle land resources

With the increasing industrialization and urbanization in China, a large number of rural residents leave the countryside to work in the city. The number of migrant workers entering the cities in China reached 286.52 million in 2017, which corresponds to a sharp reduction in the population of rural residents from 745.44 million in 2005 to 576.61 million in 2017. Meanwhile, great changes have taken place in the rural population structure of China. The decrease in the rural population and the aging of population have caused severe problems: the land was uncultivated due to lack of people or ability, and the house was unoccupied or had a low utilization rate, leaving valuable land resources idle.   The rural land resources market is immature and land resources mobility is not high, some land resources have been idle for a long time, forming an unreasonable pattern of resources distribution features "available land not being used and failure to get land". This has caused a waste of land resources and is also detrimental to the increase in farmers' income, agricultural modernization, and rural vitalization.

2.2 The reform of rural land system is the breakthrough to realize the two-way flow of urban and rural resources

The urban and rural areas are divided into two separate marketsin the era of planned economy, causing the stagnation of important market factors such as the urban and rural labor force and land as well as the inefficient distribution of resources. It is also an important reason for the long-term poverty and backwardness of rural areas in the era of planned economy(He Xuefeng, 2010). After the reform and opening up, with the gradual establishment of a socialist market economy, a unified national product market has been built. The reform of the rural property rights system with land as the core is in its infancy, resulting in obstacles to the transfer of urban capital, talent, technology and other factors to rural areas and poor motivation. Land is the core resource. Only through the reform of the rural land system and the realization of the free flow of rural land can we open the channels for the flow of urban and rural resources and promote the integrated urban-rural development(Ma Chichun, 2018).

2.3 The reform of rural land property right system is an important prerequisite to realizing industry prosperity

In the early period of reform and opening, the reform of household contract responsibility system with "separation" as the main part overcame the disadvantages of excessively centralized management, single management mode and "eating from the same big pot" in the period of People's Commune, allowing hundreds of millions of farmers to gain full right of autonomous management and greatly mobilizing the enthusiasm for production(Cheng Yu, Chen Chunliang, 2017). By the middle of the 1980's, people in rural areas could have adequate food and clothing and they lived a fairly comfortable life by the end of 1990. With the increasing demand for green and safe agricultural products, small-scale peasant economy hinders agriculture from being large-scale, mechanized, brand-development focused and eco-friendly, requiring the land to be "unified"(Guo Zhong-xing, Luo Zhi-wen, 2012). "The separation of three rights" of land realizes the free transfer of the land management right, allowing land to be specialized gradually as the family farm, the specialized farmers' cooperatives and agricultural business, and the agriculture to be moderately large-scale farming. According to the implementation of the separation of three rights in Wuhan, the proportion of land flowing over 200 mu is more than 40%. Next, in order to realize the industrial vitalization, the integration of the primary, secondary and tertiary industries must be achieved and obstacles to the land development must be eradicated.

Table 1   The Relationship of "The Separation of Three Rights"

Three Rights	Attribution	Right
Land property	Belonging to the collective	Rights including reissue, supervise land use, income rights, etc.
Land contracting rights	Belonging to farmers	Rights including use, transfer, mortgage, income rights, etc.
Land management rights	Belonging to the farmer or lessee	Rights including use, mortgage, income rights, etc.

2.4 Reform of rural land system is an important way to increase farmers' property income

The income structure of rural residents has also changed dramatically in 2017, and property income accounts for only 2.2%, which is 7.53% lower than that of urban residents. According to the implementation of "the separation of three rights" of contracted land, farmers can transfer the land management right and thus gain profit by leasing or becoming shareholders. Or they can also voluntarily pull out of the contracted land and obtain corresponding compensation. For example, farmers participating in the transfer of land rights transactions in the Wuhan municipality can obtain 2625 yuan rent income annually; in Yunfeng Town, Cangxi County, the average household income from the transfer of land increases by more than 1700 yuan. Homestead and agricultural housing are also important channels to increase farmers' property income. According to the implementation of the "Three Township Project" in Wuhan, in 2017, a total number of 10078 rental agreements regarding idle rural housing was signed, and the annual rent reached 149 million yuan; the increase in total property income, salary income, and operational income of farmers reached 22.12 billion yuan, contributing 56.42% to the annual expected growth of farmers' income (Wuhan Countryside Comprehensive Property Exchange, 2017).
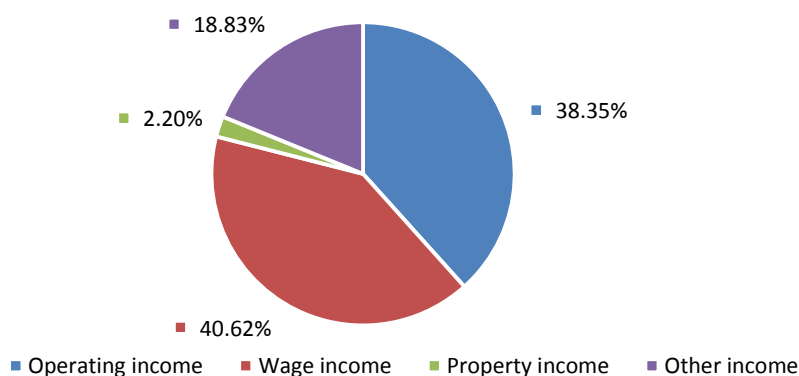
Figure 1 Rural Residents' Income Structure in China

3 The Status Quo and Deficiencies of the Reform of Farmland Property Right System

3.1 Although the "separation of three rights" of contracted land has been fully carried out, the functions of mortgage and guarantee have not been comprehensively implemented

At present, the separation of three rights of rural land has made significant progress in terms of the certification and registration of land rights, construction of trading market of property rights, and transactions of land transfer. According to the statistics of the Ministry of Agriculture, by the end of November 2017, the total confirmed area of rural contracted land reached 1.11 billion mu, accounting for 82% of the contracted land of the second batch of householdsin China. By 2018, China will complete the registration of rights(Shao Haipeng, 2017). In terms of the transfer of land, 35% ofland has been transferred in China. The rate of land transfer in the eastern region is higher than that in the central and western regions and it has reached more than 50%.

There are also some problems in the process of implementing "the separation of three rights" of contracted land. First, the mortgage and guarantee of the land management rights is not in place. Most areas apart from Wuhan and other few areas in China have not yet realized the mortgage and guarantee of the land management rights and lessees still fail to finance by mortgaging their land management rights in financial institutions. Second, the second-hand transfer of land management rights is not smooth. When the lessee has difficulty in operating or face bankruptcy, the second-hand transfer of land management rights is inevitable. However, the process of a second transfer is hard due to tedious procedures in seeking consent from village collectives and original contractor as well as the great difficulty in finding appropriate undertakers. The third is that the collective ownership in the separation of three rights is not fully reflected, and it is likely to be left untouched.

3.2 The implementation of pilot reform of homestead (rural housing) and the confirmation and registration of rights are difficult

At the beginning of 2015, Homestead pilots are launched in 15 regions. According to the data, 15 pilot areas have already pull out of more than 76,000 homesteads, covering an area of 59,000 mu, with more than 31,000 mortgages of housing property rights, and a total of more than 3.7 billion yuan in loans (Zhu Juan, 2017). In 2018, the reform of homestead proposed "the separation of three rights", that is, homestead ownership rights, qualification rights, and the right to useMore complete empowerment of the homestead is conducive not only to homestead entering the market, but also to the realization of the mortgage and guarantee of homestead as well as the capitalization of homestead resources.

In the trial reform of homestead in various places, there are some difficulties to varying degrees. First, it is difficult to solve the problems left over by history. In rural areas, "single household with multiple houses" and excessive usage is common and farmers have become accustomed to using the homestead "for free". However, the conformation and registration of rights requires farmers to return homestead excessively occupied or use them with charge and it will arouse farmers resistance. Therefore, governments' implementation of reforms is arduous in consideration of the stability. Second, the trading market of the transfer of the homestead is confined to the village collective, which cannot form an influential trading market and also causes seriously underestimated value of homestead. Third, there is a lack of uniform reference for the pricing of homestead pulling out with compensation. Due to the

absence of a mature trading market of homestead and market price of it, areas differ over the standards and valuation methods as well as the prices when determining the price of compensated pull-out of homestead. For example, in Ningguo, Anhui the subsidies are 40,000 yuan to 60,000 yuan per mu and for the part beyond, the subsidies are 20,000 yuan to 30,000 yuan per mu, while in Dianjiang, Chongqing, the subsidies are120,000 yuan per mu.

3.3 The scope of the implementation of collectively owned construction land entering the market at the same prices is narrow

With the large-scale urbanization in China, the supply of urban construction land is insufficient, which has also become an important reason for the rise in urban housing prices; at the same time, there are a large number of collective construction lands in rural areas that are idle due to institutional reasons. This is not conducive to the growth of a collective economy and the increase in farmers' income, but it is also detrimental to the free flow of rural land resources and the construction of a unified urban-rural land market. In the new era of new urbanization and rural vitalization, the reform of the rural construction land system has become a general trend. At the end of 2014, the reform of collectively owned rural profit-oriented construction land entering the market was carried out in 15 regions and later expanded to 33 pilot regions. Trial areas such as Deqing in Zhejiang and Zezhou County in Shanxi Province all achieved the marketization of collectively owned rural profit-oriented construction land. For example, Deqing first sold a village-level collectively owned profit-oriented construction land with an area of 20 mu at the price of 575,000 yuan per mu in the form of public bidding, auction, hanging out a shingle on September 8, 2015. During the three-year pilot period, Zezhou County completed a total of 14 cases of marketization of collectively owned rural profit-oriented construction land with 195.75 mu. To expand the use of collectively owned construction land, in August 2017, the Ministry of Land and Resources and the Ministry of Housing and Urban-Rural Development selected 13 cities including Beijing, Shanghai and Wuhan to conduct pilot projects and aimed to explore the construction of rules, mechanisms, services and supervision system of rental housing using collectively owned construction land.

There are still deficiencies in the reform of the marketization of collectively owned rural construction land despite major breakthroughs which have been made. First, the pilot scope is narrow. At present, pilot reforms have been carried out in only 33 regions and other regions are not authorized to reform. Furthermore, in terms of the types of land, only profit-oriented construction land can enter the market, while the construction land which is not profit-oriented has not yet obtained the qualification for entering the market. Second, the distribution mechanism of interest needs further optimization. The profit from the marketization of collectively owned rural construction land must be reasonably distributed among the state, collectives, and farmers. The distribution ratio among the three parties in each region is not the same and, in some areas, the income of the rural households is relatively small, leading to conflicts concerning interests among the three parties. The third is the lag in supervision after the collectively owned construction land is introduced into the market.

4 Conclusion

4.1 The implementation of "the separation of three rights" should be promoted

First, it is necessary to conduct in-depth study of the rights and empowerment of collective farmers, contract farmers and agribusiness providers and further clarify the boundary of rights of three rights and their relationship.The second is to strengthen the construction of trading market system of the transfer of rural property rights, support the establishment of professional and standardized trading organizations for rural property rights, encourage trading institutions to carry out business across administrative regions, promote the establishment of provincial-level trading institutions, and promote the transfer of land in a wider range of markets. The third is to fully grant the land management right functions of mortgage and guarantee as well as certificates for management or transaction and use the certificates as the mortgage to get financial assistance from financial institutions. It is also necessary for the central or local government to issue supportive policies to encourage financial institutions to carry out loan business regarding the mortgage of land management right, as well as make joint efforts with financial institutions to prevent relevant financial risks.

4.2 The pace of pilot reform of rural homestead should be quickened

The ultimate goal of deepening the reform of rural homestead system is to allow both rural housing to be traded freely as well as enter the market with the same rights and at the same prices as state-owned land and farmers to have the same full right to use housing and land (Zuo Chenming, 2016). First, the

confirmation and registration of rights of homestead should be accelerated. Historical traditions and rural citizens' autonomy should be respected. Each region should determine farmers' qualifications and the pull-out of excessively occupied homestead as well as standards of paid use based on actual conditions and give confirmation and registration of rights to homestead and rural housing meeting requirements. Second, methods to effectively use idle rural homestead and farmers' idle homestead should be explored. For example, rural collective economic organizations may use construction land conserved in the process of rural and homestead renovation to develop industries such as rural leisure and pension tourism, and rural integration of three industries by means of shareholding, joint ventures (Ye Xingqing,2018). Thirdly, the key to the establishment of the mechanism and method of compensated pull-out of homestead is to solve the problem of where money come from. Storage companies of homestead should be establishedat countylevel and make companies responsible for the collection and storage of homestead. Homestead collected and stored can be leased, developed, or reclaimed. Fourthly, homestead and rural housing use rights should be allowed to mortgage and guarantee so as to achieve the financing functions.

4.3 Collectively owned construction land entering the market at the same prices should be promoted

The first is to establish a reasonable income distribution mechanism of land value-added income. After comprehensively considering all the factors forming land value-added income and confirming the collecting ratio of adjustment fund of land value-added income, the distribution of land value-added income should favor the collectives and individuals, and gradually establish a mechanism for the distribution of land value-added income that takes account of the national, collective, and individual interests (Zhang Yinghong, 2016). The second is to research and explore the system of transfer from adjustment fund of land value-added income to taxes and fees. The adjustment fund is a temporary arrangement and the transfer from adjustment fund to taxes and fees can not only be legally based but also become a local stable tax type under the trend of normalization and institutionalization of collective construction land. The third is to include the rural construction land which is not profit-oriented in reform timely. Eastern developed provinces have more collectively owned rural profit-oriented construction land, while most of the rural areas in the central and western regions have no idle profit-oriented construction land.

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Research on Innovative Model of Art Talents Cultivation under the Background of Cultural and Creative Industry

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Abstract: Art talents have been playing an important supporting role in the development of cultural and creative industries. With the continuous development of cultural and creative industries and the deepening of innovation driven strategy, the cultivation of art talents is facing many new problems. This paper, starting from the system concept, breaks through the limitations of the general art talent cultivation theory, combines the classification of art talents with the industrial demand, and constructs the classification and positioning mode of six types of art talents based on the main needs of upper, middle and lower reaches of the art industry, and puts forward the art talents innovative model of training from the aspects of cultivating input, cultivating host and cultivating objectives.
Key words: Art talents; Talent cultivation; Innovative model; Cultural creative industry

1 Introduction

The cultural and creative industry emphasizes the support and promotion of cultural and art on economy, which is the emerging economic form and green industry of many countries in the world. And the main manifestations of today's art are basically concentrated in the field of cultural and creative industry. Art is the source of the cultural creative industry which has an important value itself. On the chain of creative industries, talents are the most fundamental, critical and important factors (Qin Jia, 2012). In recent years, China has been vigorously developing cultural and creative industry. The competitiveness of cultural and creative industries is essentially the competition of artistic talents. Artistic talents Artistic talents support the development of cultural and creative industries in terms of intellectual resources, and provide a sustainable development for the cultural and creative industries. Therefore, the cultivation of art talents is one of the key factors in the development of this industry.

In the field of cultural creative industry, the cultivation of art talents in China has the problems such as not paying attention to creativity in training objectives, over-specialization in training model, and being too elite in the process of talent evaluation and so on. How can the cultivation of artistic talents adapt to the development needs of the current cultural and creative industry is a big question. Although there are some researches in the academic field, there are still a lack of discussion on the creative cultivation of art talents from the perspective from the macroscopic system of the art market and the market demand (Cao Hong and Yan Yanfei, 2016). The current art and social life are linked in many aspects. The creativity, planning, management, dissemination, criticism and information consultation in artistic activities have become an important part of art production (Nie Lijia, 2009). New art talents such as art finance talents, art brokers, etc., are the parts of the art talents cultivation model that cannot be ignored. Therefore, we need to reconsider the cultivation model of art talents from a more systematic perspective, combined with the needs of art industrial chain.

2 General Connotation and Classification of Art Talents

The art talents cultivating model is one of the most important measures for the implementation of art education. There are different education and talents cultivating models in one country or regions in the same or different times. Higher artistic talents cultivation has been sticking to the elite education model. With the development of cultural and creative industries, the talent cultivation model of traditional elite art education has not been able to meet the development of popular art education, and the art talent cultivation has been discussed from the perspective of cultural and creative industries and art industrialization is the demand for art market and social development (Tan Yaosheng, 2013).

The art communication technologies, production methods, and media carriers are changing under the impact of globalization and informationization, and this new situation has been brought new demands to the traditional art talents cultivation methods and art education model. From the perspective of art subjects, the scope of contemporary art covers a wide range, and the arts and technology, agriculture, enterprises and other aspects of it have become a "value-added" effect of various industries (Zhu Zongqing, 2013). The connotation of artistic talents, the definition of artistic talents, and the

classification of artistic talents need to be re-examined. This also is the research basis of innovative cultivating mechanism of art talents. There are many methods for the definition and classification of artistic talents. The specific classification methods and contents are as follows. (Table 1)

Table 1   Art Talents Classification Method and Connotation

Classification Method	The Specific Content
Two – points (Lin Wen, 2010)	Pure Art Talents, Applied Art Talents.
Two – points (Feng Jia, 2012)	Professional and technical Talents, Management Talents
Three-points (Lin Wen, 2010)	High-level art talents, Intermediate level artistic talents, Operation level art talents
Three-points (Tang Jia Lu and Hu Ying Sheng,2015)	Open design art talents, Design art theoretical talents, Design art practical talents
Four-points (Shu Xiaping, 2013)	Single-art art college model, Normal college art department model; Theoretical research training model, Comprehensive university art talent training model.
Four-points (Shu Xiaping, 2013)	Practical application type talents; talents with practical and creative leading, with theoretical teaching and skill teaching; purely theoretical research talents; talents with theory as leading and capable of practice
Five-points (Ye Zhonghai,2009)	Drama Talents, Music talents, film talents, Art talents, Dance talents
Five-points (Zhao Qinping, 2013)	Artistic creation talents, artistic performance talents, art theory talents, art education talents and artistic application talents.
Seven-points (Tan Yaosheng, 2013)	Artistic research talents, Art education and teaching talents, Artistic and technical talents, Applied art talents, Community art talents, Ethnic art talents, Regional art talents.

As can be seen from the above table, there are many methods of classifying art talents, but most of them are based on the attributes of art itself. From the perspective of cultural creativity, the diversification of the art market will inevitably require multi-layered art education, multidimensional knowledge structures, and complex cultivation of artistic talents. The types of talents needed in the cultural and creative industries need to have multiple knowledge in an interdisciplinary context. Both the ability and the organic combination of science and art, especially in the creative and applied aspects of digital art, are the essential qualities of composite art talents.

3 Innovative Classification and Cultivating Position of Art Talents

The art talents cultivation model refers to the cultivation of the art talent training model and the art talent education according to the specific training goals and requirements under the guidance of art education concepts and laws, and scientifically setting teaching content, curriculum system, management system, and goal evaluation system. It is more in line with the requirements of the country's cultural development strategy. Talent cultivation meets the needs of social development (Shu Xiaping, 2013).

From the perspective of market demand, there is a great demand for applied arts talents, especially digital art talents and cultural management talents (Lin Wen, 2010). A complete cultural and creative industry chain should include three parts: culture and art (source), creativity (middle reaches), and industry (end) (Zhu Zongqing, 2013). Art industry chain is divided into three parts and five links, namely, the upstream, middle and downstream parts. Education, creative creation, production and production, sales of exhibitions, and re-invention are five links.

Therefore, based on the types of talents summarized in the current classification of art talents collected and combined with the needs of talents in the cultural and creative industries, this article holds that it is necessary to cultivate six kinds of artistic talents, namely, art theory talents, artistic creative talents, art education talents, art management talents, art production talents, and art business talents. These six types of artistic talents do not have the ability to compete. They are the art talents that needed in the cultural and artistic creative industries. However, the six types of talents play different values in different stages of development and different aspects of the art industrial chain. (See Figure 1)

According to the main axis of the art industry chain and the six types of art talents to discuss different kinds of artistic talent in the arts industry chain of upstream, midstream and downstream's value degree of strength, to construct an art industry developing different types of talents cultivation mode and direction.

Distinguish the strengths and weaknesses of the six types of talents in the various aspects of the art industry chain, determine the structure of art talents training, and the types of industries associated with art talents, and give full play to the joint training of corporate resources, social resources, etc. This kind of transformation vision, with the art industry chain as the logic point art talent training model, has certain innovation value for changing the current art training system.
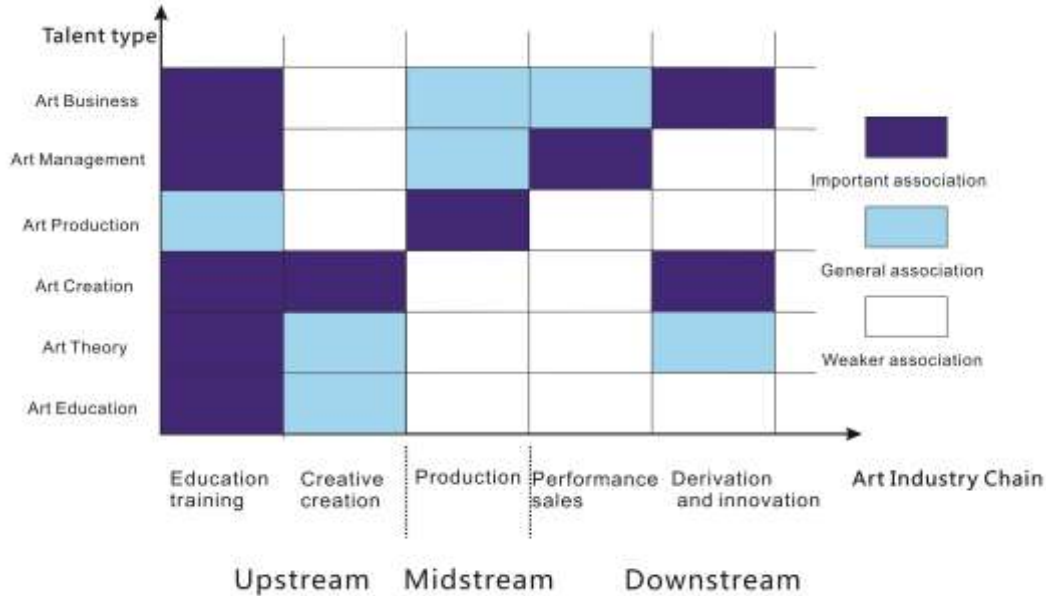
Figure 1   Artistic Talents Cultivation Model under the Art Industry Strategy

4 Innovative Cultivation Mechanism of Art Talents

Art talents cultivation model is a systematic study, involving many elements, as well as many subjects and levels, the implementation main body has a national policy formulation, there are also schools, enterprises, the implementation of public art field and so on. Therefore, we need to systematically design the cultivation of art talents, and explore the innovative mechanism of artistic talent cultivation.

The diversity of art categories, the complexity of the art system, and the diversity of artistic talents make it necessary for the cultivation of artistic talents to be advanced step by step. In the process of the art cultivation, the main body, including government policy levels, schools, enterprises, social art institutions and groups, work in coordination with each other to coordinate the cultivation of artistic talents. The input includes: teachers, funds, and platforms; the integration of the four main subjects in the training of artistic talents: government, enterprises, schools, and other social resources such as art galleries, museums, social art groups, etc. The process has different values and meanings. For example, the government elaborates on the country's macroeconomic policy formulation, the orientation of personnel training, capital investment, and the establishment of art talents fundraising projects, etc., and provides relevant departments with constructive opinions and countermeasures. (See Figure 2)

Through a combination of the above factors, in order to achieve the basic goals of the six types of art theory talents, artistic creative talents, art education talents, art management talents, art production talents, and art business talents. In addition, the improvement of the quality of art talents should be based on the needs of society and art talents of different location to be layered, classification, establish the evaluation system.
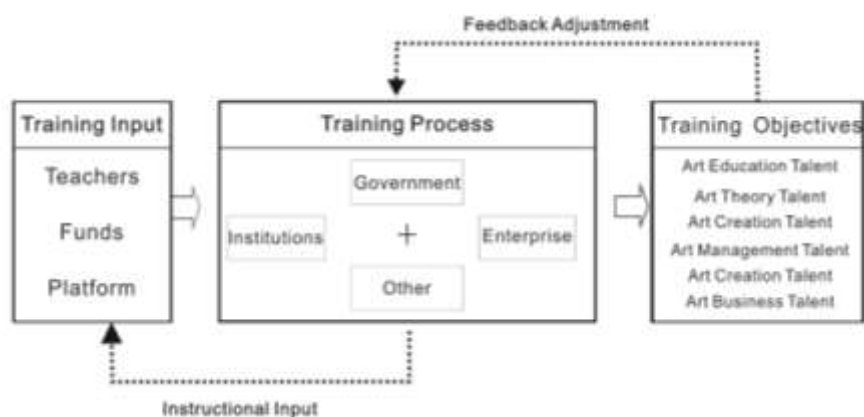
Figure 2   Artistic Talents Cultivation Model under the Art Industry Strategy

5 Conclusion

This article examines the cultivation of talents in China as a whole and systematically. It combines the cultivation of art talents with the current social and economic development in China, and explores the direction of the cultivation of art talents in a rational way. From the macro perspective, we will explore the mechanisms and paths for the cultivation of various types of artistic talents that are suitable for the current economic development situation, and explore the top-level design patterns and dynamic research systems for the cultivation of art talents.

Acknowledgement

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Research on the Cultivation Path of University Science and Technology Innovation Culture: Based on Wuhan University of Technology

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Abstract：Scientific and technological innovation culture is a kind of good innovation atmosphere, which is the basic soil for cultivating innovative talents, cultivating new technological achievements and forming new technology industry chain.Good college scientific and technological innovation culture can let related subjects acquire the consciousness of independent innovation, regard scientific and technological innovation as an inner needs and spiritual motivation.It is conducive to improve subject's scientific and technological innovation capability.Colleges and universities are important generations of scientific and technological innovation achievements.This paper systematically sums and combs the way of cultivate college scientific and technological innovation culture, additionally, it puts forward innovative cultivating way on the basis of empirical research.
Key Words: College scientific and technological innovation culture; The way of cultivate; Technological innovation; Wuhan university of technology

1 Introduction

College student is an important subject of scientific and technological innovation.Putting them into the scientific and technological innovation culture attribute to cultivate their scientific and technological innovation capability and the develop their technological innovation potential.Problems lie in the process of cultivating college scientific and technological innovation culture, such as campus atmosphere of technological innovation is not strong, the system of the school management is imperfect, tutors are not very enthusiastic, the tutor team of scientific and technological innovation activities is imperfect.

2 Research Status at Home and Abroad

At present, both domestic and overseas research on the important subject of college scientific and technological innovation culture cultivation.

2.1 Overseas research status

At present, the Overseas research results of foreign universities' scientific and technological innovation culture are mainly concerned about various cultivation modes.Harvard University graduate school has adopted "science and technology, innovation and education program", and use it as a way of training creativity and execution as well as evaluation many items such as education, science and technology media capable leader. Its objects include all students and faculty.The "technology, innovation, education program" integrate science and technology into teaching methods to provide the most effective teaching experience and to enable outstanding students from around the world to learn from each other.The learning content includes: how to investigate and design a new technology product, and use technology and media to improve the immersing learning experience. The class project let students make the prototype of cutting-edge technology products, and the whole process is equipped with the guidance of top practitioners or relevant teachers.But technology is only a means of breeding, not an end.The choice of adding media or cutting-edge technology into the teaching is aimed at improving learning efficiency.This program does not require students to have prior experience in computer science and technology, and only requires students to be enthusiastic about innovation.

Franklin W. Olin College of Engineering offers many courses based on project cooperation.Unlike most engineering courses, this school chose appropriate and targeted education content, and the curriculum is an amalgam of feasibility, viability, desirable, especially attaches great importance to the cultivation of innovation ability.Innovative skills include creative thinking, effective reasoning, convergence and divergent thinking, and behavioral responses. Focusing on developing individuals who are self-directed, confident, and motivated by their sources.

2.2 Domestic research status

The importance of scientific and technological innovation culture.Tang Genli believes that cultivating college students' innovation and entrepreneurship ability is a major strategic measure to serve the construction of innovation-oriented country. It is an important way of cultivating students' innovative spirit and practical ability.It is an important measure to implement entrepreneurship to promote employment and promote the full employment of college graduates.

Research on the influencing factors of the cultivation of scientific and technological innovation culture in colleges and universities.Many scholars believe that the country's policies and strategies are essential strength and correct guidance to promote the innovation of scientific and technological culture in colleges and universities.As Yang Yu pointed out, the country's "12th five-year" science and technology development planning, on the development of the business and promote the innovation in the public space of the guidance, the state council on pushing through public entrepreneurship people's opinions on some policies and measures of innovation such policies raised a storm of innovation entrepreneurship.Wang Shouguan pointed out that the promotion of mass entrepreneurship and innovation requires institutional innovation and better scientific spirit. Jiang Xiaodong believes that the spirit of innovation is an important part of the scientific spirit, which is an important foundation for innovation and a spiritual source of all innovation and creation.

Research on the way of cultivate college scientific and technological innovation culture.Yang Yu claim on constructing the education system of innovation and entrepreneurship for college students, putting innovation entrepreneurship into the teaching system, constructing college students' innovative undertaking education practice base, establishing diversified creative teachers, etc.Wang Xiaoming advocates the construction of the university's maker space to cultivate students' innovative ability.In order to reform the traditional education mode, we will add innovative content to the curriculum.Creating an atmosphere of innovation in colleges and universities, reforming the teacher evaluation system and the student evaluation system, attaching importance to the student's personality development, the innovation ability and the comprehensive ability evaluation, based on which builds the student's comprehensive evaluation system.Cao Huiqiu believes that the cultural system of colleges and universities should be innovated, the investment in materials should be increased, the teaching facilities such as new media should be popularized,cultivate students' innovation driving force in students should be attached importance to, innovative knowledge system should be constructed. JinYongcan proposed to cultivate innovative teachers, implement personalized education, reform the employment system and other paths.

On the basis of relevant research theories, many colleges and universities have established their own scientific and technological innovation culture.Fudan university teaches students basic knowledge and basic skills of entrepreneurship, East China Normal University tries to open a"entrepreneurial education curriculum", Wuhan University carries out the "three innovate"education, the institution such as the science institution of Beihang University support student entrepreneurship with capital support.In recent years, three typical education modes have been formed: The subject oriented mode represented by Renmin University of China; The practice-oriented model represented by Beihang University; Comprehensive model represented by Shanghai Jiao Tong University.

3 The Cultivation of Science and Technology Innovation Culture in Universities: A Case Study of Wuhan University of Technology

Basing on our aim to build a culture of innovation in science and technology for university students and cultivate top-notch innovative scientific research talents, Wuhan University of Technology provides students a wonderful platform of innovation, and enhance students' innovation ability through lectures, students projects and academic competitions.And our university holds academic lectures and conference and other activities, particularly from the basic level of awakening scientific consciousness and training of scientific research.At the same time, academic societies which make full use of features have played an important role in cultivating students' comprehensive innovation abilities.Our university also sticks to focus on scientific and technological activities , "Innovative Cup" science and technology festival has become a unique brand.
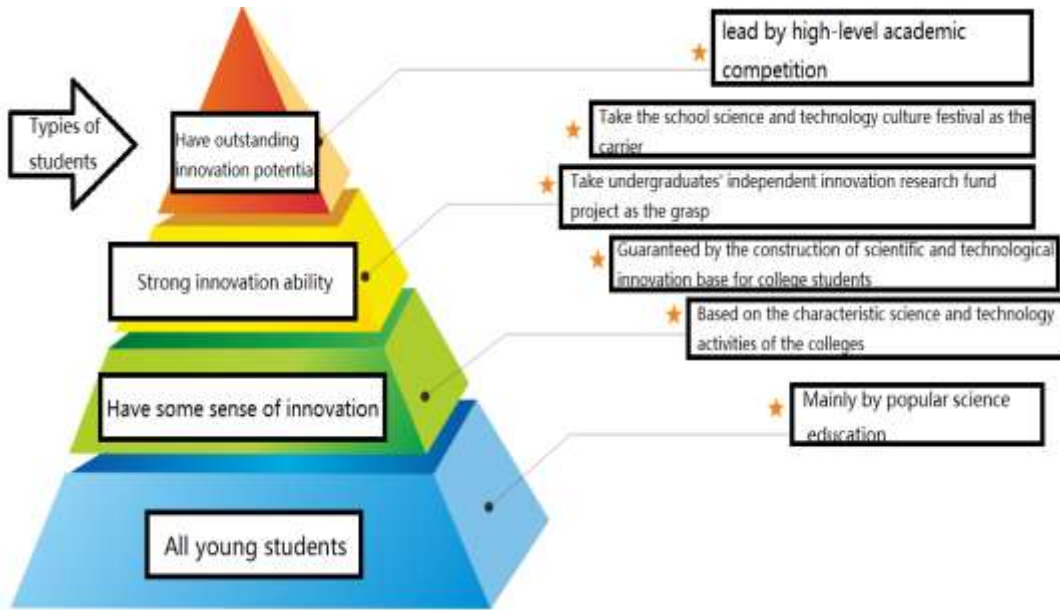
Figure 1   The Independent Innovation "Climbing Action"of Science and Technology Culture System in Wuhan University of Technology

Through questionnaires and visits, combined the result with the specific situation of Wuhan University of Technology and other domestic universities, we can see that although each school has invested a lot of energy into building a scientific and technological innovation culture as well as introduced relevant policies, which did have been realized certain achievements, there are still some deficiencies of scientific and technological innovation activities done by university students now.
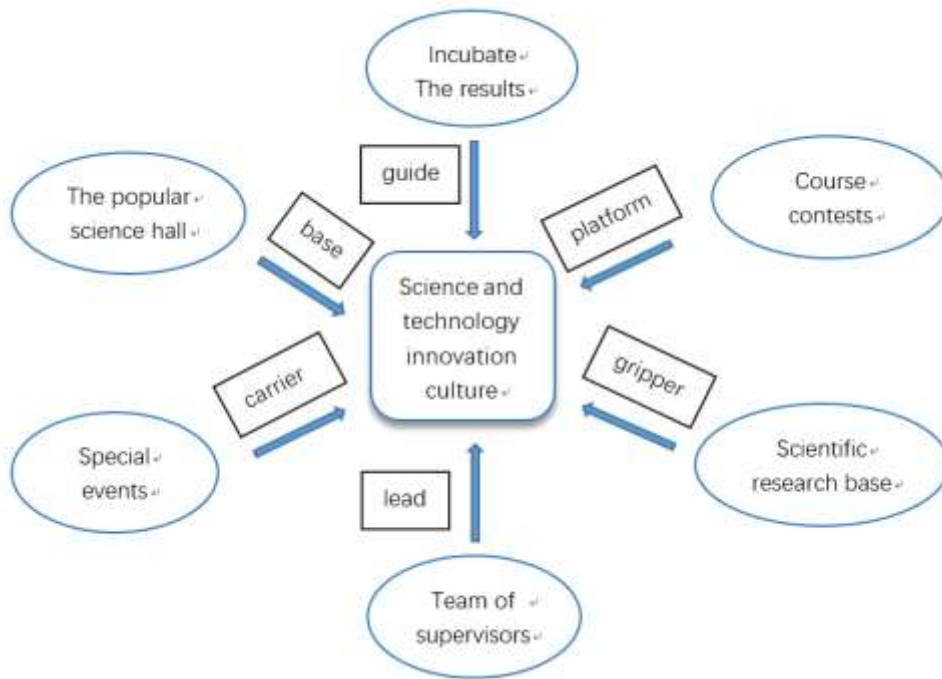
Figure 2   University "Six Wheel Drive" Scientificand Technological Innovation Culture System

First of all, the school innovation atmosphere and management system are not perfect. According to the results of the questionnaire survey in our University, about 20% of the students think that the technological innovation support policy and the school innovation atmosphere are general when others

feel satisfied. Secondly, the motivation of the academic advisors is still low, the faculties of scientific and technological innovation activities advisor team are also not completed yet. As we can see from the questionnaire survey in the whole, in the terms of giving guidance to student's innovation activities, there still remains biggish demand of the quality advisor teams. What's more, we also have found some problems that have greatly limited the development and improvement of scientific and technological innovation activities, such as imperfections in the system of school guarantees, unbalanced development of innovation activities, and low quality of achievements.

And then, analyzing the causes for the problems in the cultivation of scientific and technological innovation activities. First, at the school level, the policy support, school innovation cultural atmosphere and management system need to be consummated. It is obvious that the innovation atmosphere, the cultivation of innovative thinking, and practical professional guidance are insufficient. Moreover, the lack of personal expertise and support in the material level also becomes the barrier to scientific and technological innovation activities in our university. Second, at the teacher level, some teachers' awareness is not comprehensive enough. They believe that the first classroom education is superior to the second classroom education and neglect the guidance of students. Some teachers who are busy with their own teaching and research work have little enthusiasm for guiding students' scientific and technological innovation activities, which has led to these activities can't be carried out in depth. Third, at the student level, many students' theoretical knowledge and foundations are not solid, ignoring the accumulation of knowledge except the major. And there are also students who study passively. In addition, the important reason for the unbalanced development of students' scientific and technological innovation activities is the unbalanced development of disciplines. From the survey results, students have trouble in lacking hands-on ability, teacher's guidance and funds in the process of innovation, regarding their narrow knowledge and short of good ideas as the main one.

4 Analysis of the Cultivation of Scientific and Technological Innovation Culture in Universities

Through the questionnaire survey on the students of Wuhan University of Technology and the visit to other domestic colleges and universities, the related materials and the problems of the scientific and technological innovation activities of the college students are summarized. It can be found that the educational function of college education, on the basis of taming the theoretical knowledge in the first classroom teaching, we should attach importance to and strengthen the expansion and extension of the second classroom, improve the students' comprehensive quality through various scientific research projects and practical training methods, and realize the function of educating people in colleges and universities.

4.1 Use characteristic activities as a carrier to enhance the campus science and technology innovation atmosphere

Schools should vigorously advocate campus culture with the theme of scientific and technological innovation, and form a popular and innovative campus atmosphere. By inviting experts and scholars from relevant fields to school, holding regular academicians' forums, scholars' forums, and other series of popular science lectures, aiming at frontier development of science and technology and social needs, encouraging ordinary students to participate in various research projects and discipline competitions, listening to various academic reports, we will deepen the concept of scientific and technological innovation into the minds of every ordinary students, and enable the scientific and technological innovation to form a new situation of national participation, no longer just a game of the minority.

Schools should rely on professionalism, give full play to their advantages, and constantly improve the innovative, entrepreneurial and educative endurance of scientific and technological activities with academic characteristics. Schools should encourage academies to carry out branded academic and scientific and technological cultural activities with distinctive disciplinary characteristics combined with professional characteristics, and gradually form a good situation of scientific and technological innovation of "one academy, one festive, one feature". These scientific and technological and cultural activities with strong disciplinary characteristics are based on the characteristics of the academic disciplines and are geared towards the most extensive student groups in the whole school, which have a positive role in encouraging students to actively engage in innovative entrepreneurial practices, expanding projects, exploring talents, cultivating a group of students with strong innovative abilities and promoting the atmosphere of students' innovation and entrepreneurship, and are conducive to the formation of a new situation of campus science and technology innovation activities like "a hundred

flowers bloom, strive for beauty".

Schools should guide and set up a number of innovative science and technology societies and research bases, such as the Student Science and Technology Association, the Excellent Innovation Base, etc. Science and technology innovation base is an important position of cultivating students' innovative spirit. It has strong professionalism, it can better combine the characteristics of professional knowledge, cultivating students' good sense of innovation and innovation ability. By organizing disciplinary competitions, students can better understand the core connotation of the competition, and they can also increase their interest in the application and experience of professional knowledge, thus making the activities of science and technology innovation become a kind of campus culture. Through carrying out practical training of various innovative projects, students' innovative thinking and practical ability can be further improved, so that students can really participate in all kinds of scientific research projects.

4.2 Take the mentor team as the guide and perfect the security system

Judging from the results of the survey visits, most university students' scientific and technological innovation activities currently have unstable scientific research teams, poor communication, and inadequate teacher guidance. The school should train teachers, introduce a group of excellent and high-quality teachers who are willing to study with students and have high academic accomplishments, and strengthen the professional level of teachers. On the basis of years of practice, schools should further improve the relevant assessment system for instructors, establish a reasonable management system, and establish a perfect guarantee system for scientific and technological innovation activities. This guarantee system should include a strong executive force, a stable management organization, the guidance of the teacher's organization and a good training system. It should also include supporting financial support, site support, and policy support, etc.

In addition, in response to the low enthusiasm of instructors, a corresponding assessment and reward system for instructors should be established. The teacher's guidance of students in the technological innovation work is linked with the teacher's annual assessment and promotion. At the same time, the teachers who have achieved the results are given a certain amount of spiritual rewards and material rewards, so that the university students can receive comprehensive guidance in scientific and technological innovation, and can also make Students' ideas are translated into actual works more easily. At the same time, the school is equipped with tutors for undergraduates, deepens the tutorial system, and strives to build a tutor team with a high level of theory and practice.

Take the discipline competition as the platform to show the students' demeanor Schools should rely on the holding of high-level scientific and technological competitions to encourage students to meet challenges, practice boldly and be good at innovation and effectively promote students' ability of independent innovation. Schools shall adhere to the "Challenge Cup" National Competition for College Students' Extracurricular Academic and Scientific and Technological Works, the "Youth creation" National College Student Entrepreneur Competition, the "Energy Saving and Emission Reduction" Social Practice and the Scientific and Technological Works Competition, the Mechanical Innovation Design Competition and other kinds of state-level competitions and actively organize students to participate in various high-level competitions, including the Logistics Design Competition, the College Students' Electronic Design Competition, the Transportation Science and Technology Competition and so on. Schools rely on the competition activities with the characteristics of specialized disciplines, form the academic competition pattern which integrates point and sphere, and strive for outstanding achievements in all kinds of major competitions. Schools have cultivated a group of students as advanced and typical characters of innovation and entrepreneurship, and have also encouraged more students to actively throw themselves into the practice of innovation and entrepreneurship, and to highlight the fruitful results of innovation and entrepreneurship practice.

Based on the results of incubation, promote the production of students' works Schools should rely on the characteristics of disciplines, strengthen cooperation with enterprises in the industry and government departments, make use of school brands, rely on alumni resources, and strive for government policy support and financial support from alumni enterprises to promote the transformation of students' works from the state of laboratory to products, and to further the students' achievements to be applied to the production practice of enterprises and society.

Through the analysis of the investigation report above, we preliminarily explore the path of university students' science and technology innovation culture cultivation, put great efforts into perfecting the first class education system, improve the quality of education, compact the theoretical foundation and provide theoretical support for students to participate in scientific and technological innovation activities. we make efforts to build the "six-wheel drive" science and technology innovation

culture system which takes science popularization lectures as the foundation, characteristic activities as the carrier, mentor teams as the guide, scientific research bases as the grasp, scientific research projects as the platform, and achievements hatching as the direction, create the second class of students with characteristics, and really facilitate the development of scientific and technological innovation activities of college students into the fast lane.

5 Conclusion

On the basis of summarizing the present situation of scientific and technological innovation culture cultivation in universities at home and abroad, taking Wuhan University of Technology and other famous universities as key research objects by issuing online and offline questionnaires,

This article summarizes the existing problems in the cultivation of scientific and technological innovation culture in colleges and universities, and finally puts forward the specific ways of cultivating scientific and technological innovation culture in colleges and universities, such as building the "six-wheel drive" science and technology innovation culture system which takes science popularization lectures as the foundation, characteristic activities as the carrier, tutor teams as the guide, scientific research bases as the grasp, scientific research projects as the platform, and achievements hatching as the direction. This path contributes to promoting the further development of scientific and technological innovation activities of college students, makes the scientific and technological innovation activities of college students step into a good track and strengthens the construction of scientific and technological innovation culture cultivation in colleges and universities.

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Research on Financial Competitiveness of High-end Equipment Manufacture Industry in China: Based on Factor Analysis

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Abstract: This paper has collected and sorted out panel data of 79 high-end equipment manufacture A-share listed companies in Shanghai and Shenzhen from 2014 to 2016 for factor analysis by applying Stata software and has extracted three main factors of debt paying ability, profitability and debt paying ability by dimensionality reduction. This paper has constructed regression equation of financial competiveness, calculated total score and implemented ranking. Research result shows: the whole financial competiveness of high-end equipment manufacture industry is relatively strong, but development among enterprises is unbalanced. By putting forward attention to national policy of enterprises with not strong financial competiveness, increasing investment in scientific research and strengthening suggestion of international communication and cooperation, development of high-end equipment manufacture industry will march toward a new step.

Key words: High-end equipment manufacture industry; Financial competitiveness; Factor analysis; System dynamics model

1 Introduction

In 2017, General Secretary Xi proposed in report of the 19th National Congress of the Communist Party of China of the Party to accelerate establishment of strong manufacture country and accelerate development of advanced manufacture industry. In 2015, the State Council issued Made in China 2025, which provided action outline for China to implement strong manufacture country. In 2016, executive meeting of the State Council passed Equipment Manufacture Industry Standardization and Quality Promotion Planning. Manufacture industry is core force to develop national economy, but high-end equipment manufacture industry with high technology and high additional value is its core (Jing Yongsheng, 2014). In addition, it is very necessary to enlarge attention degree and support strength to financial competitiveness of high-end equipment manufacture industry. High-end equipment manufacture industry involves aviation industry, satellite, application industry, railway transportation equipment industry ocean engineering equipment and intelligent manufacture equipment fields. In recent years, establishment of Tiangong-2 laboratory, normal operation of Fuxing CRH train and successful maiden flight of national large flight C919 all embody promotion of whole level of national high-end equipment manufacture industry.

Because the high-end equipment manufacturing industry is a newly developed industry in recent years, most of the research has contributed to the development of the industry based on technology, and few scholars have studied the financial competitiveness of the industry. The innovation of this paper is that the study of the industry is based on the perspective of financial competitiveness.

This Paper has selected 9 financial indexes of high-end equipment manufacture enterprises represent its financial competitiveness level (Song Xiaoling, Du Meijie, Liu Shasha, 2016) and classified them, to calculate comprehensive score of financial competitiveness of different enterprises and clarify difference of its financial competitiveness among different enterprises, which aims at putting forward some suggestions for future development of enterprise in disadvantageous status and promoting whole competitiveness of high-end equipment manufacture industry in China.

2 Factor Analysis of Financial Competitiveness of High-end Equipment Manufacture Industry

2.1 Data source

This Paper collects and sorts out index data of panel finance from 2014 to 2016 (Liu Chunying, Yu Qingqing, 2013) by taking 89 high-end-equipment manufacture enterprises as research objects and utilizing CSMAR, Straight Flush Finance Website and Sina Finance Website. To ensure completeness and comparability of data, 5 ST companies and 5 companies with incomplete information data are eliminated and 79 companies are obtained as sample.

2.2 Model construction

This Paper implements factor analysis by utilizing Stata statistics analysis software and transforms several correlative financial index data into several independent comprehensive indexes by dimensionality reduction. The purpose is to interpret more variables with a few variables and simply complex problems. According to principle of factor analysis, this Paper standardizes variable, calculates correlative matrix, implements KMO inspection and deducts main factor (Li Shuangshuang, 2015). To increase feasibility and persuasion of living examples, this Paper implements empirical analysis by adopting average value of ending financial data from 2014 to 2016 (He Shan, 2016). Influence of change condition of all financial indexes on financial competitiveness can be reflected intuitively by applying system dynamics Vensim software, as shown in Figure 1.
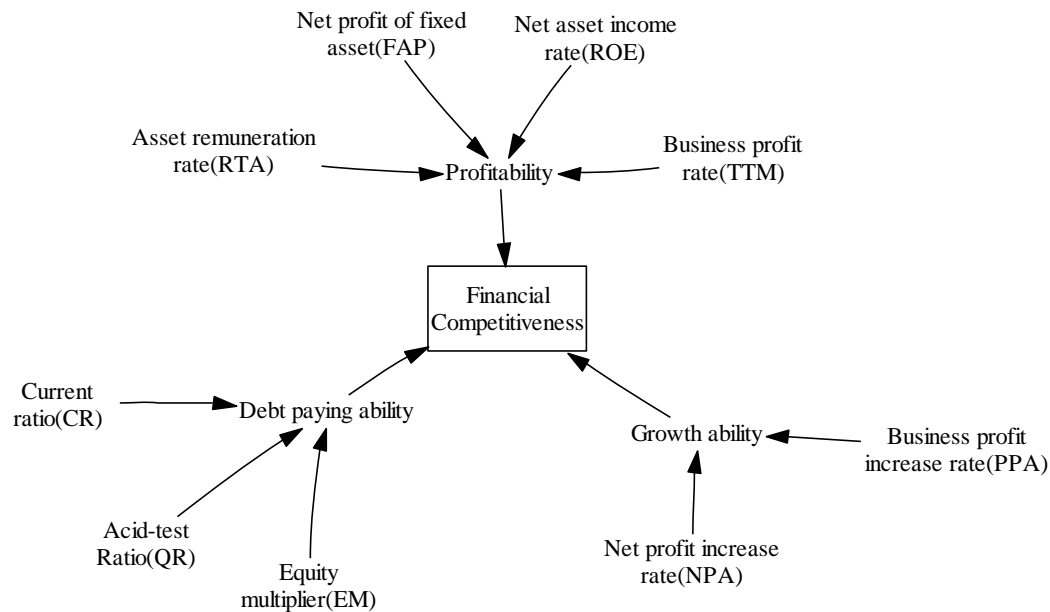
Figure 1　System Dynamics Model of Finance Competitiveness

2.2.1 Analysis on descriptive statistics quantity

Table 1 lists the maximum, the minimum, mean value, variance and standard deviation coefficient of 9 financial indexes of 79 high-end equipment enterprises. The maximum and the minimum reflect extreme value condition of value distribution within definition interval; Mean value reflects average level of corresponding variables; standard difference reflects dispersion degree of corresponding variable value distribution. Standard deviation of asset remuneration rate is the minimal, which shows that its value distribution is relatively concentrated. Standard deviation of increase rate of net profit is the maximal, which shows that its value distribution is relatively loose and difference of increase speed of net profit in different high-end equipment manufacture industry is relatively large-,the growth rate is different. Standard deviation coefficient is equal to ratio of standard deviation and mean value and reflects absolute value of data disperse degree under different conditions of data dimension. The index value of businessprofit growth rate is the maximal, which shows that difference of business profit increase speed of different high-end equipment manufacture enterprises is relatively large.The growth of each enterprise is uneven.

Table 1　Descriptive statistics

	Minimum	Maximum	Mean	Variance	Coefficient of Variance
CR	.6701	8.1267	1.989226	1.3383879	0.581576533
QR	.4452	6.9806	1.497464	1.1626411	0.720056285
EM	1.0901	5.7953	2.268031	.9335217	0.426003554
NPA	-28.2358	110.6017	1.081458	13.6751540	3.419451555
PPA	-45.4835	69.9143	.479708	11.9835710	7.216326351
RTA	-.0369	.1312	.028251	.0297104	6.101272529
FAP	-.1675	.9919	.163490	.2356742	2.96937349
ROE	-.2837	.1535	.033640	.0686514	7.788766996
TTM'	-.2442	.3390	.036516	.1030248	8.789976048

2.2.2 Correlation analysis

To unify standard deviation with data unit 1, this Paper standardizes data and mean value of data after standardization is 0 and standard deviation is 1. Standardized data are adopted in the following paper. Correlation matrix has described intensity of correlation among variables. It can be obtained from data in Table 2 that correlation coefficient between ZCR and ZQR is 0.978; correlation coefficient between ZRTA and ZTTM is 0.821 and correlation coefficient between ZROE and ZTTM is 0.762 and corresponding sig value is all .000, which shows that correlation among the three couple of variables is very significant. They are proper for factor analysis.

Table 2   Correlation Matrix

	ZCR	ZQR	ZEM	ZNPA	ZPPA	ZRTA	ZFAP	ZROE	ZTTM
ZCR	1.000	.978	-.552	-.127	.003	.309	.339	.243	.360
ZQR	.978	1.000	-.549	-.115	-.032	.352	.366	.272	.390
ZEM	-.552	-.549	1.000	.076	-.151	-.325	-.259	-.335	-.355
ZNPA	-.127	-.115	.076	1.000	-.064	-.099	-.097	-.101	-.191
ZPPA	.003	-.032	-.151	-0.064	1.000	-.014	.010	.107	.015
ZRTA	.309	.352	-.325	-.099	-.014	1.000	.739	.856	.821
ZFAP'	.339	.366	-.259	-.097	.010	.739	1.000	.709	.734
ZROE	.243	.272	-.335	-.101	.107	.856	.709	1.000	.762
ZTTM	.360	.390	-.355	-.191	.015	.821	.734	.762	1.000

2.2.3 Factor analysis

Based on correlation matrix analysis, factor analysis is further implemented. Under general condition, value of KMO is larger than 0.7, which shows that it is proper for factor analysis. As shown in data in Table 3, value of KMO is 0.7779, which is larger than critical value, which shows that data in this Paper are proper for factor analysis.

Table 3   KMO

Variable	KMO
Current Ratio	0.6154
Acid-test Ratio	0.6199
Equity Multiplier	0.9329
Net profit growth rate	0.6639
Sales profit growth rate	0.2291
Return on Total Assets Ratio	0.8093
Net Profit of fixed asses	0.9263
Rate of Return on Common Stockholders' Equity	0.8323
Operating Profit Ratio	0.8863
Overall	0.7779

Characteristic value and accumulated variance contribution rate in Table 4 and characteristic value and accumulated variance contribution rate after rotation of Table 5 have listed variance strength and accumulated total variance of each common factor interpretation. Seen from characteristic value column that principle of common factor withdrawal is that characteristic value is larger than 1. Therefore, we have selected three factors and accumulated variance sum has reached 76.050% and can better represent most data information better.

Table 4   Eigenvalues and Total Variance Explained

Factor	Eigenvalues	Proportion	Cumulative
Factor1	4.107	0.45636	0.45636
Factor2	1.662	0.18469	0.64105
Factor3	1.075	0.11945	0.76050

Table 5   Rotated Eigenvalues and Total Variance

Factor	Eigenvalues	Proportion	Cumulative
Factor1	3.293	0.36584	0.36584
Factor2	2.432	0.27021	0.63605
Factor3	1.120	0.12444	0.76050

Table 6 shows component scoring coefficient matrix. It has displayed factor load of all factors by data intuitionally and has clarified load distribution of three factors. It can be got by weighing load distribution of 3 factors on various variables that factor 1 occupies larger load on RTA, FAP, ROE and TTM; factor 2 occupies relatively large load on CR, QR and EM; factor 3 occupies relatively large load on NPA and PPA.

Table 6   Component Score Coefficient Matrix

Variable	Factor1	Factor2	Factor3
ZCR	-.098	.444	-.054
ZQR	-.080	.435	-.090
ZEM	.051	-.286	-.202
ZNPA	.011	-.015	-.407
ZRTA	.309	-.067	-.055
ZPPA	-.064	-.061	.831
ZFAP	.277	-.042	-.059
ZROE	.305	-.106	.074
ZTTM	.277	-.032	.006

By summarizing component scoring coefficient matrix in Table 6 and rotation component matrix in Table 7, all index variables can be classified as follows: ZRTA, ZFAP, ZROE and ZTTM are taken as the first main factor; ZCR, ZQR and ZEM are taken as the second main factor and ZNPA and ZPPA are taken as the third main factor.

Table 7   Rotated Component Matrix

Variable	Factor1	Factor2	Factor3
ZCR	.158	.957	.007
ZQR	.198	.950	-.030
ZEM	-.213	-.683	-.273
ZNPA	-.100	-.111	-.456
ZRTA	.927	.172	.016
ZPPA	-.035	-.041	.898
ZFAP	.847	.196	.006
ZROE	.906	.101	.150
ZTTM	.879	.235	.081

By summarizing foresaid KMO inspection table, characteristic value and accumulated variance contribution rate table, rotation component matrix and rotation space component diagram, all financial variable indexes are classified into three main factors. The first main factor occupies relatively large load on asset remuneration rate, net profit of fixed asset, net asset income rate and business profit rate, which is divided into profitability index. The second main factor occupies relatively large load on current ratio, quick ratio and equity multiplier , which is divided into debt paying ability index. The third main factor occupies relatively large load on net profit increase rate and business profit increase rate, which is divided into growth ability index. See Table 8 for specific classification of all variables indexes.

Table 8　Index Summary

Index	Variable
Profitability index	RTA（Asset remuneration rate）
	FAP（Net profit of fixed asset）
	ROE（Net asset income rate）
	TTM（Business profit rate）
Debt paying ability index	CR（Current ratio）
	QR（Acid-test ratio ）
	EM（Equity multiplier）
Growth ability index	NPA（Net profit increase rate）
	PPA（Business profit increase rate）

3 Results

By combining with three indexes, comprehensive score of financial competitiveness of high-end equipment manufacture enterprise is calculated and its evidence formula is: According to final score, total score of 79 high-end equipment manufacture industry is ranked from front to back. To summarize average level and individual difference comprehensively, this Paper selects enterprises, of which total scores rank in the top 5 and bottom 5 and list scores in two intervals. The first interval represents enterprise, of which total final score ranks top 5 and the second interval represents enterprise, of which total final score ranks bottom 5. See Table 9 for specific ranking condition of total score and all components. Ranking of component 1, component 2 and component 3 of enterprises with total score ranking in bottom 5 is relatively low. When all component scores are relatively low, according to calculation formula of total score, total score is naturally low. Ranking of enterprise component 3 with total score ranking in the top 5 is relatively low. After exploration, it is found out that the enterprise has existed for relatively long time in the industry and its growth space is relatively less than newly-rising enterprises in the industry. Total score of enterprise that ranks the first is 1.61 and shares are briefly called as Sanlux. Net asset income rate of the Company increases continuously recently, which shows that its profitability is favorable. Total score of enterprises that rank in the last is -1.27 and shares are called briefly as Taiyuan Heavy Industry. Year-on-year growth of business income of the Company decreases obviously recently, which shows that its profit condition is unstable. It can be seen that main component score of high-end equipment manufacture enterprises is relatively large, which has showed that difference of financial competitiveness of different high-end equipment manufacture enterprises is relatively large.

Table 9　Main Component Scoring List of Part of High-end Equipment Manufacture Enterprises

Share code	Total score ranking	Total score	Component 1 ranking	Component 2 ranking	Component 3 ranking
002224	1	1.61	6	2	74
300024	2	1.03	4	5	66
300384	3	1.00	1	16	61
002270	4	.86	7	7	72
002651	5	.85	8	6	56
000680	75	-.69	77	40	39
000852	76	-.72	78	47	43
002535	77	-.91	64	58	78
600760	78	-1.21	79	62	73
600169	79	-1.27	71	76	79

4 Robustness Test

This Paper implement robustness test by data substitution. Data selected in factor analysis of this Paper are average value of panel data from 2014 to 2016 and are replaced with panel data in the end of three years from 2014 to 2016 and selected financial variable indexes are unchanged. Factor analysis for

3 times has been implemented by SPSS statistical software. Experiment result shows that three main factors of debt paying ability, profitability and growth ability are obtained by dimensionality reduction and scoring order of all enterprises is ranked according to total score of main component. Except for relatively large change in financial competitiveness in enterprises with comprehensive ranking No. 3 and No.4 in 2011 for inner reason, there is no significant change in ranking order of rest enterprises, which shows that result of this Paper is stable. Table 10 is ranking order list of enterprises with ranking top 5 and ranking bottom 5.

Table 10   Main Component Total Scoring Ranking List of Part of Enterprises

Share code	Ranking	Ranking in 2011	Ranking in 2012	Ranking in 2013	Average ranking
002224	1	1	2	1	1.33
300024	2	4	3	3	3.33
300384	3	75	4	4	27.67
002270	4	28	1	2	10.33
002651	5	2	6	7	5
000680	75	68	76	62	68.67
000852	76	38	61	78	59
002535	77	60	77	51	62.67
600760	78	73	79	53	68.33
600169	79	74	74	79	75.67

5 Conclusion

This paper has implemented factor analysis on liquidity ratio, quick ratio, equity multiplier, return on assets, net profit of fixed asset, net assets income rate, operating profit ratio, net profit growth rate and business profit increase rate of 79 high-end equipment manufacture enterprises and classifies it into three main factors and calculates its comprehensive score of its financial competitiveness finally. It is found out by empirical study result that whole financial competitiveness of high-end equipment manufacture industry is relatively strong, but strength of different enterprises is different and competitiveness level difference is relatively large.This is in agreement with the conclusions of the relevant scholars (Huang Minyi, 2015) For enterprises with relatively lower score in financial competitiveness score, this Paper puts forward the following three suggestions. (I) Strengthen attention to relevant national policy. National policy is compass of industry development and the country pays highly attention and supports greatly for strategic emerging industry, such as high-end equipment manufacture industry. High-end equipment enterprises shall seize opportunity and develop rapidly under guidance of national policy. (II) Enlarge investment to scientific research innovation. Because of inherent characteristics of high-end equipment manufacture industry of high technology and high value, requirement to scientific innovation is very high. Increase of investment in scientific innovation is embodied in introduction and cultivation of scientific talents and construction and maintenance to infrastructure. Only through continuous innovation in scientific research, can we keep up with the times and meet the needs of the people. (III) Strengthen international communication and cooperation. Under driving of"The Belt and Road Initiative", communication and cooperation of China with other countries are increasingly frequent. High-end equipment manufacture industry of China can "bring in and go out", learn mutual experience, create international brand and increase influence under tide of the age. Under large environment of quick economic increase, we expect to highlight competition advantage of high-end equipment manufacture enterprise and different enterprises can keep pace with each other jointly and facilitate development of high-end equipment manufacture industry in China and even development of the whole manufacture industry.

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Research on Innovation-driven Development Strategy, Comparative Advantage and Industrial Transformation and Upgrading

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Abstract: China is in the midst of a momentous economic transition from one of high-speed to high-quality growth. The industrial transformation and upgrading supported by extensive growth model that focused on "quantity" has encountered bottlenecks. It's urgent to find a new model to promote new round of industrial transformation and upgrading. This paper, based on the current unbalanced industrial structure in China, analyzes the development strategy China has implemented since reform and opening up and its influence on industries. Conclusions are as follows: China has implemented an extensive forging ahead growth strategy that transcends comparative advantage. This has generated industrial structure deviations, longstanding factor price distortion, overcapacity and wave phenomenon and constrained industrial transformation and upgrading. Therefore, China should choose an innovation-driven development strategy that could unleash the potential of comparative advantage and drive industrial transformation and upgrading.
Key words: Innovation-driven development; Comparative advantage; Industrial transformation and upgrading

1 Introduction

Industry is the bedrock of economic growth and industrial structure holds the key to sustained economic growth. Since the outbreak of the global financial crisis in 2007, China's central and local governments have pressed ahead with industrial structural reform at a higher speed. However, problemssuch as extensive industrial structure, low-level industries and high degree of government-owned businesses remain outstanding. As the longstanding obstacle in China's economic growth, we must seek radical policies from the institutional level to ensure the quality of China's industrial and economic development and thus achieve sustainable industrial growth (Li Keqiang, 2018). The academic circle has conducted considerable researches on the above issue from diversified perspectives and with abundant literature (Li Jianbo, 2014, Liu Yang, 2015, Li Yining, 2015, Ren Zeping, 2016, Wei Feng, 2014), whereas little literature analyzes the mechanism from the perspective of systems and development strategies. Therefore, this paper attempts to study industrial transformation and upgrading from the perspective of development strategies.

2 Mechanism Analysis of the Influence of Development Strategies on Industrial Transformation and Upgrading

The government itself is the most significant institution in the economy whose economic policies can usually be summarized as development strategies (Lin Yifu, 2017). It is quite natural and reasonable, considering the historical context, for the Chinese government to implement a top-down extensive growth strategy to catch up with others since the People's Republic of China was founded. Undeniably, such a strategy as based on the expansion of the quantity of inputs, and especially on massive investment, creates a remarkable Chinese miracle (Wu Jinglian, 2013). At the same time, however, problems such as perennial dependence of industrial upgrading on investment, relatively insufficient consumer demand and overcapacity are becoming increasingly prominent. All these have impaired the quality of industries and their sustainable growth capacity.
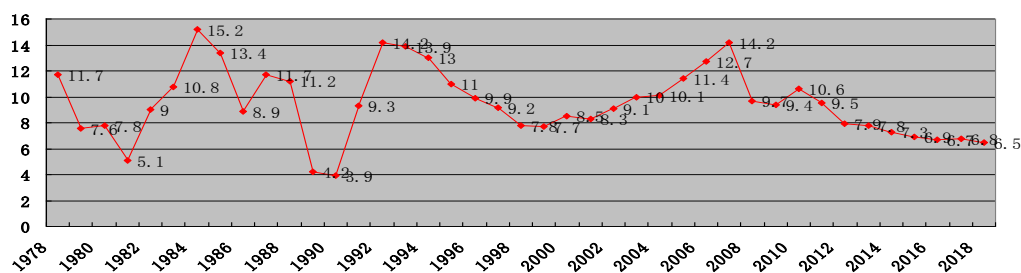
Figure 1   China's economic growth rate each year (%)
source: website of National Bureau of Statistics

How does the extensive growth strategy cause an unbalanced industrial structure, in other words, what's the mechanism behind it? First of all, from the perspective of unbalanced structure of domestic demand--the most superficial issue--the most direct reason why investment far exceeds consumption is that the investing entity's (government departments and enterprises) income far exceeds the consuming entity's (residents). It's true that government and enterprises control more national income while residents' income has been decreasing in the past few decades. The uneven distribution of national income directly leads to unbalanced structure of China's domestic demand (Xu Xiaonian, 2010). In addition, the production part lies before the distribution part in large-scale socialized production. Therefore an unbalanced distribution of national income is directly led by an unbalanced productive structure. If there are more capital-intensive industries, the distribution of income will be more conducive to capital rather than labor. Last but not least, the extent to which China's industrial structure inclines towards capital-intensive industries far exceeds the abundance of capital. Apparently, government's improper policies featuring forging ahead such as large-scale investment on infrastructure, facilitating financing for capital-intensive companies, lowering capital prices through interest rate regulation will distort the macro incentive mechanism for companies and generate more capital-intensive enterprises.

Table 1   Uneven National Income Distribution

Government real income (% of GDP, in 100 million)

Year	Tax	Land-Transferring Fees	Social Security Fund	State-Owned Enterprises	Lottery Sales	Extra-Budgetary and Non-Tax Revenue	Excluded from the Budget	Real Income of the Government	Total Size of GDP	Proportion of Government's Revenue on GDP
1995	6038		187			2938	680	9843	59810	16.45
2000	12581	522	1006		181	4919	1476	20685	98000	21.10
2005	28778	5505	2645		411	8608	2582	48529	183617	26.43
2010	73211	28198	19276	440	1662	16693	5316	144796	399759	36.22
2011	89738	31140	25153	700	2216	14136	6016	169099	468562	36.09
2012	100614	26652	30739	1154	26158	16639	7290	185703	518214	35.84
2013	110497	39073	35253	1288	3093	18645	8828	216677	566130	38.27
2014	119158	43606	39592	2211	3824	21192	10682	239265	636483	37.59
2015	124892	32547	46012	2560	3679	27325	12818	249833	676708	36.92

source: Hengda Research Center

In summary, China's economic structural imbalance is not simply a structural imbalance of domestic demand but rather a systematical imbalance. The perennial extensive growth mode is the fundamental factor which has distorted the macro incentive structure for enterprises. It first directly leads to an unbalanced productive structure (deep structural imbalance) and then the imbalance will be transmitted to the distribution of national income (middle level structural imbalance) and ultimately, will cause the unbalanced structure of domestic demand (the most prominent structural imbalance).

China's industrial policies since 1949 has facilitated industries that surpass our comparative advantages, such as capital and technology-intensive industries. Li Yifu (2017) described it as a forging ahead strategy. With profound changes in the political and economical environment at home and abroad, its unsustainability is becoming more and more conspicuous and it will constrain the industrial upgrading and economical transformation in the foreseeable future:

2.1 Deviations in China's industrial structure

On the one hand, China's industrialization grew rapidly amid low levels of per capita GDP, surpassing its own factor endowment and the stage of economic development, resulting in a productive structure that is not adapt to the demand structure determined by average income (Huang Qunhui, 2014). On the other hand, the extensive development strategy has led to a deviation in comparative share among labor-intensive, capital-intensive and technology-intensive industries. Large-scale, long-term loans flow to capital and technology-intensive industries. According to the data provided by the official website of the People's Bank of China, from 2000 to 2007, the proportion of medium and long-term loans grew from 26.7% to 70%.

2.2 Long-term distortion of factor prices

China's capital accumulation has outpaced GDP growth because of capital preference of the forging ahead strategy. This development model use to be the driving force of China's skyrocketing

economic growth while effectuated systematical distortion of factor prices at the same time (Lu Ming, 2014). Intentionally depressed prices of capital, land and energy have prompted government departments to increase subsidies towards enterprises, causing sever consequences such as low productivity, investment-driven growth, environmental pollution and inappropriate industrial structure.

2.3 Overcapacity and waving phenomenon

The emerging industries supported by the government are always advanced ones. The waving phenomenon happens when, affected by the policies, countless companies and investors are highly consistent in the assessment of one industry (Fu Caihui, 2016). Most of government-supported industries don't meet the requirements of comparative advantage and are more likely to suffer from overcapacity and waving phenomenon, such as steel, cement and petrochemical industries.

3 Suggestions for New Policies

Based on the current stage of Chinese industry, systematical improvement of innovation and stimulation of innovative vitality should be concentrated on the following aspects:

3.1 Strengthening the establishment, reform and improvement of the institutional cost of industrial innovation

Institutional cost is the premise of industrial innovation and the institutional cost of China's industrial innovation is still relatively high. First, laws and regulations on rewards, equity, options, taxation, room for trial and error and other aspects must be improved. Secondly, reducing financing cost, especially for small and medium sized private enterprises is significant. The third suggestion is to establish and improve the risk control mechanism for industrial innovation. The government must set up funds and subsidies for risky projects.

3.2 Accelerating talent fostering

To begin with, by fostering respect for science, government departments should create a conducive atmosphere for scientific innovation and consolidate talent sources. In addition, the government need to unlock the scientists' creativity and entrepreneurial passion, fully support enterprises to attract more innovative talents and encourage talents to work for enterprises. What's more, we should master the laws of innovative talents fostering and expand the recruitment pool.

3.3 Removing institutional barriers that hamper population movement and migration of workers

Initially, barriers that hinder talent flow such as household registration, restrictions on gender and age should be eliminated. Additionally, based on the two-child policy and the act of raising the retirement age, the government must deepen reform of population policy, slow down the aging population and mitigate its negative effect on innovation. Furthermore, government service models and grassroots governance also require innovation. More attention should be paid to public service and policies pertinent to migrants. Finally, the government should expand exchanges of talents abroad and proactively guide the inflow of overseas talents.
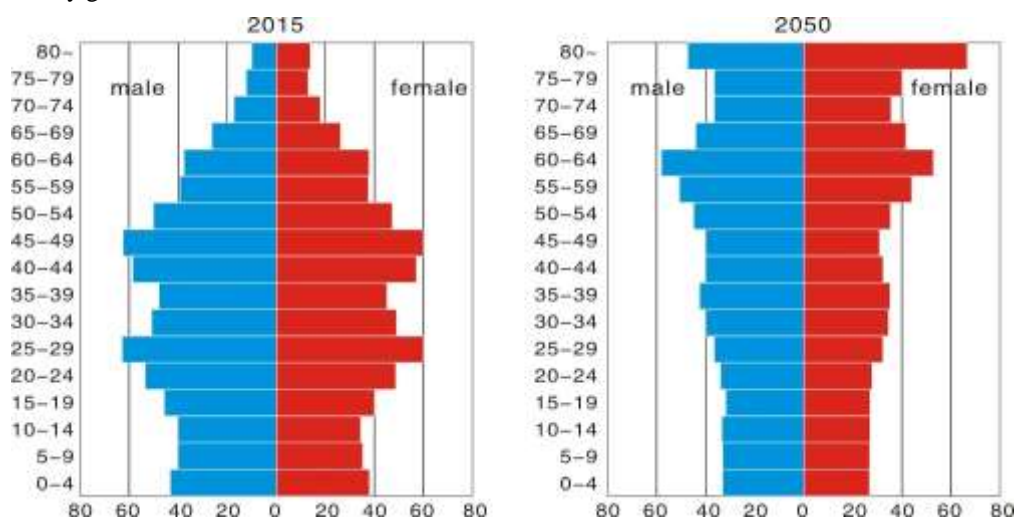
Figure 2   Population in China in 2015 and 2050, by Age and Gender (In Million Inhabitants)
source: website of National Bureau of Statistics

3.4 More governmental investment in infrastructure such as science, education, culture and health

During the past four decades, the government has paid disproportionate attention to infrastructure and achieved a infrastructure miracle. Meanwhile, we should bolster points of weakness or soft environment, so that the coordinated development of hard and soft environment can better attract, serve and facilitate talents.

3.5 Establishing and improving talent incentive system

First of all, it's pivotal to make flexible use of wages, performance, benefits, employee stock ownership and other compensation mechanisms to mobilize their passion for innovation. Meanwhile, enterprises can attract and keep talents with people-oriented cooperate culture, formulate a blueprint for their future career to maintain a prolonged incentive. Furthermore, enterprises should provide sound working conditions and channels for enhancing personal value.

3.6 Enhancing exchanges and cooperation with other countries and regions, expanding the scale of opening up, strengthening exchanges, absorbing talents and providing an effective way for enrollment

To start with, we need to create a sound living and working environment to attract high-level overseas returnees and foreign. In addition, we can improve the political and commercial environment to facilitate international trade and acquire knowledge from trade. What's more, we spur foreign direct investment so that we can enjoy their knowledge and technological spillover effect. Last but not least, the international licensing system proves to be an effective way for developing countries to obtain certain new proprietary technology and its cost benefit is even more feasible than the enterprises' own development.

To sum up, at the backdrop of complex international situation and economic downturn in China, industrial transformation and upgrading, together with innovation, are what China must do now in avoiding a middle-income trap and pursuing development and prosperity. At present, we need to deepen our understanding of the urgency, necessity and importance of industrial transformation and upgrading and innovation. Further discussion and research on the national development strategy, strategic support and guidance for industrial upgrading and innovation are paramount.

4 Conclusion

The extensive forging ahead development strategy since 1978 has profoundly stimulated industrial progress and industrialization. Meanwhile it has left numerous structural problems, for example, it has directly led to deviations in China's industrial structure, long distorted factor prices and overcapacity and waving phenomenon. Admittedly, the strategy has its historical inevitability and rationality. However, the Chinese economy is undergoing a major transition to a post industrial economy nowadays. The past forty years have witnessed China's unprecedented economic growth-- in fact, China has shifted gear from the previous high speed to a medium-to-high speed growth--for example, affluent capital accumulation, major changes in factor endowment structure , and many companies that used to be lack of viability now can survive the fierce competitiveness and even go global to provide foreign companies with technologies and services. The major economic changes make it imperative for the government to keep abreast of the changing times and seize opportunities to readjust its economic structure, adopt a development structure that is more responsive to comparative advantage, that is, the innovation-driven development strategy.

At present, we need to deepen our understanding of the urgency, necessity and importance of industrial transformation and upgrading and innovation. Further discussion and research on the national development strategy, strategic support and guidance for industrial upgrading and innovation are paramount. The first three aspects of this paper are particularly important in the six aspects of industrial transformation and upgrading. It is necessary to deepen and broaden the research, and to study in an international perspective. At the same time, it is necessary to combine the current complex and ever-changing international situation, carry out comparative research, and propose more targeted and practical measures for China's industrial transformation and upgrading!

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Research on Freeway Emergency Rescue Mission Planning Based on HTN Algorithm

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Abstract: With the rapid increase of highway mileage and traffic flow, the numbers of highway accidents and casualties have a year-on-year rise. Therefore, the highways' scientific management system must be established and improved while perfecting the construction the highway infrastructure, especially the establishment of the highway emergency rescue system. In this paper, the planning system of actual highway emergency rescue, which combined with Hierarchy Task Net (HTN) planning technology, is established based on the features of highway emergency rescue. The experiment shows that this method can quickly generate the planning of highway emergency rescue tasks in complex environments with a wide range of applications, good scalability, and good practical value.
Key words: Highway; Emergency decision; Artificial intelligence; Hierarchy task net planning

1 Introduction

The continuous development of transport capacity is a necessary guarantee for a country's modernization. Because of highway's outstanding advantages in terms of fast transportation speed and high flexibility, it has become a basic project for the vigorous construction of various countries. In recent years, China has continued to vigorously promote the construction of highways, and the mileage of highways has been increasing year by year. By July 2017, China has built 131,000 kilometers of highways, and the total mileage is the first in the world, providinga guarantee for the rapid development of China's economy. However, with the rapid increase of highway mileage and traffic flow, the number of highway accidents and casualties also increase quickly. For this reason, the highways' scientific management system must be improved while perfecting the construction the highway infrastructure, especially the establishment of the highway emergency rescue system. In this way, the number of highway accidents can be minimized, the survival rate of the wounded in the accident can be increased, and the tragedy can be avoided.

At present, China's highway management departments have also designed and developed some systems for emergency rescue of highways. For example, in 2009, Shandong Highway established a highway's daily management and emergency rescue system, which can assist relevant personnel in the management of road network information, police information, resource information, emergency plans etc., and in the decision-making of the highway emergency rescue. Lv Baohe (Lv Baohe, 2006) analyzed the existing problems in China's highway traffic accident rescue system, and gave the interaction relationship among elements of emergency rescue. Li Zheng (Li Zheng, 2015) analyzed the new requirements of highway emergency rescue decision-making in detail, and developed the actual software based on web-GIS and B/S to achieve the support of various rescue departments in information sharing and decision-making. For the specific details of highway emergency rescue, such as resource scheduling, scholars have also conducted a lot of research.Yarnad T (Yarnad T, 1996) studied the role that the timely and effective schedule ofmaterials and medical resources play in shortening rescue time and reducing accident losses after a traffic accident. Takeo Yamada (Takeo Yamada, 1994) etc. transformed the path selection problem of emergency rescue into the shortest path solving problem.The shortest path solution is divided into static shortest and time-varying shortest, and the study of the shortest time-varying path is of great significance to the schedule of highway emergency materials. J Ali Haghani (Haghani, 1996) etc. used the network flow model to solve the problem of rational scheduling of various emergency supplies in different modes of emergency rescue. Most of the above studies on key technologies and resource scheduling in highway emergency rescue are focused on establishing a fixed mathematical model, and then solving it using operational research and other related mathematical methods to get an emergency rescue plan for highway accidents. However, general accidents, including highway accidents, which have features of sudden and random, is an unstructuredissue, making it difficult for to establish an ideal mathematical model and then calculate through an optimization algorithm to obtain the plan.

Compared with the traditional operational research, modeling and other planning methods,

hierarchical task network (HTN) planning, whichis a popular branch in artificial intelligence, can solve it well. Hierarchical task network planning can simulate humans to understand and analyze the planning environment. Based on the objectives that the plan needs to achieve, it imposes inferences on a number of alternative actions and the provided resource constraints to comprehensively formulatethe plans that can achieve the goals. It can provide a technical basis for the construction of highway emergency rescue task planning system and reduce the workload of rescue workers. It greatly accelerates the speed of task planning, improves the effectiveness of rescue operations, and reduces the loss of personnel and property.

2 Principles of HTN-based Highway Emergency Rescue Planning Method

The HTN planning method (Wang Z, 2013), which is based on the precondition reasoning of the state, realize the top-down task decomposition and action reasoning process according to related domain knowledge. Sacerdoti proposed the basic idea of HTN planning in 1975 (Sacerdoti E D, 1975). The intelligent planning system –Nonlin (Biundo S, 2001), designed by Tate in 1977, is an earlier implementation of the HTN planner. Erol conducted a theoretical study of HTN planning and analyzed the complexity of HTN planning (Erol K, 1995). In 1994, he designed the first HTN planning system UMCP with reliability and completeness. Because of its strong expression and reasoning abilities, HTN planning can make clear and effective expressions of complex decision-making issues and efficiently manage related domain knowledge. With the progress of intelligent planning from the laboratory to the engineering practice, the HTN planning method has gradually become the most widely used intelligent planning method in practical engineering (Wilkins D E, 2001). Therefore, HTN will be used to establish a highway emergency rescue task planning system in this paper.The HTN planner generally goes through the following four steps in the development of the highway emergency plan. The specific process is shown in Figure 1:

Step1: According to the problem domain model of highway emergency rescue mission planning, the related domain knowledge of highway emergency rescue is transformed into a domain knowledge model of highway emergency rescue;

Step 2: According to the problem model of related highway accident and the domain knowledge model of highway emergency rescue, the domain issues is described;

Step 3: According to the domain description, the planning problem is extracted and concluded;

Step 4: The actual highway emergency rescue mission planning problem and the domain knowledge of highway emergency rescue are inputted to the planner. Then the HTN planning algorithm was started to obtain final planning solution.
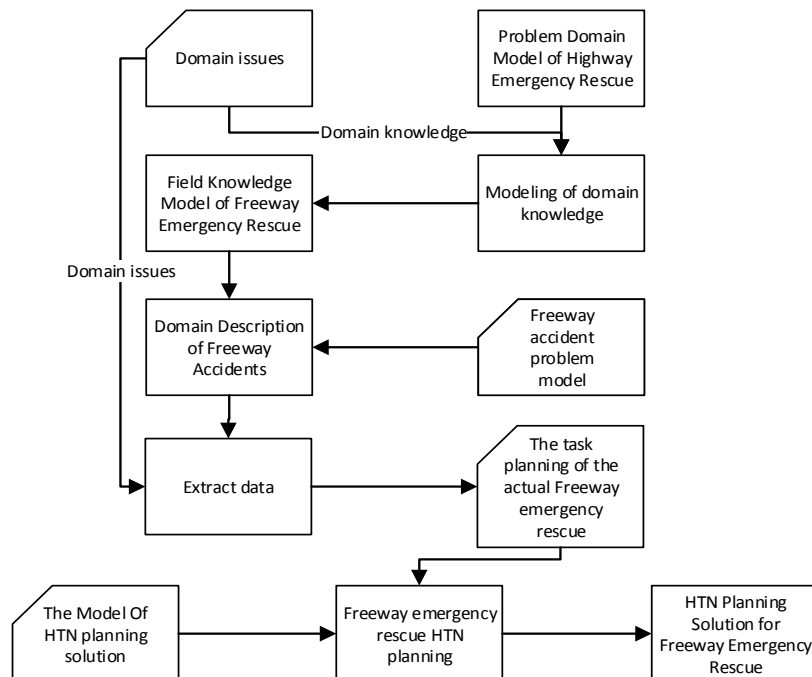
Figure 1   Highway HTN Planning Emergency Decision Process

The goal of the HTN planner is to recursively decompose the originally abstract top-level target task into a more and more specific sub-task sequence, and to achieve the desired effect of the top-level target task by executing this subtask sequence. The description of the problem domain by the HTN planner consists of a series of operators similar to the classical planner and a series of methods. Each method describes how to decompose from a high-level task into a low-level or atomic task. The process of HTN planning is to use the domain knowledge in related fields to gradually decompose top-level tasks into the simplest atomic tasks, and then get a complete plan for a task.

3 Practical Experiment of Highway Emergency Rescue Planning System

3.1 Case Introduction

In the summer of 2017, due to the slip and poor sight contributed by the heavy rain, two accidents occurred at the same time on a highway, which were located in the A1 and A2 sections. There are two highway maintenance points near the area, located at B1, B2. There are two kinds of resources needed for rescue, stones and ambulances. The resources required and owned by the two accident sites and highway maintenance points are shown in Table 1. The available time for occupied ambulances is shown in Table 2. Now the traffic police department needs to quickly formulate emergency rescue plans for these two accidents. In this case, multiple incident points are corresponded to multiple resource supply points, and the required resources include both consumable resources and reusable resources, which are consistent with the generality of the case. At the same time, this case has a resource shortage problem, which is targeted and can verify the characteristics of the planner developed in this paper. Therefore, this case was taken as an example to verify the effectiveness of the proposed method.

From Table 1, it can be seen that the consumable resource stone will have a gap of 120 tons. From Table 1 and Table 2, it can be seen that there are 8 currently available vehicles, and 4 vehicles will be released in 8 units of time at B1, and 1vehicle will be released in 12 units of time while 3vehicles can be released in 30 units of time at B2, which cannot be requisitioned within the required time. So there will be a gap of one vehicle. We hope to input the planning problem into the planner and obtain a final planning result that includes a resource shortage report in a short time, so that the superior department can find out the resource shortage problem in the rescue process and supply resources in time.

Table 1　Resource Requirements and Resource Status

	A1(demand, time)	A2(demand, time)	B1(reserve, time)	B2(reserve, time)
Stone (tons)	（220,10）	（300,15）	（200,0）	（200,0）
Ambulance	（6,10）	（8,15）	（3,0）	（5,0）

Table 2　Available Time for Ambulances (Reusable Resources)

	B1 (quantity, time)	B2 (quantity, time)
Ambulance	(4,8)	(1,12), (3,30)

3.2 Analysis of planning results

For the above situation, the planning problem P, encoded from the site conditions and rescue goals of the two disaster points according to the Planning Domains Definition Language (PDDL), is inputted into the highway emergency rescue mission planner. The planner will receive the emergency planning problem P and then automatically read the domain knowledge file method. After reading the two files, the planner can gradually decompose the highway emergency planning problem under the guidance of the method, and in turn obtain the emergency rescue plan for this accident.

The rescue plan is divided into two parts: the action plan and the resource shortage report. The action plan consists of a number of specific actions which is similar to (Inform traffic police to enter a1) and is in sequential order. Taking account of the accident site conditions and the resource situations in the highway maintenance points, the planner separately formulated the action plans for the traffic police and firefighting, the plans for traffic control and recovery, and the specific plans of resource scheduling for the two accident points. These plans fit the accident site conditions and can fully adapt to the accident site rescue. Andthe anticipated rescue goals will be achieved in accordance with each step of the action plan. Meanwhile, due to the shortage of resources in this accident, the planner also generated a resource shortage report, which consists of several statements similar to (lack b2 ambulance 1.0 15.0), detailing the types, quantities and times of resource shortage during the rescue process. From this report, we can see intuitively that there was a gap of 120 tons of stone and 1 vehicle at B2 at the 15th moment,

which is consistent with our previous analysis, and can provide a basis for the superior departments to quickly supply the response resources. This test shows that the planner is working properly. It not only generated a highway emergency rescue plan, but also successfully identified resource shortages by giving it in the form of a report. The action plan and the resource shortage report complement each other, and provide comprehensive guidance for the rescue work. At the same time, when testing repeatedly for this problem, the plan was completed within 3 seconds, which is an acceptable range for actual emergency decision-making.

4 Conclusion

The paper analyzed the drawbacks and weaknesses of traditional highway emergency planning methods or auxiliary decision-making systems.In addition, a highway emergency rescue mission planning system based on hierarchical task network planning has been developed. The system can generate a complete highway rescue plan that can guide the rescue process and the supply of resource shortage through the framework generation and specific parameters optimization of the emergency plan. At the same time, it can be seen that the entire planning time is less than 3S, which is an acceptable range for actual emergency decisions. In summary, this system can improve the efficiency and rationality of highway emergency rescue tasks planning and reduce the loss of personnel and property.

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Public Opinion Dissemination Model of Emergency in Universities Based on Immunology

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Abstract: Public opinion dissemination of emergency in universities impacts the normal order in universities, and damages the environment of education. Emergencies in universities have the characteristics of particular subject, social sensitivity and rapid diffusivity, which make the public opinion dissemination more complicated. This paper analyzes the process of public opinion dissemination of emergency in universities (PODEU) based on immunology, develops SIR model of PODEU, and simulates the influence from the number, intervention time, range and influence of real opinion leaders to PODEU. The results showed that cultivating more positive opinion leaders, enhancing the influence of positive opinion leaders, and giving opinion to PODEU as soon as possible will be beneficial to control PODEU.
Key words: Public opinion dissemination of emergency in universities (PODEU); Immunology; SIR model; Real opinion leaders

1 Introduction

In some countries, emergencies in universities are considered to be a specific subset of the field of emergencies in the general sense. Since 1990s, the theories of system security and non-traditional security were appeared, at the same time, crisis management began to enter the field of public management and the campus (Siegel D, 1991). *A Practical Guide for Crisis Response in Our Schools* written by Mark D Lerner and others was considered to be more authority in the campus emergency research, which is known as "a set of comprehensive response plan of campus crisis" (Mark D Lerner, 2003).

Emergency in universities refers tothe emergencies that suddenly erupts and do not follows managers expect, which is because of social environment, natural or man-made factors, and causes damage or threat to society, universities and individual (Li Xincang, 2015). Emergency in universities is a kind of public emergency. Therefore, it has the same characteristics of public emergency, such as sudden, complexity, destructive, variability, etc. In addition, it has its own characteristics on account of its manning and management style.

a. Personnel specificity

The subject in universities can be divided to 2 parts, teachers and students. In universities, especially in emergencies, students are the main subject no doubt. In new period, students have the characteristic of full of vigor so that they are full of knowledge and thought, concerned with social, political and economic development, active and open in thinking, enthusiastic, competitive and curious. However, they also have the characteristics of scarce social experience, immature thought, poor ability to resist setback and distinguish right from wrong, so that they are easily affected by external environment and bring forth aggressive behavior and universities become the social organization of more emergencies.

b. Social sensitivity

Universities are bearing the duty of education, carrying hopes of thousands of families, and the focus of the government, society and media. Once emergency erupts, it will inevitably generate a strong social response and arouse the attention of the whole society. Furthermore, it is very easily impacted by external environment and other related factors, and interact with the outside world to blow up and radiate to become bigger social emergency.

c. Rapid diffusivity

The number of students in universities is generally over ten thousand, even tens of thousands. Almost all the students live in the campus so that it has very big crowd density and homogeneity. Once emergency erupts, negative information can spread easily and rapidly, which urges public opinion to be group action. Especially in the network period, if emergency in universities is not controlled timely, it will be the focus of public opinion because of the information including pictures, words and videos spreading rapidly on all the kinds of new media by students. Highly concentrated physical distance in

universities and spreading rapidly information in new media, form obvious online and offline public opinion coupling network.

With rapid development of network technology, the network has gradually become the main platform for people to exchange ideas, transmit information and spread ideas, and also the main carrier of public opinion of emergencies. In recent years, the research on public opinion of emergencies mainly focuses on communication mechanism (Chen Bo, 2011), monitoring mechanism (Fan Liguo, 2010), early-warning technology (Jianhua Ruan, 2007), etc. From the literature review, the research of PODEU mainly focuses on the perspective of social science and the qualitative description of public opinion evolution mechanism, rarely on the simulation analysis about characteristics of PODEU (Li Zhongchun, 2014) (Huang Youfa, 2011). There is no research on PODEU based on immunology from the existing research results. This paper analyzes the process of PODEU based on immunology, develops SIR model, and simulates the influence from the number, intervention time, range and influence of real opinion leaders to PODEU.

2 The process of PODEU

The agents of PODEU consist of students, online opinion leaders (online media and We-Media) and offline opinion leaders (propaganda department and counselors). The process of PODEU can be abstracted that students release opinions under the joint action of online and offline opinion leaders.

Some scholars have studied emergencies based on immunology (Yang Qing, 2015) (Zhu Hengmin, 2016). In this paper, immunology is applied to the study of PODEU. The states of students can be summarized as three kinds. The first kind does not release opinions, which is identified as susceptible state (S). The second releases negative opinions influenced by negative public opinion, and to be identified as infected state (I). The third releases positive opinions in the influence of positive public opinion, and is considered recovered state (R).

Figure 1 shows the process of PODEU. When emergency in universities begins, t=0, negative online opinion leader A releases rumor, as all the 8 students are susceptible state.

When t=1, student 1, 3, 5 and 6 turn infected state (I) from susceptible state (S), and release rumor in the influence of A, which forms public opinion.

When t=2, positive offline opinion leader B releases opinion by the way of mainstream media and communication with students, which can be considered immunization. Student 5 and 6 turn recovered state (R) from infected state (I); student 3 and 4 turn R from S; student 1, 2, 4 and 7 are immunity failure. Therefore, student 1 and 4 still keep I, student 2 turns I from S, as student 7 is still S.

When t=n, all the students are R or S, and the public opinion comes to the end.

（a）t=0 （b）t=1

（c）t=2   （d）t=n
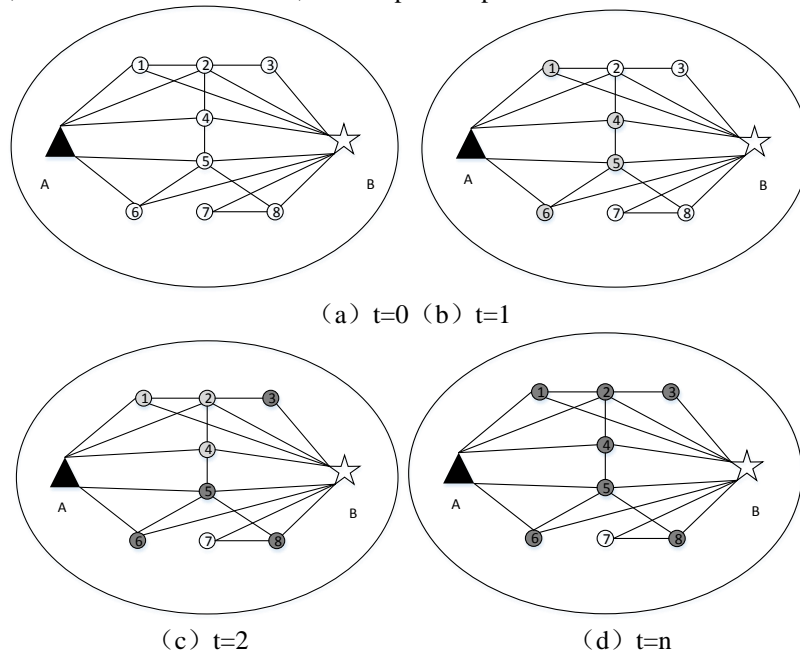
Figure 1   Process of PODEU

3 The SIR Model of PODEU

3.1 Modeling Assumption

The SIR Model of PODEU consists of 3 kinds of agents, which are students, online and offline opinion leaders. This paper proposes assumptions as follows before modeling by Netlogo:

a. All the online opinion leaders release negative information and all the offline opinion leaders release positive information.

b. Every student can be influenced at different levels by online information and offline information, and the level is considered susceptible level (SL). The SL of every student is random in a certain range by system.

c. Initial number, range and influence of all the agents have been known, and the scale of agents has been certain.

d. The attribute of all the agents updates every tick at the same time.

3.2 The attribute of the Agents

The attribute of the 3 kinds of agents is showed as Table 1.

Table 1   Attribute of the Agents

	Agents		
	Students	**Online Opinion Leaders**	**Offline Opinion Leaders**
Attribute	State of Susceptible State of Recovered Susceptible Level (SL) Influence Range Influence Level	Tendency Influence Range Influence Level	Tendency Influence Range Influence Level

3.2.1 Attribute of the Students Agents (SA)

The function of the attribute of the student agent s_i is $F[I_{s_i}(t), R_{s_i}(t), E_{s_i}(t), S_{s_i}(t), A_{s_i}(t)]$, where $I_{s_i}(t)$ shows the state of susceptible of s_i at t, $I_{s_i}(t) \in \begin{cases} [0,0.5) \text{ state of S} \\ [0.5,1] \text{state of I} \end{cases}$. At t=0, the number of the state of susceptible of all the SA is 0.

$R_{s_i}(t)$ shows the state of recovered of s_i at t, $R_{s_i}(t) \in \begin{cases} [0,0.5) \text{ state of S} \\ [0.5,1] \text{ state of R} \end{cases}$. At t=0, the number of the state of susceptible of all the SA is 0. When $R_{s_i}(t) \in [0,0.5)$, SA have low immunity and still stay the state of S or I. When $R_{s_i}(t) \in [0.5,1]$, SA have become the state of R and can't be influenced by negative information. At the same time, $I_{s_i}(t) = 0$.

$E_{s_i}(t)$ shows SL of s_i at t and values in the [0,1] , which does not change in the process of PODEU. A higher value of $E_{s_i}(t)$ indicates the more likely the students are infected or recovered, and the more likely they are influenced by others in the process.

$S_{s_i}(t)$ shows the influence range of s_i to others and $S_{s_i}(t) \in [0,5]$. A higher value of $S_{s_i}(t)$ indicates a higher influence range of s_i to others.

$A_{s_i}(t)$ shows the influence level of s_i to others and $A_{s_i}(t) \in [0,1]$. A higher value of $A_{s_i}(t)$ indicates a higher influence level of s_i to others.

3.2.2 Attribute of the Online Opinion Leader Agents (ONOLA)

The function of the attribute of the online opinion leader agent n_i is $F[T_{n_i}(t), S_{n_i}(t), A_{n_i}(t)]$, where $T_{n_i}(t)$ shows tendency of n_i to emergency in universities. Based on assumption a, $T_{n_i}(t) = 0$.

$S_{n_i}(t)$ shows the influence range of n_i to SA and $S_{n_i}(t) \in [0, +\infty)$. A higher value of $S_{n_i}(t)$ indicates a higher influence range of n_i to SA.

$A_{n_i}(t)$ shows the influence level of n_i to SA and $A_{n_i}(t) \in [0,1]$. A higher value of $A_{n_i}(t)$ indicates a higher influence level of n_i to SA.

3.2.3 Attribute of the Offline Opinion Leader Agents (OFFOLA)

The function of the attribute of the offline opinion leader agent r_i is $F[T_{r_i}(t), S_{r_i}(t), A_{r_i}(t)]$, where $T_{r_i}(t)$ shows tendency of r_i to emergency in universities. Based on assumption a, $T_{r_i}(t) = 1$.

$S_{r_i}(t)$ shows the influence range of r_i to SA and $S_{r_i}(t) \in [0, +\infty)$. A higher value of $S_{n_i}(t)$ indicates a higher influence range of r_i to SA.

$A_{r_i}(t)$ shows the influence level of r_i to SA and $A_{r_i}(t) \in [0,1]$. A higher value of $A_{r_i}(t)$

indicates a higher influence level of r_i to SA.

3.3 The Interaction Principal among Agents

3.3.1 The Influence Principal of ONOLA to SA

At t, ONOLA has a negative impact on SA in the state of S in the influence range. At t+1, the state of susceptible of SA is

$$I_{s_{i+1}}(t) = I_{s_i}(t) + E_{s_i}(t) \times A_{n_i}(t) \times (S_{n_i}(t) - d_{ns}) \tag{1}$$

where d_{ns} is the distance from ONOLA n_i to SA s_i. When the state of SA is I or R, ONOLA have no impact on SA.

3.3.2 The Influence Principal of OFFOLA to SA

At t, OFFOLA has a positive impact on SA in the state of S or I in the influence range. At t+1, the state of recovered of SA is

$$R_{s_{i+1}}(t) = R_{s_i}(t) + E_{s_i}(t) \times A_{r_i}(t) \times (S_{r_i}(t) - d_{rs}) \tag{2}$$

where d_{rs} is the distance from OFFOLA r_i to SA s_i. When the state of SA is R, OFFOLA have no impact on SA.

3.3.3 The Influence Principal of SA to SA

At t, SA in the state of I s_j has a negative impact on SA in the state of S or I in the influence range. At t+1, the state of susceptible of SA is

$$I_{s_{i+1}}(t) = I_{s_i}(t) + E_{s_i}(t) \times A_{n_i}(t) \times (S_{n_i}(t) - d_{ss}) \tag{3}$$

where d_{ss} is the distance from SA s_j to SA s_i.

At t, SA in the state of R s_j has a positive impact on SA in the state of S or I in the influence range. At t+1, the state of susceptible of SA is

$$R_{s_{i+1}}(t) = R_{s_i}(t) + E_{s_i}(t) \times A_{r_i}(t) \times (S_{r_i}(t) - d_{ss}) \tag{4}$$

where d_{ss} is the distance from SA s_j to SA s_i.

4 Results

Based on the attribute and the interaction principal above, the SIR model of PODEU is established by Netlogo as shown in Figure 2, and the number of all the agents can be changed. SA are shown by the turtle of the person shape, in which white turtles are representative of SA with the S state, blue are I, and red are R. ONOLA are shown by the turtle of the blue sad face while OFFOLA are the red happy face.
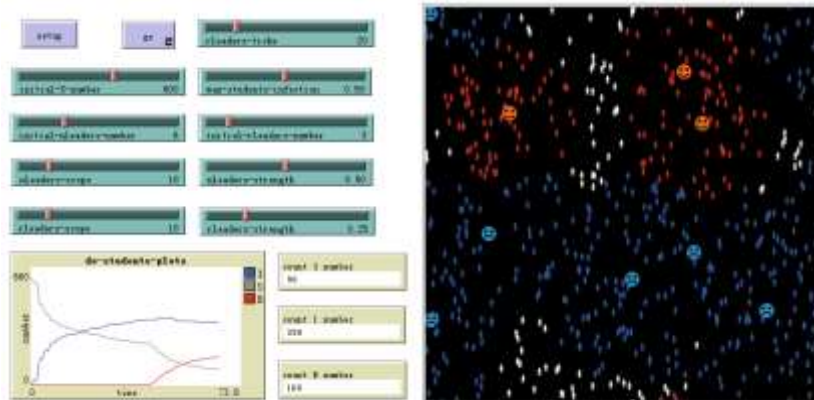
Figure 2   SIR Model of PODEU

4.1 The Impact of the number of OFFOLA to PODEU

The initial condition of a PODEU is assumed as follows: the number of SA with S state is 600, the SL of SA is random in [0,0.5], the influence range is 3, and the influence level is 0.1; the number of ONOLA is 6 with the influence range 10 and the influence level 0.5; the number of OFFOLA is 0, 3, or 6 with the influence range 10 and the influence level 0.5, and intervention time is 20th ticks. The results are shown as Figure 3(a)-(c). A bigger number of OFFOLA indicates a smaller peak of the opinion of emergency in universities, a faster increase of the students with positive opinions, a shorter time for controlling opinion, and better to interdict PODEU.
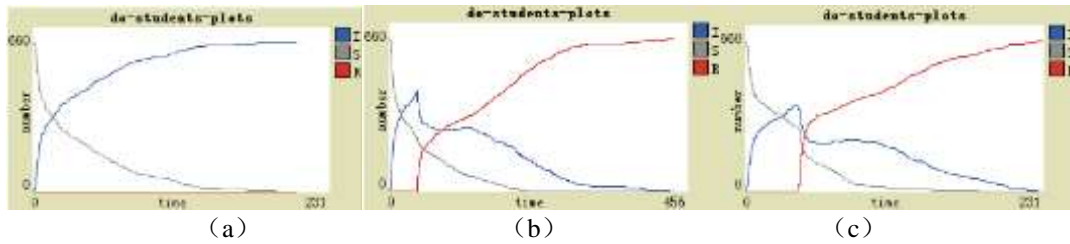
Figure 3   Impact of the Number of OFFOLA to PODEU

4.2 The Impact of the intervention time of OFFOLA to PODEU

The initial condition of a PODEU is assumed as same as 4.1 except that the number of OFFOLA is 3, and intervention time is 0th, 20th and 40th ticks. The results are shown as Figure 4(a)-(c). An earlier intervention time of OFFOLA indicates a smaller peak of the opinion of emergency in universities, a shorter time for controlling opinion, and better to interdict PODEU.
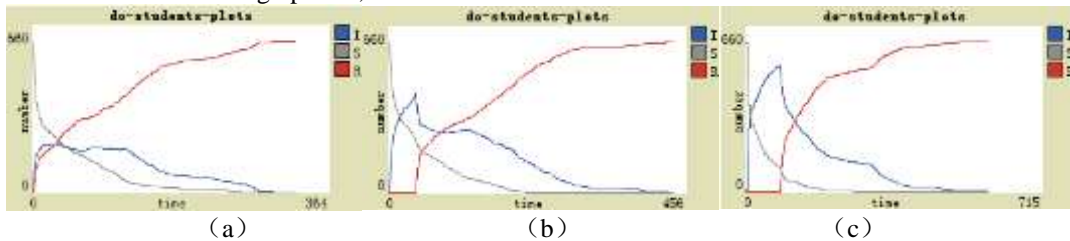
Figure 4   Impact of the Intervention Time of OFFOLA to PODEU

4.3 The Impact of the influence range of OFFOLA to PODEU

The initial condition of a PODEU is assumed as same as 4.1 except that the number of OFFOLA is 3, and the influence range is 5, 10 and 15. The results are shown as Figure 5(a)-(c). A larger influence range of OFFOLA indicates a smaller peak of the opinion of emergency in universities, a shorter time for controlling opinion, and better to interdict PODEU.
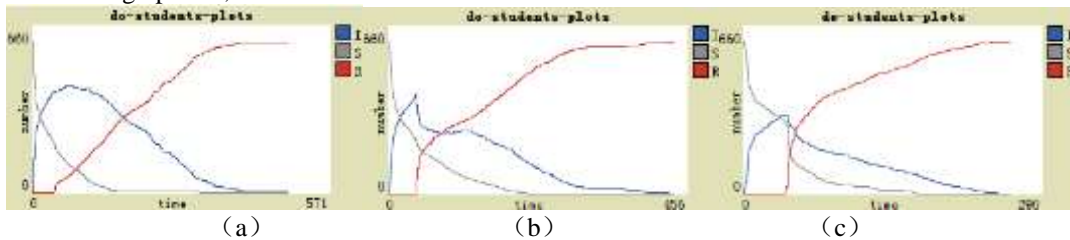
Figure 5   Impact of the Influence Range of OFFOLA to PODEU

4.4 The Impact of the influence level of OFFOLA to PODEU

The initial condition of a PODEU is assumed as same as 4.1 except that the number of OFFOLA is 3, and the influence level is 0.2, 0.5 and 0.8. The results are shown as Figure 6(a)-(c). A larger influence range of OFFOLA indicates a faster increase of the students with positive opinions, a shorter time for controlling opinion, and better to interdict PODEU.
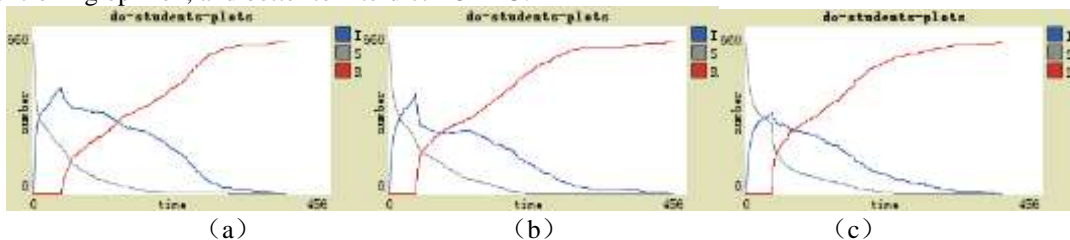
Figure 6   Impact of the Influence Level of OFFOLA to PODEU

5 Conclusion

It is very important to control PODEU for the safety and stabilization. Based on the results, it will be better for controlling PODEU to cultivate more OFFOLA, increase their influence and intervene

earlier.

Acknowledgement

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Methods and Theories of Psychological Factors in Emergency [*] Logistics in Post-disaster: A Brief Review of Literature

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Abstract: The frequent occurrence of emergencies has made people aware of the importance of emergency management and emergency logistics is on disaster relief. However, in therelative research, few people consider the psychological factors. This article reviews and analyzes relevant literature on human psychological factors in emergency logistics in post-disaster,then proposes that the psychology of both disaster victims and decision makers will affect the implementation of disaster relief andaffect the entire process of emergency logistics. In the emergency evacuation, abnormal psychology caused by individual and environmental factors can affect evacuation results. In the emergency materials distribution, the risk perception caused by rescue supplies and waiting time. In the post-disaster reconstruction, the psychological recovery is related to the perceived waiting time for reconstruction.
Key words: Large-scale emergencies; Psychological factors; Emergency logistics; Risk perception

1 Introduction

In recent years, with the destabilization of international economic development and the damage of environment, natural and man-made emergencies have frequently occurred in all countries of the world and have both shown an upward trend, such as the "9.11" terrorist attacks in the United States in 2001, SARS epidemic in China in 2003, large-scale tsunami in the Indian Ocean in 2004, hurricane Katrina in the United States in 2005, Greece forest fire in 2007, China Wenchuan earthquake in 2008 and snowstorm in South China, Japan's nuclear radiation incident in 2011, Tianjin explosion in 2015 and so on. The occurrence of these large-scale emergencies has caused a great deal of loss of life and property, and has also brought great challenges to national security and social stability. How to deal with these challenges has become a major issue for all countries.

When a disaster event occurs, rescue workers need to respond quickly to make scientific rescue decisions, timely evacuate and safe transferof victims from the disaster site to temporary resettlement sites or medical rescue sites for medical assistance, and choose a reasonable path and program of material deployment relief materials such as food, medicine, and tents were distributed to the victims in a timely manner so as to reduce casualties after the disaster. At present, many scholars in this field have established a very complete theoretical system.In emergency evacuation, HAMZA-LUP G L et al.(HAMZA-LUP G L, 2007)developed an intelligent traffic evacuation management system for the role of modern intelligent transportation systems in the emergency evacuation of emergencies; In emergency supplies distribution, Du Lijing (Du Lijing, 2015) studied the multi-objective and multi-cycle dynamic emergency vehicle distribution vehicle routing problem, a mixed integer programming model for multi-objective and multi-period open vehicle routing problems was established; In the post-disaster reconstruction of reverse logistics, Guo Jingbo (Guo Jingbo, 2013) based on the basic principles of system dynamics, established the ISM model of influencing factors of emergency reverse logistics, and from the aspects of transport resources, inventory resources, and lack of materials due to untimely recovery caused by reusable materials at certain recovery rates. A comprehensive analysis of rescue satisfaction was conducted, and a system dynamics model for reusable material recovery frequency and rescue satisfaction was established.

All the above-mentioned Literatures have made a very meaningful exploration of emergencies and emergency logistics. However, they rarely consider the influence of human psychology, that is, the mentality of decision makers and victims on the effectiveness of emergency logistics. Because emergencies are sudden, unpredictable and destructive, and post-disaster rescue operations have the characteristics of delayed response time and restricted materials, after a disaster occurred, the affected people often bear tremendous psychological pressure and it throughout the entire process like

emergency evacuation, waiting for rescue and post-disaster reconstruction.It is manifested as tension, panic, and this kind of mentality is spread. If it is not properly dealt with, it will lead to extreme behaviors, produce a huge negative public opinion effect and make the impact more than its owns. In addition, decision-makers play a decisive role in the effectiveness of the rescue process in emergency management of disaster incidents. The psychological factors of decision makers will influence the decision-makers' judgment. In previous studies, it was assumed that the decision-makers were completely rational, ignoring the actual rescue. The influence of the decision makers' psychological factors on their decision-making behavior significantly deviates from the optimal solution under calculation, making it difficult to achieve good results when the traditional emergency logistics optimization research results are applied in actual rescue activities.

Therefore, in the process of emergency logistics research, it is necessary and practical to consider the impact of the psychological factors of disaster victims and decision-makers on the effectiveness of emergency logistics. More and more scholars have begun to put disaster victims and decision makers' mentality in the process of emergency logistics. This article summarizes relevant literatures on the human psychological factors in the process of emergency logistics evacuation, material distribution, and post-disaster reconstruction.

2 Psychological Factors in Emergency Evacuation

Emergency evacuation is an effective measure for disaster risk reduction control of sudden crisis events, and it has been a research hotspot for many scholars at home and abroad. However, under the circumstance that the research on emergency evacuation has been relatively thorough and comprehensive, the literature that considers the influence of psychological factors is relatively few and studies only the psychological factors of the evacuees, but does not consider the decision-makers' mentality. When faced with emergencies, due to the stimulation of the external dangerous environment, especially the interference of panic emotions, personnel may easily lose normal mental and behavioral patterns in the evacuation process, leading to the misjudgment of sudden disasters and further irrationality. Harrie C.M. Vorst (VORST H C M, 2010) believes that evacuation models that take into account human behavioral and psychological impacts are more effective. He explores some of the key variables in disaster psychology, and believes that these variables can enhance prediction of human's evacuationbehavior.

In the emergency evacuation process, the psychology of the people to be evacuated is affected by many factors. Zhang Zhihong et al. (Zhang Zhihong, 2013) used statistical methods to analyze the anxiety status of 645 displaced people who had been resettled after the flood and analyzed the relationship between age, gender, smoking, history of hypertension, and SAS scores, then obtained the anxiety level of the post-flood population and its influencing factors. Mu Nana et al. (Mu Nana, 2013) conducted a random survey of subway passengers through questionnaires. It was concluded that factors such as the passenger's gender, baggage status, education level, and safety knowledge had a significant impact on the psychological and behavioral responses of evacuees. Zhou Jian et al. (Zhou Jian, 2014) conducted a questionnaire survey of people's panic in the evacuation of road tunnels, and suggested that evacuation mental behavior was significantly related to gender, education level, fire education level and other factors. Yang Libing (Yang Libing, 2012) investigated and studied the evacuation behavior and psychological characteristics in the case of fire. He conducted 182 employee field surveys on the environment, management, and human factors. Through system cluster analysis, he obtained typical factors and established a test based on the Chi-square test. The evacuation influencing factors contingency table was used to analyze the evacuation behavior and psychological characteristics of fires from different aspects of enterprises, gender, age, and education level. In addition, Xiong Lichun (Xiong Lichun, 2015) used the E-Prime software to simulate the fire environment and recorded the emergency response process of the tested person under conditions of no stimulation, acoustic stimulation, light stimulation, and acousto-optic stimulation. The changes in physiological indicators such as heart rate, electrocardiogram, and blood pressure under various scenarios were analyzed, and the relationship between the physiological activities of the subjects and the subjects was analyzed. The results show that the acousto-optic stimuli have a significant effect on the response rate and response proneness of the personnel under emergency evacuation, causing the staff to generate tension, panic, and aggravating herd behavior that occurs under panic attacks.

By summarizing the relevant literature, it can be concluded that the factors that generally affect the psychology of the victims and their ways of action in the emergency evacuation processare shown in

Table 1.

Table 1   Psychological Factors in Emergency Evacuation

Process	Influencing Psychological Factors		Impact Method	Related Literatures
Emergency Evacuation	Individual	Age	Older people and children are more likely to panic than young people	Ge Xiaoxia (XIAO-XIA G E, 2011), Zhang Zhihong (Zhang Zhihong, 2013), Mu Nana (Mu Nana, 2013), Zhou Jian (Zhou Jian, 2014), Li Xun (Li Xun, 2012),Yang Libing (Yang Libing, 2012), Xiong Lichun (Xiong Lichun, 2015), et al.
		Gender	Women are more likely to panic than men	
		Safety Education	The higher degree of education, the greater the degree of psychological stability	
		Related Experience	No related experience is more likely to panic	
		Carrying Luggage	The heavier the baggage, the easier it is to panic	
		Injury Situation	The more serious the injury is, the more likely it is to panic	
	Surroundings	Personnel Density	Too large and too small can cause panic	
		Evacuation Environment	The more complex the environment, the more easily panic	
		Location of Accident	The farther away from the escape location, the easier it is to panic	
		Export Visibility	The lower the visibility, the easier it is to panic	
		Personnel Guidance	No personnel guidance can cause panic	
		Sound and Light Stimulation	Sound and light stimulation can cause panic	

Although the above literature makes a detailed analysis of the psychological influence factors to be evacuated in the emergency evacuation process, most of the data collection methods are based on questionnaires, the data samples are few. What is more, the scientific and reliable quantitative analysis of various influencing factors is lacking, the mathematical model of the mode of action is not established.

After a disaster occurred, due to conditions such as related resources and safety, the evacuees often need to wait at the accident site, and therefore a waiting price will be incurred in the evacuation process. Cui Xuan (Cui Xuan, 2014) and Zhi-Hua Hu (Zhi-Hua Hu, 2014) established emergency evacuation function model of wounded in disaster area under the influence of psychological cost. The difference is that Cuiused multi-attribute utility theory to establish the basic information measurement function of age, gender, knowledge structure, evacuation experience, measurement function of injury physiological condition, and measurement function of waiting psychological cost affected by time. Encode the model with CPLEX for the casualty evacuation allocation scheme. While Zhi-Hua based on the minimization of psychological punishment costs caused by panic, the cost of psychological intervention and the costs associated with transportation and construction shelters, a new mixed integer linear programming scheme was constructed for multi-step evacuation and temporary placement.Regrettably, Cui did not consider factors such as the disaster level of the source point, the real-time road conditions, and the intersection congestion.

When the waiting time for the evacuees is too long and exceeds a limit, panic will occur. In previous studies, panic psychology was used as a correction factor in the evacuation behavior model. Only the significance analysis was used to determine the influencing factors of panic psychology, and there was no systematic analysis and quantitative analysis of the psychological influencing factors of emergency evacuation panic. The social force model is a commonly used method for studying evacuation behavior. Based on the theory of group dynamics, Helbing (Helbing, 2002) studied the dynamics of people's evacuation behavior in a panic state, pointed out that evacuation under panic conditions, friction between people, and the social force model were different from those in daily life. Therefore, many scholars have improved the social force model under normal conditions and conducted qualitative and quantitative analysis of panic psychology. Wang Chunxue (Wang Chunxue, 2015) conducted a questionnaire survey on the influencing factors of subway evacuation panic. The degree of panic was quantified in combination with the ergonomic social force model anxiety factor correction, and the subway emergency evacuation panic degree model was established. Finally, according to the simulated test data, the relevant accident experience factors in the model are revised to obtain the final

optimization model of subway emergency evacuation panic. Innovation lies in the questionnaire consisted of a panic factor questionnaire and a panic psychological scale. The scores of the scales reflect the panic levels of people under the influence of different panic levels. And correlative analysis was carried out to obtain the weight value of the influencing factors of panic level. But the disadvantage is that the data sample points are less. What is more, Di Yue (Di Yue, 2017) analyzed the factors that affect the psychological stress level of a person in a fire situation, models various types of factors, and established a psychological panic model of people with comprehensive consideration of multiple factors and characteristics of panic attacks. The using of personnel psychological pressure model to improve the social force model and get a new social force model considering the psychological pressure of personnel. The innovation lies in calculating the cumulative panic psychology and establishing an evacuation perception model considering its physiological characteristics and psychological characteristics. The downside is the lack of analysis of real data. In addition, Fang Li (Fang Li, 2014) used the Java simulation language written in the Any Logic simulation software to facilitate research on passenger panic propagation mechanisms and build a multi-agent evacuation simulation model that takes passengers' psychological pressure into consideration. In this model, innovatively predicting the sudden change of emotional changes in the actual emergency by considering the residence time, population density and exit distance.

The panic of the victims will spread to each other, and some scholars have made a quantitative study of the degree of contagion of panic. Wang Jinghong (Wang Jinghong, 2013) studied the spread of panic emotions and their impact on evacuation during large-scale crowd evacuation in terms of evacuation guidance. Using the method of system dynamics, a qualitative simulation model for large-scale crowd evacuation was constructed. By implementing various input schemes for the model, it was discovered whether the panic control or out-of-control condition occurred due to the increased disaster atmosphere during evacuation guidance. The law of change and the spread of panic among people in a disaster atmosphere, are more often result of dominant emotions. It reveals the characteristics of panic sentiment that is very prone to large-scale crowd evacuation and its impact on evacuation.Regrettably, the leaders who are actually likely to exist in the evacuated population and their impact on the normal and panic populations are not taken into account in the model. What is the mutually reinforcing relationship between leaders and evacuation guidance, and how the existence of leaders affects the behavior patterns of the normal population and the panic population. Zhi-hua Hu (Zhi-hua Hu, 2014) innovatively established SIR model was used to analyze the extent of panic spread. Psychological intervention was used to reduce the extent of panic and panic spread. A mixed-integer linear programming model with the goal of minimizing the costs associated with psychological penalty costs, psychological intervention costs, and traffic and building shelters was constructed for multi-step evacuation and temporary placement.

The infectivity of the mind not only affects the mood of the person to be evacuated, but also affects the individual's decision-making. Under the influence and pressure of groups, individuals will no longer insist on their own opinions because of lack of understanding and experience of certain behaviors, which will create a herd mentality. However, this kind of psychological certain evacuation environment will cause more serious casualties. Li Changyu (Li Changyu, 2016) elaborated on the application of Agent theory in urban rail transit stations, influencing factors of emergency evacuation behavior, herd behavior in emergency evacuation, social force model and other emergency evacuation theories, based on the example of subway stations. From the aspects of evacuation personnel attributes, physical model establishment, and simulation experiment design of the simulation model, the herd behavior was simulated in the emergency evacuation of urban rail transit, and the influence of herd behavior on emergency evacuation was analyzed based on the simulation results. The results of simulation experiments show that moderate herd mentality can play a beneficial role in reducing response time and guiding evacuation direction; conversely, excessive blindness can only lead to an increase in evacuation time and a decrease in evacuation efficiency. However, only the influence of herd mentality on evacuation results has been studied. The relationship between panic factors and herd behavior has not been established, and qualitative and quantitative research on the factors influencing herd behavior has been lacking.

3 Psychological Factors in Emergency Logistics Distribution

Material distribution after disasters is an important part of disaster relief. In the dispatch of emergency supplies, the psychological factors of disaster victims and decision makers are both

important factors that need to be considered. If the distribution of emergency supplies takes too long or the distribution is unbalanced, it will cause psychological bias and panic among the disaster victims. The greater negative impact comes from wrong decisions. At the same time, the decision-making behaviors made by decision makers have a significant impact on the operational effectiveness of the entire supply chain system, especially in the decision-makers' different decision preferences. Therefore, based on the research results already obtained in the field of psychology, how to apply the psychological theory of disaster victims and decision makers to the emergency logistics process has gradually become a new hot spot.

3.1 Disaster victims psychological factors

In the formulation of the emergency material dispatching plan, taking into account the psychology of the disaster-hit people and optimizing them to reach the expected value of the disaster victims, it will help the emergency relief work to be carried out in a timely manner and reduce the loss of life and property. In addition to the emergencies themselves, the victims of risk perception are also affected by many factors. Weber (Weber, 2001) reviewed three risk perception paradigms and discussed the impact of human subjective information, cultural factors, and emotional responses on risk perception. In response to the incident, Peng S Q (Peng S Q, 2004) proposed a fear source element, a social element and a self-element. Shi Kan et al. (Shi Kan, 2003) talked SARS as an example to establish a public risk perception structural equation model, and explored and discovered some of the elements that affected panic.Sheu (Sheu, 2014) proposed a conceptual model of the post-disaster survivors' perception-attitude-recovery relationship, conducted normative analysis, established a service distribution optimization modeconsideringspecific classification attitude function for survivors, and established post-disaster relief—a centralized logistics distribution with maximum resilience for survivors.

A large part of the public's perception of risk is due to the scarcity of relief supplies and the panic that cannot be obtained in time for emergency supplies. In large-scale emergencies, supplies are often allocated to less than demand, and the individual needs of disaster victims are difficult to meet. Coupled with regional characteristics, the differences in the amount of material distribution and arrival time, the misunderstandings of victims, and the temptation of rumors, all will result some victims produceunbalanced psychologically and psychological comparisons, even result some irrational behaviors that looted the supplies. Aimed at the first batch of emergency materials distribution problems in multi-supply points in large-scale earthquake disasters,Wang Xuping (Wang Xuping, 2016)established an emergency material distribution modelbased on the irrational comparison mentality of disaster-affected people in disaster-stricken areas. The model was solved using the simulated plant growth method, and the effectiveness of the model and algorithm was demonstrated by examples. Reflecting the reality that the first batch of emergency materials may be unevenly distributed. In addition, due to the spread of panic psychology, in order to avoid some undesirable public opinion effects, Zhang Nana (Zhang Nana, 2016) established the corresponding emergency supplies quantity comparison function and emergency supplies distribution time comparison function in consideration of the irrational comparison of disaster victims. A model for the distribution of emergency supplies in such disasters was constructed. Finally, a heuristic simulation plant growth algorithm for the corresponding model was designed.

In order to make rescue supplies reach the expected mentality of the disaster victims, Chen Leilei (Chen Leilei, 2010) established an emergency material management and dispatching model based on the satisfaction level of the disaster-stricken people in the supply of emergency supplies at the supply point in the event of a large-scale emergency that is less than the demand for emergency supplies at the emergency point. Combining the characteristics of large-scale emergencies, the model is set to be an optimized scheduling model for multi-materials, multiple modes of transport, and multi-vehicles that enable limited resources to be dynamically changed in response to dynamic changes in multiple periods and based on different emergency points. Different weighted value is introduced to the importance of material requirements, so that the allocation of limited resources at the initial stage of emergency rescue can achieve the overall maximum satisfaction.

After the occurrence of emergencies, the public was more sensitive to the timeliness of emergency supplies dispatch. Wang Haixin (Wang Haixin, 2016) subdivided individual factors, event factors, and social factors that constitute a panic psychological perception after the earthquake, without considering other factors and aftershocks. Under the premise of selecting the representative age structure and education background of the affected people, the damage degree of the emergency event and the perceived time of the affected person, the panic psychology was described; on this basis, the disaster

clustering theory was used to divide the affected area. The extent of damage in the region, the parameters of the damage factor, the panic utility coefficient of the individual's characteristics, and the value function of the prospect theory are used to describe the psychological perception time of the affected person, and the effect of perceiving the target based on the panic psychology and the damage coefficient is established. Target, multi-objective emergency material distribution planning model based on the Gini coefficient fair objective. Finally, the variable neighborhood ant colony algorithm program is designed with examples and the model is solved to verify the validity and applicability of the model. However, in this model, it is assumed that each disaster-stricken point only accepts the assistance of a single temporary rescue point. But in actual rescue, it is often the case that multiple temporary rescue points simultaneously rescue multiple disaster-affected points.

In response to emergencies of emergency material distribution and scheduling, the behavioral science and dynamic scheduling methods are introduced into the emergency materials optimization distribution model. Decision makers can formulate corresponding material distribution plans according to the degree of psychological risk perception of disaster victims after emergencies. Many scholars realize that the prospective theory can be used to quantify the psychological risk perception of the victims.Among them, Wang Xuping (Wang Xuping, 2013) and Ma Chao (Ma Chao, 2012) both defined and selected the public psychological expectation time as the time reference point, and obtained the risk perception curve and function model and established a mixed integer programming model aiming at minimizing public psychological risk perception and material unsatisfaction. The final numerical simulation of the corresponding multi-level search algorithm is designed to verify the validity of the model and algorithm. The innovation lies in the use of behavioral operations to integrate it into the distribution of materials. The characteristics of real-time changes in emergencies and the ubiquitous capacity shortage are optimized to optimize the emergency materials dispatching method, which makes it more dynamic and more realistic.

In addition to the distribution and dispatch of emergency supplies, the design of emergency logistics supply networks is crucial. How to consider the psychological factors of the victims in the emergency supply network is also realistic and necessary, but few studies. Sheu (Sheu, 2014) designed the emergency logistics supply network to quantify the psychological costs of disaster victims. Based on the demand, she proposed a design solution to integrate emergency supply networks seamlessly through the integration of three sub-networks of evacuation, medical care, and distribution, and three sub-networks. The connection of the latter network is based on the former arrangement, and a three-phase multi-objective mixed-integer linear programming model is established based on which the total travel distance, the operating cost, and the psychological cost are minimized. It makes up for the lack of research in this area.

The panic of the victims is spread. If they are not dealt with correctly, they will cause negative public opinion effects. For the spread of public opinion may lead to resources snapping, Wang Zhiying (Wang Zhiying, 2016) first defined the scheduling problem through multi-case analysis, that is，the optimal scheduling problem of multi-supply, multi-distribution, multi-demand, and multi-resource flows that features capacity expansion.Then, taking into account the limited rationality of the public, the risk perception behavior was characterized using prospect theory, and the definition of reserve supply rate was given to characterize the preference behavior of decision makers when dealing with public risk perception. Further, by presenting research hypotheses and using prospect theory to represent the public's retrospective supply of resources, taking into account the expansion of the capacity of supply points and distribution centers, a multi-source emergency optimization scheduling system under the context of public opinion transmission is constructed. It provides theoretical support for decision makers to identify the public's risk perception characteristics in the context of public opinion communication and the emergency resource dispatching means to control the occurrence of resource snapping events.

In addition, some scholars consider the impact of the both psychological costs of disaster victims waiting for evacuation at the disaster site and waiting for relief supplies within the resettlement site. Lin Qingfu (Lin Qingfu, 2015) aimed to minimize the economic cost of disaster relief and minimize the psychological penalty costs of the disaster victims. A mixed-integer planning model for the evacuation of quake victims and the distribution of relief supplies was used to determine the short-term disaster supply locations, evacuation of evacuees, and transportation plans for relief supplies, and a specific example was used to validate the proposed model. However, the shortcoming is that only the single disaster site is considered and the impact of the panic spread between the evacuated groups on the disaster relief work is not considered.

3.2 Decision maker psychological factors

In recent years, scholars have generally found that traditional research on the optimization of emergency logistics can hardly achieve good results when applied in real-life rescue activities. The reason is that in actual situations, decision-makers are caused by various objective or subjective influencing factors. The decision-making behavior clearly deviates from the optimal solution under calculation. Therefore, the decision makers' psychological and behavioral factors in the actual decision-making environment are the influencing factors that must be considered in the supply chain research. Yang Jiping (Yang Jiping, 2009) finds that emotion, gender, and task difficulty have a significant impact on decision-making quality factors such as time, confidence, satisfaction, and rate of new programs in crisis decisions. Wang Kai (Wang Kai, 2010) The negative sentiment of decision makers under emergencies leads to a stronger frame effect, and this phenomenon is also affected by factors of gender and problem background, and verified from the perspective of EEG experiments. Lei Ting (Lei Ting, 2016) through analyzing related researches on time pressure, emotion regulation strategies and frame effects in psychology and behavioral decision-making, combined with the inner experience of decision makers in the context of emergencies, put forward relevant hypotheses, and used comparative experiments to examine the time. The influence of stress and emotion regulation strategies on the frame effect of decision makers.

Different decision-makers often face different levels of psychological risks when making replenishment and ordering decisions on relief supplies. For decision-makers in disaster relief centers, the higher the degree of shortage of materials for feedback in the disaster area, the longer the delay in transportation and the perceived risk, the greater its demand for materials and the more urgent it is, and the more proportional it is in a positive proportion. For affected decision makers, the direct source of risk perception is the current inventory of the disaster, the current material demand, and the estimated time of shipment of the next shipment. Wang Xuping (Wang Xuping, 2015) analyzed the impact of two different decision-makers' attitudes of optimism and pessimism on the emergency material allocation process. According to the prospective theory, the rescue center and disaster were respectively constructed for the problem of seismic resource allocation under the dynamic change of road conditions. In order to measure the risk perception of decision-makers for out-of-stock and transit time delays, a system dynamics simulation model for the whole process of material allocation was established from the modules of road capacity assessment, material flow, decision-making process, and material demand. The innovation lies in applying the causality model and feedback structure of material allocation to the decision-maker risk perception model, but the limitation is that only the coordinated operation process of consumable materials in the secondary supply chain is considered.

4 Psychological Factors in Reconstruction

Under the conditions of sudden disasters, little research has been done on post-disaster reconstruction of reverse logistics. Through consulting various types of disaster relief news, it is a fact that in actual rescue work, a large number of construction, living, and medical supplies that were abandoned which were recyclableafter the disaster, and some of the reusable materials accumulated in the disaster area after use. However, the recycling of reusable materials under disasters cannot be ignored. In addition, if the disaster area is not restored and reconstructed in a timely and effective manner, it will result in a negative psychology and aggravate the psychological pressure of the disaster victims, thus causing irretrievable evaluation of public opinion. Therefore, in the actual reconstruction of reverse logistics during the post-disaster reconstruction process, the decision-makers should take into account the psychological factors of the victims, so as to maximize the expected value of the disaster recovery of the victims to better formulate a reconstruction plan.

In this context, there are few studies on reverse logistics management that consider the psychology of the victims. Sheu (Sheu, 2013) studied the reverse logistics system for handling post-disaster debris collection and recovery and found that the psychological recovery of the victims was more stringent than the post-disaster reconstruction requirements. In the formulation of the issue, taking into account the impact of environmental protection, resource recovery, operational risk, and the psychological cost of the affected population, the psychological costs of the affected people include the cost of psychological recovery and the waiting time for perceived reconstruction, and verify that the psychological cost is an incremental marginal integration function. A multi-objective linear programming model that minimizes logistics costs, operational risks, and waiting for psychological costs was established. This research has made great contributions to resource recovery, environmental protection and psychological costs of disaster victims.

5 Conclusion

This article studies and summarizes relevant literatures that currently consider human psychological factors in emergency logistics and finds that in the emergency logistics, psychological subjects mainly involve disaster victims and decision makers, and psychological factors play a role in emergency logistics resource scheduling, emergency evacuation and post-disaster reconstruction. In the emergency evacuation process, the psychological factors affecting the evacuees are mainly individual factors and environmental impacts. After the disaster, the evacuees often need to wait at the accident site and thus have to wait for psychological costs. Waiting for too long can also cause panic. In addition, under the influence and pressure of the community, the evacuees will have a herd mentality, and these psychological factors will affect the final evacuation results. In the distribution of emergency resources, disaster victims and decision makers are affected by many factors in the perception of risk. Except for the emergencies themselves, a large part is due to the scarcity of relief supplies and the fear of being unable to obtain emergency supplies in time.In the reverse logistics ofthe post-disaster reconstruction, the psychological recovery of the disaster-affected people is related to the perceived waiting time for post-disaster reconstruction. The psychological cost of disaster victims is also an important part that decision-makers have to take into consideration during the planning.

On the basis of reviewing and analysing the above literatures, this article puts forward the following opinions:

(1) Most researches are concerned with the psychology of the evacuees and victims, and the influence of decision-makers' psychological research in the in the emergency logistics evacuation, resource optimization distribution and disasters is rarely considered. The specific role of the specific process of reconstruction has much room for research;

(2) Relevant researches are mainly focused on evacuation and material distribution in emergency logistics. In the post-disaster reconstruction, little consideration is given to the influence of human psychological factors and optimization analysis is done. What is more, most of the studies focus on the psychology of the evacuees and victims, while the psychological research on decision makers limits their emotions and risk preferences in the decision-making framework. The specific effects of its specific actions in emergency logistics evacuation, optimized resource distribution, and disaster reconstruction are rarely considered.

In summary, psychological factors are introduced into emergency management to explore the impact of psychological factors on the decision-making and improving the applicability of emergency decisions is of practical significance under the current social background.

Acknowledgement

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Research on Location and Path Optimization of Urban Emergency Logistics Based on Floyd Algorithm

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Abstract: Emergency logistics is an important task for post-disaster emergencyManagement, which plays a key role in ensuring emergency supplies transported in time and reducing casualties and property losses in the disaster area. After proposing the problem of site selection and path optimization for urban emergency logistics, we establish an urban emergency logistics center location model and use Floyd algorithm to solve it. Then we develop a path optimization model and solve it by shortest expected delivery time network model. At the end, a case is showed to demonstrate Floyd algorithm has a certain of feasibility and practicality to solve this problem.

Key words: Urban emergency logistics; Floyd algorithm; Site selection model; Path optimization model

1 Introduction

In recent years, frequent abrupt disasters did a great harm to our life, which caused a large number of casualties and a huge loss of social property. In this case, how to select favorable emergency logistics distribution centers and arrange fast, effective, accurate distribution route is of great importance to alleviate the spread of disasters and minimize property loss.

In the research of emergency logistics center location and path optimization, scholars preferred to construct a mathematical model and solve it by linear programming or intelligent algorithm. In foreign countries, Boonmee C, eta l (Boonmee C, Arimura M, Asada T,2017) combined an exact algorithm and a heuristic algorithm to settle the problem of Facility location optimization. Fancello G, eta l (Fancello G, Mancini S, Pani C, etal,2017) introduced a Mixed Integer Programming to solve emergency vehicles allocation problem. Behnam Vahdani, eta l (Behnam Vahdani, D. Veysmoradi, F. Noori, eta l,2018) used Two meta-heuristic algorithms of NSGAII and MOPSO to solve Two-stage multi-objective location-routing-inventory model. In china, Hong L, Zhang X (Hong L, Zhang X,2011) developed a multi-objective location selection model based on AHP theory and verified it by MATLAB simulation. Sun Qiang (Sun Qiang,2016) used an improved artificial bee colony algorithm to calculate an emergency logistics center location model with time window. Zhang X, eta l (Zhang X, Zhang Z, Zhang Y, eta l,2013) proposed a bio-inspired method to solve route selection problem. Pan Shiju (Shiju,2016) presented an immunity algorithm to figure out emergency logistics vehicles dispatching problem.

From literature above, we can conclude that most scholars preferred to solve this problem by complicated intelligent algorithm,which is of great difficulty for us to figure it out with no professional computer programming technology. Besides, in many cases, what we get is not the optimal solution with the use of intelligent algorithm. Nevertheless, in this paper, we introduce a simple and practical Floyd algorithm to solve location and path optimization of urban emergency logistics model and a case was demonstrated to prove the feasibility and practicality of this method.

2 Problem Description

As urban emergency logistics is a part of emergency logistics, it exists similar problems that other emergency logistics have. From literature review, the location and path optimization of urban emergency logistics distribution center can be described as: Assuming that a city occurs an abrupt disaster, the quantity of affected nodes are n. The status, distance, material demand, and latest arrival time of each disaster-affected node are known. Now we need to establish m emergency logistics centers in n disaster affected nodes which m is indefinite. Afterwards, on the condition of minimum number of transportation routes, how to arrange transportation vehicles to minimize cost is the work we need to solve. In our urban emergency logistics location model, it meets the following constraints: The ratio of demand nodes to distribution centers is not less than 3, that is $(n-m)/m \geq 3$; Each distribution center serves at least one demand node. The path optimization model meets the following constraints: The time of emergency materials delivering to a demand node must not be later than the latest arrival time of the demand node;

Demand for all affected demand nodes must be met; The sum demand of the nodes on each transportation route must not exceed the vehicle load; The fewer the routes, the better.

3 A Model of Urban Emergency Logistics Location

Emergency logistics has the same structure as general logistics. They are all consist of fluid,carrier,flow direction,circuit,flow,and velocity. In general,we just consider how to arrange transportation routes to minimize costs for general logistics.Nevertheless,the biggest characteristic of emergency logistics that differs from general logistics is that we should firstly take time effectiveness into consideration.As the faster you distribute,more lives and property losses you save.When disaster comes,emergency logistics requiresus to choose the path that minimize transportation time instead of minimizing transportation distance.So it is of a great significance to establish a model of emergency logistics location that save as much delivery time as possible.It is universally acknowledged that there is always traffic jam in city.From the literature that we refer to,we can simply divide traffic condition into six levels. theyare normal traffic,slightly clogged,more clogged,blocking,severe congestion,unable to pass.Corresponding driving speed is v , $0.8v$, $0.6v$, $0.4v$, $0.2v$,0, in which v indicates the average speed of a vehicle drive in a path without traffic jam.In this case,if the distance and the probability of every level of a path are given,then we are able to calculate the expected time of a vehicle driving in this path.The specific calculation method is shown in Table 1.

Table 1   Expected Time of Vehicle Driving from i to j

Situation of i to j	Normal traffic	Slightly clogged	More clogged	Blocking	Severe congestion	Unable to pass
Probability	p_1	p_2	p_3	p_4	p_5	$1 - \sum_{i=1}^{5} p_i$
Average speed	v	$0.8v$	$0.6v$	$0.4v$	$0.2v$	0
E(t)	$L_{ij} / (v p_1 + o.8v\ p_2 + 0.6v\ p_3 + 0.4v\ p_4 + 0.2v\ p_5)$					

According to the method in Table1,we can get a shortest expected delivery time path from i to j .Then the urban emergency logistics location model construction steps are as follows:

(1)Obtain information on road traffic connections of the affected nodes and use the Floyd algorithm to calculate the shortest delivery time matrix where any two nodes are directly connected in one step,which can be represented by the following matrix T_1 :

$$T_1 = \begin{bmatrix} t_{11}^{(1)} & t_{12}^{(1)} & \cdots & t_{1n}^{(1)} \\ t_{21}^{(1)} & t_{22}^{(1)} & \cdots & t_{2n}^{(1)} \\ \cdots & \cdots & \cdots & \cdots \\ t_{n1}^{(1)} & t_{n2}^{(1)} & \cdots & t_{nn}^{(1)} \end{bmatrix} \tag{1}$$

Among them, $T_{ij}^{(1)} = \begin{cases} 0 & i = j \\ \infty & i 、 j \text{ not connected} \\ t_{ij} & \text{the shortest expected transport ation time from i to j} \end{cases}$

(2)iterate T_1 to T_k . When $T_k = T_{k-1}$, iteration stops.At this point,we get the shortest expected delivery time matrix of any two nodes in affected area.

(3) Based on the results above,we develop an urban emergency logistics distribution center location model as follows:

$$\min z = \sum_{i=1}^{n} t_{j1,i} \tag{2}$$

$$\text{sumproduct}(--\{t_{j2,1}, t_{j2,2}, \cdots, t_{j2,n}\} > \{t_{j1,1}, t_{j1,2}, \cdots, t_{j1,n}\}) \geq 2 \tag{3}$$

$$\text{sumproduct}(--\{t_{jm,1}, t_{jm,2}, \cdots, t_{jm,n}\} > \{\min(t_{j1,1}, t_{j2,1}, \cdots, t_{jm-1,1}), \min(t_{j1,2}, t_{j2,2}, \cdots, t_{jm-1,2}),$$
$$\cdots \min(t_{j1,n}, t_{j2,n}, \cdots, t_{jm-1,n}) \geq 2 \tag{4}$$

$$u_{im} = \left\{ jm \left| \min((\sum_{i=1}^{n} \min(t_{j1,i}, t_{j2,i}, ..., t_{jm,i}), (\sum_{i=1}^{n} \min(t_{j1,i}, t_{j2,i}, ..., t_{jm-1,i}, t_{jm+1,i})) \right) \right\} \tag{5}$$

$$(n-m)/m \geq 3 \tag{6}$$

Objective function (2) represents that we need to find a node j_1 as the first distribution center whose sum shortest expected delivery time to all other nodes is minimal;constraints (3), (4), (5), (6) indicate that we can search other nodes as distribution centers that can shorten the sum shortest expected delivery time from centers to demand nodes by the use of base center node j_1 . Among them, (3) and (4) meet the requirements for each emergency logistics distribution center to serve at least one demand node. (5) means that the selected distribution center node is optimal among all alternative nodes.(6) Limits the number of emergency logistics distribution centers established in the affected area.

4 A model of Urban Emergency Logistics Path Optimization
4.1 Model establishment

We suppose that $G(V,E,L)$ is connected network graph with no direction.Point set $V = \{v_i | i = 1,2,...,n\}$ .Among them, m nodes are distribution center nodes. It is the starting point and destination of the entire emergency logistics distribution,which means that all participating vehicles must return to original distribution center after completing delivery task.The other n-m nodes are demand nodes whose demand is fulfilled by m distribution centers.Each demand node can only be fulfilled by one of these distribution centers.Point set $E = \{e_{ij} | i = 1,2,...,n; j = 1,2,...,n\}$, e_{ij} denotes the route from node i to j.Point set $L = \{l_{ij} | i = 1,2,...,n; j = 1,2,...,n\}$, l_{ij} denotes the distance from node i to j.There are k types of vehicles involved in transportation,each type of vehicle load and weight denotes s_k and w_k respectively.The demand of node i is $d_i (d_i > 0)$ and its latest arriving time can be represented as LT_i . t_{ij} is the time of vehicle driving from i to j.Ignore cargo unloading time and define the following four 0-1 variables:

$$x_{ijk}^r = \begin{cases} 1 & \text{type k vehicle r drives from i to j} \\ 0 & \text{otherwise} \end{cases}$$

$$x_{ojk}^r = \begin{cases} 1 & \text{type k vehicle r delivers materials from center o to node j} \\ 0 & \text{otherwise} \end{cases}$$

$$y_{ik}^r = \begin{cases} 1 & \text{type k vehicle r delivers materials for i} \\ 0 & \text{otherwise} \end{cases}$$

$$p_k^r = \begin{cases} 1 & \text{type k vehicle r involves in transport} \\ 0 & \text{otherwise} \end{cases}$$

Based on the conditions above, an urban emergency logistics path optimization model with the lowest total transportation cost is established as follows:

$$\min C = \lambda \sum_{r=1}^{R} \sum_{k=1}^{K} \sum_{j=1}^{n} \sum_{i=1}^{n} x_{ijk}^r l_{ij} w_k + \lambda \sum_{r=1}^{R} \sum_{k=1}^{K} \sum_{j=1}^{n} d_j \sum_{o=1}^{m} x_{ojk}^r l_{oj} \tag{7}$$

$$\sum_{r=1}^{R} \sum_{k=1}^{K} y_{ik}^r = 1 \tag{8}$$

$$\sum_{i=1}^{n} x_{ijk}^r = y_{jk}^r \quad j \in [1,n]; k \in [1,K]; r \in [1,R] \tag{9}$$

$$\sum_{j=1}^{n} x_{ijk}^r = y_{ik}^r \quad i \in [1,n]; k \in [1,K]; r \in [1,R] \tag{10}$$

$$\sum_{r=1}^{R} \sum_{k=1}^{K} \sum_{i=1}^{n} x_{iok}^r = \sum_{r=1}^{R} \sum_{k=1}^{K} \sum_{j=1}^{n} x_{ojk}^r \tag{11}$$

$$\sum_{i=1}^{n} d_i y_{ik}^{r} \leq s_k \tag{12}$$

$$t_i \leq LT_i \tag{13}$$

$$\min \sum p_k^{r} \tag{14}$$

In this model,objective function (7) indicates that the total transportation cost is the lowest when the constraints are met.The first part of the function refers to the cost of the vehicle's own weight during transportation and the latter part refers to the cost of materials weight during the transportation. λ indicates the cost of per kilometer of transport per ton of material(yuan/(km * t)). o denotes the emergency logistics center. $x_{ojk}^{r} l_{oj}$ refers to the distance of type k vehicle r driving from emergency logistics center to node j .Forexample,if vehicle r driving route is o-i-s-j,then $x_{ojk}^{r} l_{oj} = l_{0i} + l_{is} + l_{sj}$;Constraint (8) indicates that each node can be transported material only once;Constraints (9) and (10) mean that the arranged transportation vehicle can only deliver the materials to the node of specified route;Constraint (11) represents that the vehicle from the distribution center must finally return to the original distribution center;Constraint (12) indicates that the sum demand of the nodes on every delivery route must not exceed the vehicle load;Constraint (13) represents that the vehicle reaches the node no later than the node's latest arrival time;Constraint (14) means that the fewer the number of routes to arrange for transportation, the better.

4.2 Model implementation

In order to calculate the optimal path for the urban emergency logistics distribution,we design series of algorithm steps to realize it which are under the constraints.They are as follows:

Step 1: As we get urban emergency logistics distribution centers by Floyd algorithm,then we can calculate the demand nodes that they are responsible for respectively.We use O to denote the set of m distribution centers.Among them, the set of demand nodes responsible for distribution bycenter o is, which means thatthe demand node is delivered by the center whose delivery time is shortest. $U_{oj} = \{j | t_{oj} = \min \{t_{1j}, t_{2j},...., t_{mj}\}, j = 1,2,..., n\}$.

Step 2: Draw the network model of node-connected shortestdelivery time by the shortest delivery time matrix T_k. Then select one of thedistribution centers to find out a node j which is the most urgentdemand node that the distribution center is responsible for by calculating $u_{oj} = \{j | \min(t_{oj} - LT_j\}$.

Step 3: Confirm weather there are other demand nodes on this transport path.If there are other demand nodes that meet constraints,search a route in which the transportation cost is minimal.If don't,split the node that do not meet the constraints and add a new path.

Step 4: Keep on delivering the most urgent delivery time nodes from the remaining undelivered nodes of the distribution center until all them are delivered. Then the optimal path of this distribution center is obtain.

Step 5: Continue step 2 and step 3 to find out the optimal path of the other distribution centers and finally obtain the optimal path that contains all the demand nodes.

5 Case Validation

In order to verify whether the urban emergency logistics distribution center location model and path optimization model above are valid, in this article, we introduce a specific case to verify it.Assume that it happens to be a disaster in a city in which disaster affected nodes are ten.We number it ①-⑩.Suppose that there is only one kind of light transport truck in the affected area, weighing 3 tons,that is $w_k = 3t, k = 1$,load 6 tons, that is $s_k = 6t$, The average driving speed of this kind of vehicle is 40km/h.The demand for materials and the latest arrival time for each disaster-affected node are shown in Table2.

Table 2　Demand and Latest Arrival Time of Nodes

Nodes	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
$d_i(t)$	1.6	2.4	1.5	1.9	2.1	1.7	2.3	2.7	1.5	2.3
LT_i (min)	120	90	45	90	150	120	75	90	60	120

Firstly, the shortest expected delivery time matrix of any two nodes connected in one step is obtained by Floyd algorithm which is denoted as T_1, shown in Table 3.Then iterate it to T_4, which is the shortest expected delivery time matrix ofany two nodes, shown in Table 4.

Table 3   The Shortest Expected Delivery Time Matrix of Nodes(T_1)   unit: minutes

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
①	0	37	44	∞	∞	∞	∞	25	41	53
②	37	0	29	25	42	∞	22	∞	32	35
③	44	29	0	27	∞	∞	∞	∞	∞	∞
④	∞	25	27	0	37	∞	∞	∞	∞	∞
⑤	∞	42	∞	37	0	19	∞	∞	∞	∞
⑥	∞	∞	∞	∞	19	0	21	∞	∞	∞
⑦	∞	22	∞	∞	∞	21	0	17	36	∞
⑧	25	∞	∞	∞	∞	∞	17	0	36	47
⑨	41	32	∞	∞	∞	∞	36	36	0	30
⑩	53	35	∞	∞	∞	∞	∞	47	30	0

Table 4   The Shortest Expected Delivery Time Matrix of Nodes(T_4)   unit: minutes

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
①	0	37	44	62	79	63	42	25	41	53
②	37	0	29	25	42	43	22	39	32	35
③	44	29	0	27	64	72	51	68	61	64
④	62	25	27	0	37	56	47	64	57	60
⑤	79	42	64	37	0	19	40	57	74	77
⑥	63	43	72	56	19	0	21	38	57	78
⑦	42	22	51	47	40	21	0	17	36	57
⑧	25	39	68	64	57	38	17	0	36	47
⑨	41	32	61	57	74	57	36	36	0	30
⑩	53	35	64	60	77	78	57	47	30	0
Sum	446	304	480	435	489	447	333	391	424	501

According to Table 4,nodes②and⑦are the distribution centers we are looking for. Center node②transports materials to demand nodes①,③,④,⑨,⑩.center node⑦transports materials to demand nodes⑤,⑥,⑧. Nodes distance matrix corresponding to the shortest expected delivery time is shown in Table 5.

Table 5   Distance Matrix of Nodes   unit: km

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
①	0	11	13.2	18.9	23.3	22.3	19.4	16.8	12.5	11.5
②	11	0	6.5	7.9	12.3	9.4	6.5	9.1	4.3	6.8
③	13.2	6.5	0	6.6	13.5	15.9	13	15.6	10.8	13.3
④	18.9	7.9	6.6	0	6.9	9.8	14.4	17	12.2	14.7
⑤	23.3	12.3	13.5	6.9	0	2.9	5.8	8.4	16.6	19.1
⑥	22.3	9.4	15.9	9.8	2.9	0	2.9	5.5	8	16.2
⑦	19.4	6.5	13	14.4	5.8	2.9	0	2.6	5.1	13.3
⑧	16.8	9.1	15.6	17	8.4	5.5	2.6	0	6.9	8.6
⑨	12.5	4.3	10.8	12.2	16.6	8	5.1	6.9	0	3
⑩	11.5	6.8	13.3	14.7	19.1	16.2	13.3	8.6	3	0
Sum	148.9	73.8	108.4	108.4	108.8	92.9	83	90.5	79.4	106.5

Finally, with the use of algorithm steps in 4.2,we get the optimal distribution paths of each distribution center.Among them:

Center②distribution paths:②-⑨-⑩-①-②;②-③-④-②;

Center⑦distribution paths:⑦-⑥-⑤-⑥-⑦; ⑦-⑧-⑦.

6 Conclusion

Sustained, high-frequency outbreaks of abrupt disasters increasingly threaten people's lives and property, which have a seriouseffect on people's daily production and lives. Selecting suitable emergency logistics distribution centers and fast, accurate emergency logistics distribution route is an effective way to solve this problem, which is of great significance toalleviate the spread of the disaster and reducethe degree of damage. In this article, firstly, we establish an urban emergency logistics center location model and use Floyd algorithm to solve it. Then we develop a path optimization model and solve it by shortest expected delivery time network model. At the end, with the use of a case in case library, we demonstrate that Floyd algorithm is feasible and practical to solve this problem.

It is obvious that the research direction of this paper is limited to urban emergency logistics,so we take traffic jam into consideration. Nevertheless, there are still some factors that we ignore which have a great influence on the probability of road access, examples like weather, slope, etc. Besides, some other conditions such as rural emergency logistics, urban and rural integration emergency logistics are not considered. We will explore these situations deeply to optimal this model in future study.

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Research on Professional Evaluation Method for Earthquake Emergency Comprehensive Exercise

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Abstract: In order to enhance the effectiveness of earthquake emergency comprehensive exercise, firstly, this thesis proposes an evaluation index system of earthquake emergency comprehensive exercise based on expert professional evaluation, and then standardizes systematization construction of earthquake emergency comprehensive exercise by evaluation and promotion. AHP is used to determine the index weights and the fuzzy comprehensive evaluation method is used to quantitatively process the multi-factor information in the evaluation of the effects of comprehensive earthquake emergency exercises. Finally, the feasibility and practicability of the method are verified by the experiment.
Key words: Earthquake emergency comprehensive exercise; Index system; Analytic hierarchy process; Fuzzy comprehensive evaluation method

1 Introduction

Since the 20th century, nearly 800 earthquakes of more than magnitude 6 have occurred in China. In other word, 23 provincial capitals, 2/3 large cities of China, and more than one million people are located in regions where the intensity is higher than VII degrees. In the event of a major earthquake occurs, casualties and property losses cannot be measured. All departments could carry on the targeted earthquake emergency comprehensive exercise on the day. Although the influence and extensiveness of the earthquake emergency comprehensive exercise is increasing, but in actual operation, there is still a disadvantage that make act is more important than exercise, form is more important than content and demonstration is more important than effectiveness.

Quality and effectiveness of earthquake emergency comprehensive exercise should play a leading role in evaluating the effect of exercise. In 1992, the Ohio Emergency Plan Development Organization developed the first manual for emergency response and assessment of dangerous goods accidents. Homeland security exercise and evaluation program is designed by National Emergency Preparedness Office of US Department of Homeland Security, which became a national exercise evaluation method and operation guide. Kristine M, Gebbie, etc. proposed the use of Delphi method to establish the performance evaluation index system of public health institutions emergency exercise.Fagel believed that exercise evaluation teams should be involved in the exercise design phase. Deng Yunfeng compiled 18 indicators and evaluation criteria covering all major accident emergency exercises in the city. Cheng Qi, et al. set five evaluation indexes for the hazardous characteristics of chemical accidents: economy, environmental protection, safety, coordination and swiftness[0].Yi Tao and Zhu Qunxiong constructed index system based on the characteristics of emergency rescue in terms of disaster relief assessment and exercising results.

However, the evaluation of emergency exercises mainly focused on the specific types of disaster emergency exercises. The main body of research for emergency exercise evaluation is the expert, and the evaluation dimension and evaluation method are relatively single. Therefore, while constructing the scientific evaluation index system for comprehensive earthquake emergency exercises, it is necessary to further analyze the main effects of earthquake emergency comprehensive exercises. It is believed that participants are also an important part of evaluating the effects of emergency exercise. The purpose of this paper is to provide a standardized and operable basis for the evaluation of the effect of comprehensive earthquake emergency exercises by our government and relevant authorities.

2 Research and Design

2.1 Exercise types and processes

Emergency exercise can be divided into desktop exercise, functional exercise and comprehensive exercise.Desktop exercise is a process that simulates disaster scenarios indoors through sandboxes, computers, electronic maps and 3D techniques. The main leaders of each emergency organization will

be discussed, analyzed and extrapolated. Functional exercise refers to the exercise activities that examine a single or multiple emergency response functions in the emergency plan. Comprehensive exercise is an exercise that tests all or most of the emergency response functions in emergency plan.

The comprehensive earthquake emergency exercise process can be divided into three stages.

(1)Exercise preparation phase: The exercise preparation is the foundation of successful practice.

(2)Exercise implementation phase: Exercise implementation is the main part of the whole exercise.

(3)Exercise summary stage: The exercise summary stage includes on-site commentary and post-event summary tracking.

2.2 Evaluation methodology design

(1)Analyze the basic flow of comprehensive earthquake emergency exercises and construct an evaluation index system for earthquake emergency comprehensive exercises.

(2) To compare pairs of indicators, the relative importance of a certain indicator in the coordinate system and its higher-level indicator is represented by the matrix $U = \begin{bmatrix} U_{11} & U_{12} & \wedge & U_{1j} \\ U_{21} & U_{22} & \wedge & U_{2j} \\ M & M & O & M \\ U_{i1} & U_{i2} & \wedge & U_{ij} \end{bmatrix}$. U_{ij} represents the importance of U_i relative to U_j. where, $U_{ij} > 0, U_{ij} = \dfrac{1}{U_{ij}} (i \neq j), U_{ii} = 1$. Use the 9-point method to determine the specific value of U_{ij}.

(3) Calculate the weight of indicators in a single hierarchy. Calculate the product of each row: $A_j = \prod_{j=1}^{n} U_{ij}$, element($i=1,2,\Lambda,n$). Count: $B_i = \sqrt[n]{A_i}$, where n is the order of judgment matrix. Normalize the resulting vector: $W = (w_1, w_2, L, w_n)^T$,that is the eigenvector. Calculate the maximum eigenvalue: $W = \dfrac{B_i}{\prod_{j=1}^{n} B_i}$. Check the consistency of the consistency. if $CR < 0.1$,where $CR = CI / RI$. If there is any error, it is necessary to adjust the element value of the judgment matrix and recalculate it.

(4) Determine the factor set and evaluation set, calculate the membership degree of each index relative to the evaluation set, and establish the fuzzy relation matrix at all levels.

$$R = (r_{ij})_{m \times n} = \begin{bmatrix} r_{11} & r_{12} & \wedge & r_{1m} \\ r_{21} & r_{22} & \wedge & r_{2m} \\ M & M & O & M \\ r_{n1} & r_{n2} & \wedge & r_{mn} \end{bmatrix}$$

(5) Conduct fuzzy assessments based on the known index weight.

$$B = \omega \times R = (\omega_1 \quad \omega_2 \quad \wedge \quad \omega_m) \times \begin{bmatrix} r_{11} & r_{12} & \wedge & r_{1m} \\ r_{21} & r_{22} & \wedge & r_{2m} \\ M & M & O & M \\ r_{n1} & r_{n2} & \wedge & r_{mn} \end{bmatrix} = (b_1 \quad b_2 \quad \wedge \quad b_n)$$

3 Empirical Analyses

3.1 Evaluation object analysis

Taking the "2017 Earthquake Emergency Desktop Exercise in Hubei Province" as the evaluation object, the performance of this method in the actual emergency comprehensive exercise was verified. The exercise scenario envisaged a 5.8-magnitude earthquake in Zigui County, Yichang City, Hubei Province, at 09:05 on the morning of November 22, 2017, resulting in major economic losses and casualties. The exercise is divided into three phases, preparation stage of exercise,the implementation stage of the exercise,and the summary stage of the exercise.

3.2 Analysis of evaluation results

During the exercise, university experts and government emergency center staff are invited to form a group of experts to evaluate the effectiveness of the exercise. The specific process is as follows:

(1) Exercise Evaluation Organization

9 members of the expert group through questionnaire survey and interview were selected to evaluate the importance of the indexes in the evaluation index system of the comprehensive earthquake emergency exercise to calculate the weight of indexes. 20 experts participating in the emergency exercise conducted a professional evaluation on the performance of the exercise indicators. The expert team conducted a comprehensive analysis of emergency exercises.

(2) Professional evaluation

The judgment matrix constructed by expert evaluation and the determined weight of each index are shown in Table 1.

Table 1   Level 1 Evaluation Index Weight of Professional Evaluation

U	U_1	U_2	U_3	W_U
U_1	1	0.36	2.26	0.246
U_2	2.78	1	5.15	0.639
U_3	0.44	0.19	1	0.115

It is concluded that weight: $w_{ij} = (0.246 \quad 0.639 \quad 0.115)$. CR is less than 0.1 (CR=0.004),which means that the matrix is consistent and the weight calculation is effective. Similarly, the weights of the secondary indicators are calculated as follows: $w_1^u = (0.109 \quad 0.499 \quad 0.126 \quad 0.266)$, $w_2^u = (0.223 \quad 0.261 \quad 0.377 \quad 0.139)$, $w_3^u = (0.218 \quad 0.134 \quad 0.648)$. All pass the consistency test.

A total of 20 members of the expert group made professional evaluations on the performance of each exercise. The results are shown in table 2.

Table 2   Level 2 Statistical Indicators Evaluation Results of Professional Evaluation

Secondary indicators	outstanding	good	secondary	bad	Very bad
Exercise plan	3	6	8	3	0
Exercise scheme	2	10	4	3	1
Exercise mobilization training	8	8	3	1	0
Exercise guarantee	7	10	2	1	0
Earthquake emergency start	6	7	5	2	0
Earthquake command deployment	10	8	2	0	0
Earthquake emergency disposal	3	5	5	6	1
Exercise execution guarantee	7	9	2	1	1
Exercise comment	2	2	10	5	1
Site cleaning	8	8	3	1	0
Exercise tracking	1	1	7	8	3

The degree of membership of each index with respect to the comment set is calculated and the fuzzy evaluation matrix can be obtained according to table 2.

$$R_1 = \begin{bmatrix} 0.15 & 0.3 & 0.4 & 0.15 & 0 \\ 0.1 & 0.5 & 0.2 & 0.15 & 0.05 \\ 0.4 & 0.4 & 0.15 & 0.05 & 0 \\ 0.35 & 0.5 & 0.1 & 0.05 & 0 \end{bmatrix}, R_2 = \begin{bmatrix} 0.3 & 0.35 & 0.25 & 0.1 & 0 \\ 0.5 & 0.4 & 0.1 & 0 & 0 \\ 0.15 & 0.25 & 0.25 & 0.3 & 0.05 \\ 0.35 & 0.45 & 0.1 & 0.05 & 0.05 \end{bmatrix},$$

$$R_3 = \begin{bmatrix} 0.1 & 0.1 & 0.5 & 0.25 & 0.05 \\ 0.4 & 0.4 & 0.15 & 0.05 & 0 \\ 0.05 & 0.05 & 0.35 & 0.4 & 0.15 \end{bmatrix}$$

According to the algorithm, the first-order fuzzy evaluation is calculated.

$$B_1 = w_1 \times R_1 = (0.210 \quad 0.466 \quad 0.189 \quad 0.111 \quad 0.025)$$

$$B_2 = w_2 \times R_2 = (0.302 \quad 0.339 \quad 0.190 \quad 0.142 \quad 0.026)$$

$$B_3 = w_3 \times R_3 = (0.108 \quad 0.108 \quad 0.356 \quad 0.320 \quad 0.108)$$

The final results of the comprehensive fuzzy evaluation are as follows:

$$B_U = w_U \times R_U = (0.257 \quad 0.344 \quad 0.209 \quad 0.155 \quad 0.035)$$

4 Conclusion

It is of great significance to carry out pre-disaster comprehensive exercise due to the the destructive power of the earthquake. In order to improve the effectiveness of the comprehensive earthquake exercise, this paper firstly determines the evaluation index system of the earthquake emergency comprehensive exercise by expert evaluation method and literature data. Secondly, the AHP and fuzzy comprehensive evaluation method are combined to evaluate effect of comprehensive earthquake emergency exercise. Finally, 2017 Earthquake Emergency Desktop Exercise in Hubei Province is taken as an example to verify this method. the main conclusions of this paper can be concluded as follows:

(1) Combining AHP and the fuzzy comprehensive evaluation method is to improve the accuracy of this evaluation model.

(2) The corresponding indicator system should be adjusted in response to specific earthquake emergency exercises accordingly.

Acknowledgement

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Literature Review of Research on Vehicle Routing Problems of Emergency Supplies Distribution

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Abstract: Due to the deteriorating global environment, natural disasters occur more frequently in various parts of the world. China has a vast terrain andnatural disasters such as floods, typhoons, mudslides, droughts, and earthquakes occur from time to time, seriously threatening people's lives and property. Therefore, on the basis of analyzing the existing rescue model, it is great significance to have a more comprehensive and adaptable new rescue model to reduce the loss of people's lives and property. This paper first analyzes the literature related to rescue and evacuation routes, and proposes that multi-target rescue models should be established in the routing planning, taking into account factors such as time window, demand diversity, reliability and satisfaction. The second part summarizes the vehicle routing planning research in a random environment, but mainly for the mass transit network. There are few studies on disaster relief, so more randomness should be considered in the routing planning process of emergency materials. The rescue model under some fuzzy conditions is also analyzed later. The last part is to analyze the application of time-space network model in emergency rescue path planning. This is also the new path planning model proposed in this paper based on the analysis of other scholars' research. It is also the main innovation point of this paper. By analyzing the application of time-space network model in other traffic fields, the feasibility of using **time-space** network model for path planning of emergency materials distribution vehicles is proposed. Then, this paper demonstrates this model uses the time axis to reflect the advantages of the state at each point in time in a post-disaster dynamic environment. However, it is still a preliminary concept. Further research is needed on the problem of vehicle routing for emergency materials distribution based on the time-space network model.
Key words: Emergency logistics; Vehicle scheduling; Route optimization; Time-space network model

1 Introduction

In recent years, frequent natural disasters have seriously endangered people's lives and property, social stability, economic development and long-term stability of the country. The Japan-class massive earthquake in 2011, the major debris flows in Zhouqu, China in 2010, the earthquake in Haiti, the 2008 Hanchuan earthquake in China, the Pakistan earthquake in 2005, the Indian Ocean tsunami in 2004, and the European heat wave in 2003 caused major casualties and serious economic losses. The United Nations International Strategy for Disaster Deduction (UNISDR) Secretariat published the 2009 Global Natural Disaster Statistics Report in Geneva on the first day of the month. The report pointed out that the earthquake caused the most serious natural disasters and economic losses in the decade since 2000. In addition, storms and extreme weather also seriously affect human production and life. Since the beginning of the 21st century, the global average of 78,000 people died each year due to natural disasters, which is 1.8 times that of the 1990s. The global economic losses caused each year amounted to 96 billion dollars, more than twice the number in the 1980s. From 2000 to 2008, Asia was the region where natural disasters caused the greatest loss of human lives. It accounted for 84.82% of the total deaths caused by natural disasters in the world. Among them, developing countries are the hardest hit areas resulting from natural disasters.

China is a country with many natural disasters. Every year, natural disasters will bring huge losses to people. At the same time, as the process of urbanization accelerates and the population soars, major cities in China are facing severe challenges. Potential problems and public emergencies continue to emerge, seriously plaguing people's daily lives. After the occurrence of emergencies, various uncertainties (such as traffic congestion, collapse of buildings, destruction of roads, etc.) were intertwined and caused some degree of difficulty for rescue workers. In order to ensure the smooth progress of the rescue work, it is of great significance to thoroughly study the optimization of emergency route selection. For natural disasters, after disasters occur, it is necessary to effectively select the shortest path to transport disaster relief materials on the basis of the analysis of the existing road

network, so that workers and transport vehicles can reach to the disaster area to participate in rescue work at the first time. The Vehicle Routing Problem (VRP) has a wide range of research values in real life. It is very important to look for real-time and efficient algorithms. In the emergency management work, determine the best rescue route or evacuation route, provide material protection for the affected people in the shortest time, and effectively evacuate the people to the safe area, thus effectively avoiding the expansion of influence and maintaining the stability of the social order.

2 Emergency Distribution Model for Disaster Relief

2.1 Literature summary of emergency logistics route optimization

The problem of optimizing the path planning of disaster relief vehicle after VRP in emergency logistics system has attracted the attention of many scholars (YI, 2007; Wang Shaoren et al., 2010, 2011). Haghani et al. (Haghani et al.,1996) and zdamar et al. (zdamar et al., 2004) studied the issue of natural disaster emergency logistics transportation, the former is a definitive emergency logistics network flow model that takes into account the time window to determine the vehicle path, transportation mode and material transportation arrangements, and Lagrange relaxation algorithm and iterative method are used to solve the model. The latter is a time-dependent dynamic transportation problem. An integrated optimization model for multi-cycle, multi-transport vehicle routing problems and multi-variety material network flow problems is proposed. Xu Tianben et al. (Xu Tianben et al., 2002) pointed out the problem of the selection of rescue vehicle paths in the event of a single earthquake disaster and pointed out that the selected path must have both safety and efficiency characteristics. Barbarosoglu et al. (Barbarosoglu et al., 2002) proposed a two-level decision model for helicopter mission planning in disaster emergency rescue. These two levels of decision-making are coordinated through interactive programs and then solved by GAMS software. The tactical layer mainly determines the number of helicopter tours, helicopter deployment and pilot configuration, while the operational layer is to establish the helicopter flight route, relief material loading and unloading, refueling timetable and reprint plan. Since large-scale natural disasters are sudden, destructive, and urgent for emergency rescue, there is great uncertainty in the supply of information and demand for emergency supplies, in the process of rescue, it is necessary to coordinate the balance between the supply of emergency supplies and the inability to accurately predict the needs of the affected area. Sheu Jiuh-Biing (Sheu Jiuh-Biing, 2007) proposed a fuzzy clustering optimization method for emergency logistics joint distribution operations. This method mainly uses fuzzy clustering analysis method and multi-objective dynamic programming model, so as to obtain the optimal emergency supply and distribution strategy. Wang Jing et al. (Wang Jing et al., 2009) analyzed the characteristics of the emergency logistics system and established a mathematical optimization model using a robust planning method, it solves the problem of how to arrange the emergency distribution center site selection and distribution plan under the condition of uncertainty of emergency supplies, and numerical experiments show that it has good robustness. Yuan et al. (Yuan et al., 2009) established a route selection model for emergency logistics and designed a corresponding calculation method. Arun Jotshi et al (Arun Jotshi et al., 2009)studied the optimization of natural disaster relief resources, the optimization model of distribution and itinerary scheduling was established with the shortest delivery time of the wounded and the maximum survival expectation of the casualty as the goal. The problem of parameter setting was studied by assuming post-earthquake cases. Chen Daqiang et al. (Chen Daqiang et al., 2010) studied the problem of multi-objective decision-making with supply constraints under time-varying conditions, and established a multi-objective decision-making model in which the emergency response time is the shortest and the number of rescue points is the minimum in the emergency logistics system, a simulation example was used to verify the validity of the model and algorithm. Zhi-Hua Hu (Zhi-Hua Hu, 2011) established a linear integer programming model for emergency rescue in logistics systems for the design of network flow design and vehicle path optimization for supply chain containers in natural disaster environments, the simulation shows the feasibility and effectiveness of the model. Luis conducted an integrated study of emergency rescue paths and detailed examples of serious natural disasters in recent years, classification and summarization of various types of rescue path papers and the models involved therein provide a great deal of reference value for follow-up research. He Wenwen studied the problem of emergency goods dispatching vehicle routing based on the prohibition of time windows, and provided prohibition time windows for roads and nodes in transportation networks, an integer programming optimization model was established aiming at the minimization of emergency material transfer time. The tabu search algorithm was designed to obtain a satisfactory solution. Liu Yunzhong comprehensively reviewed the research status of the vehicle

routing problem model and algorithm, discussed the vehicle routing problem model and its solution algorithm. Sun Ying took into account the occurrence of potential disasters, established a nonlinear mixed integer programming model for emergency resource scheduling under multipath, and minimized the total amount of time from the resource assistance point to different resource demand points. Zhong Zhixin combined the connectivity reliability and k-short circuit and considered the two indicators of path utility and connectivity reliability to establish a bi-level planning model. From the manager's point of view, the upper-level model was established in the hope that the relief materials would be sent to the disaster-hit areas as soon as possible, and the lower-level model was considered from the user's point of view, expecting the travel time of the individual users to be the least, then establish a deterministic traffic allocation model. Wei Hang combined various variable factors (traffic congestion, weather changes, etc.), established an emergency path optimization model under stochastic time-varying networks, designed the algorithm to solve, and discussed the complexity of the algorithm. Wu Qing used the theory of traffic flow fluctuations to convert the road's comprehensive factors (such as length and traffic flow) into vehicle driving time. Then, the probability of collapse of the building and the risk of road blockage due to the collapse of the surrounding buildings caused by the variable factors of the road were taken into consideration. Thus, an emergency rescue vehicle route optimization model was established when the earthquake occurred. Zhang Jie took earthquake disasters as the background, aiming at the reliability of path travel time, the risk of path blocking, and the complexity of the path (the number of intersections included in the path), a multi-objective planning model for emergency rescue path selection was established, and a genetic algorithm was used to solve the model, which provided a reliable method for the selection of rescue paths. Liu Yang aimed at minimizing travel time and maximizing travel time reliability, and also established a multi-objective planning model for selecting the optimal path before emergency vehicles travel. The algorithm then chooses k path planning algorithm. Zhang et al. analyzed the choice of emergency relief material vehicle transportation routes. Based on the special circumstances of emergencies, the three decision attributes of time, effectiveness, safety, and economy were considered. The mathematic representation of the attribute is performed and the corresponding function is constructed. Then the multi-attribute problem is transformed into a single-attribute decision problem, and the decision plan with the highest expected utility is selected. Liu Yong focused on the optimization of emergency rescue paths, from the two aspects of the evacuation path for people and the emergency material dispatch path optimization, the model was established and the ant colony optimization algorithm was used to solve it, the path weights were introduced into the state transition rule in this algorithm. On this basis, the improvements were made. Gwo-Hshiung built a multi-objective disaster allocation model with the goal of minimizing transportation costs, minimizing transit time, and maximizing satisfaction. However, assuming that the conditions include the road network intact and the path connectivity is normal, it is obviously inconsistent with the actual situation of the road network at the time of the actual emergency. This part is mainly based on the emergency rescue route and evacuation route. The research and analysis of domestic and foreign scholars can be seen that there are many factors to be considered in the path selection of emergency materials. For instance, considering the certainty and uncertainty of the time window, the utility of the material dispatching path and the reliability of the communication, the uncertainty and diversity of the demand, the safety, the economy, the efficiency, and the occurrence of potential disasters. Different targets are selected for distribution under different factors, such as minimizing transportation time, maximizing reliability, minimizing travel time for individual users, minimizing transportation costs, maximizing satisfaction and optimizing route selection to establish corresponding models. The more comprehensive the factors considered in the modeling process, the more reasonable the selected objectives, and the established models are more applicable.

2.2 Research on vehicle routing problems under different environments

2.2.1 Research on Emergency Material Delivery Path under Random Environment

In 2003, Xie Binglei studied the problem of stochastic vehicle routing in his doctoral dissertation. Based on the number of customers and customer demand, the single-loop and multi-loop strategies were discussed. The genetic algorithm and simulated annealing algorithm are designed separately for this problem. In addition, taking the travel time on the route as a random variable, a chance constrained programming model is established for this problem and a corresponding genetic algorithm is designed. Then the related researches on dynamic random VRP problem and inventory path problem of stochastic demand are carried out. In the same year, with the background of wartime transport in the military transport sector, Shi Yufenproposed the optimization of the single-source single-vessel transport path under uncertain conditions. He Fangguo focused on transport problems based on stochastic theory and

fuzzy theory, and established a model of network optimization under uncertain conditions, a genetic algorithm based on spanning tree was designed to solve the fixed-cost transportation problem with random variables. Li Yinzhen studied the problem of constrained networks and stochastic path and fuzzy path under uncertain conditions, and designed a hybrid intelligent algorithm to solve it. In 2012, Zhao et al. considered the random demand vehicle routing problem with time windows in a random environment and established a multi-objective mathematical programming model based on fuzzy satisfaction. A piecewise optimization method based on quantum evolutionary algorithm and particle swarm optimization algorithm is proposed to solve Pareto solution, which effectively avoids the prematureness of the algorithm. The validity of the algorithm is verified by comparison between instances. For the random demand VRP problem, a large amount of literature is studied every year. Liu Guiying studied the vehicle routing problem of stochastic customers and stochastic demand in master's thesis, and calculated expressions based on the expected length of prior sequences under different circumstances. The heuristic algorithm is designed by combining the space filling curve with the exchange search. The result shows that the problem is solved effectively. Because the uncertainty factors in the emergency environment are more complicated, this part mainly organizes the distribution methods and models in the random environment. It can be found that all scholars are based on the general transportation network transportation, on the basis of which some random factors are considered and corresponding optimization algorithms are designed. These complex random factors can also be considered in the transportation network with emergency rescue as the background, then the current emergency rescue model can be further optimized.

2.2.2 Research on Emergency Material Delivery Path under Ambiguous Environment

Deng Xianming et al. used knowledge of fuzzy mathematics to consider the situation of a rescue center corresponding to multiple disaster-affected sites, and set the demand for relief supplies at the affected site as a fuzzy variable, at the same time, an optimization model that minimizes the transport time of rescue vehicles with hard time window constraints is established, and a conservation algorithm is designed to solve the case where the rescue center implements rescue to eight disaster sites. they also considered expanding a rescue point into multiple rescue points in a fuzzy environment, that is, multiple rescue points responding to emergency response transportation optimization problems at multiple disaster sites, treat the problem as a two-stage decision problem, they also selected three rescue sites to provide rescue cases to 12 disaster sites for analysis. In the latest literature search, Ding et al. studied the location-routing problem (LRP) in natural disasters, taking into account the characteristics of multi-vehicle segmentable material distribution. With the goal of minimizing the sum of transit time, a fuzzy dynamic LRP chance constrained programming model was established and a two-stage heuristic algorithm was designed. Wang Xuzhu established a bi-objective fuzzy linear programming model that minimizes transportation time and minimizes transportation costs, and uses the principles of fuzzy number sorting and fuzzy optimization to solve the model. Zhang Qun and Yan Rui established a hybrid VRP model with multiple distribution centers, multiple models, and multiple products based on previous research and proposed a fuzzy genetic algorithm to solve the problem, the fuzzy logic controller is used to realize the dynamic adjustment of the crossover probability and the mutation probability. Finally, the algorithm is simulated and tested. The example shows that the algorithm has good efficiency. Kang Xuhui and Zhen Haibo studied the problem of stochastic fuzzy three-dimensional transportation. The credibility of the theory was used to establish the opportunity-constrained programming model, and their genetic algorithms were used to solve the problem. Cao Erbao et al. considered the VRP of fuzzy requirements, established a fuzzy chance constrained programming model, and proposed a hybrid differential evolution algorithm based on fuzzy simulation. Yang Lixin and Liu Linzhong considered the three-dimensional transportation problem under the fuzzy environment, and established an expectation model with multiple fuzzy variables, an opportunity-constrained model, and a related opportunity planning model, they designed a hybrid intelligent algorithm based on fuzzy simulation and tabu search algorithm. Ge Yue proposed a fuzzy bottleneck transport problem in his doctoral thesis and gave a polynomial algorithm. Zhong Bo et al. proposed a transportation problem in which both demand and supply are fuzzy variables, the idea of chance constrained planning model and related opportunistic planning model based on this problem is proposed. A hybrid intelligent algorithm is designed to solve the approximate optimal solution of the model. This part analyzes that multiple distribution centers, disaster points, models and products may be considered in the emergency rescue process, and a solution model containing fuzzy variables is established for emergency rescue vehicle transportation problems under different fuzzy environments.

2.3 Research on path planning of emergency rescue vehicle based on time-space network model

2.3.1 The Use of Space-time Networks in other Areas

Although the time-space network model does not have used for emergency rescue vehicles, it has been widely used in other transportation fields. Le Meilong This paper designed a flight aircraft model allocation method for airlines by constructing a model of flight model distribution based on time-space network, and passenger spillover function and flight model distribution cost function. The basic idea is based on the known airline flight plan, passenger demand distribution, fleet structure, model number, based on the establishment of time-space network diagram to draw the parameters needed for flight model distribution model. Then, by solving the flight model distribution model, the flight plan configuration scheme that minimizes the total cost of flight model allocation is obtained. Qiu Lu combined the analysis of time-space paths, time-space prisms, time-space cones, etc. in time geography with the time-space network framework in the traffic field, and proposed the description method of individual reachability in the time-space network. This paper takes the traffic infrastructure network as the background and studies the traffic network problem based on the time-space reachability. Taking the traffic service network as an application background and custom bus services as specific cases, the problem of custom bus service network design based on time-space reachability was studied. A general theoretical framework for modeling and solving traffic network design problems considering the time-space accessibility of individuals is formed, which provides a theoretical basis for traffic planning and management based on accessibility. Hao Congli first discussed the relationship between "flow" and "line" in the process of railway freight transportation. Then based on the time-space network graph to analyze the problem of the combination of streamlines, a streamline combined optimization model was established and an algorithm suitable for fast solution was designed. Chen Baiqian combined with the characteristics of China's railway transport organization and management, put forward a dynamic optimization model of empty car deployment with practical application value. Based on time-space network modeling, solving from the perspective of speeding up the turnover of railway vehicles, the time spent on empty vehicles at the station is greatly reduced. Ingmar Steinzen proposed a new modeling method based on the underlying vehicle scheduling problem of the time-space network and solved the synthesis problem by combining the Lagrangian relaxation column generation method. P. Chardaire also used the time-space network to solve the problem of fleet transfer.

2.3.2 Analysis of the Feasibility and Advantages of Time-space Network Model for Emergency Rescue Routing Planning

In the emergency rescue process, the demand for materials after the disaster in the disaster-affected areas is set as a fuzzy variable that changes with time according to the experience of the policy makers, by applying the time-space network model, each disaster point in the affected area is mapped to the time-space network, and it is solved to obtain the optimal solution for material distribution. Taking into account the serious damage to roads in the disaster-affected areas after some natural disasters, there is an urgent need to open up the lifeline within a limited period of time, due to the sudden occurrence of disasters, road repair teams are generally difficult to organize on a large scale quickly and the repair power is limited. Therefore, limited repair resources must be reasonably applied to the affected areas. When applying the time-space network to post-disaster material distribution studies, due to the limitations of time-space networks, most of the transit time between nodes is limited to known constants. In the actual rescue process, the travel time of the road often has a certain deviation or cannot be well predicted, and in the road repair network, the prediction of the road repair time is also a difficult problem to solve. The inaccuracy of repair and travel time often results in deviations of the entire distribution plan, and it is difficult to achieve an overall optimum. Introducing the method of fuzzy or probability into the modeling of time-space networks will be one of the future research directions. In the time-space network model, due to the introduction of the time axis, the number of nodes in the network has increased exponentially, resulting in the rapid expansion of the model scale. For mixed-integer programming problems, the increase of variables often leads to an exponential increase in solution complexity, the difficulty of solving the problem caused by the scale expansion of the model, the model cannot be solved quickly, affecting the responsiveness of the model. In order to effectively apply the time-space network model, how to solve the problem of the time-space network model algorithm is also the focus of future research.

3 Conclusion

Through the analysis of the published literature, it has been found that a great deal of research has been done on the problem of vehicle path planning in the distribution of emergency supplies. Some

scholars like (YI, 2007; Wang Shaoren, 2010, 2011), Haghani et al. (1996), zdamar et al. (2004), and Xu Tianben (2002), Barbarosoglu et al.(2002), Sheu Jiuh-Biing(2007), Wang Jing(2009), Yuan et al.(2009), Arun Jotshi et al(2009), Chen Daqiang (2010), Zhi-Hua Hu(2011), Zhang Yi, Liu Yong, Gwo-Hshiung proposed many new methods in the optimization of vehicle routes. Xie Binglei, Shi Yufeng, He Fangguo, Li Yinzhen, Zhao Yanwei, Liu Guiying and others made a systematic study of the distribution of emergency materials under random circumstances. Deng Xianming, Dai Ying, Wang Xuzhu, Zhang Qun, Yan Rui, Kang Xuhui, Yan Haibo, Cao Erbao, Liu Linzhong, Ge Yue, Zhong Bo and others mainly studied the distribution of emergency supplies in a fuzzy environment. However, in many researches on material distribution methods, there is little mention of the use of time-space network models for the optimization of vehicle routing for emergency goods distribution, the use of time-space network models in other areas of transportation has been extensive. For example, Le Meilong applied the time-space network model to the allocation of flight models, Hao Congli used the time-space network model for the optimization of railway freight transportation and Ingmar Steinzen used the time-space network model to optimize the vehicle scheduling problem. It can be seen that the time-space network model can be used to optimize the problems in various traffic areas. It is also possible to consider the use of time-space network models and the optimization of emergency material distribution methods. At present, some scholars have proposed the use of time-space networks for disaster relief, but they have only theoretically analyzed their advantages and feasibility, and have not proposed how to use time-space network models to optimize the distribution of materials, researchers can do further research in this area. Applying the time-space network model to emergency logistics, based on the previous research, we further optimized the routing problems in the emergency material distribution process, making it possible to have a more efficient and feasible material distribution plan after the disaster and improve disaster relief capabilities.

Acknowledgement

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Research on the Community Health Service Centers in China

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Abstract: The low rates of visit willingness and utilization of medical service in the Community Health Service Center (CHCs) are dual problems need solving urgently. In this article, statistical analysis of data is collected from announcements in official websites of NationalHealthCommission of the People's Republic of China, relevant literatures, and expert consultations. The reasons for being unappealing, inefficient andunprofitable of the CHCs are analyzed from three aspects: factors of consumers, own construction of CHCs and medical service system. The CHCs could give full play to the basic role to solve the difficulty and high cost in getting medical service though correct guidance for consumer's cognition, improvement in medical service quality, strengthening of management and increase of government investment.
Key words: Community health centers; Poor attractiveness; Unclear positioning; Suggestion

1 Introduction

Communityhealthcenters (CHCs) are powerful tools in the three-tier system to guard the basic health of people and make it feasible that people all can get comprehensive, equitable, and affordable healthcare. There is already a great deal of researches and explorations for the development of the CHCs, which aim to promotethedevelopmentandmakefulluseofthemedicalcapacitiesofCHCs. By the comparison of three CHCs models, it has been pointed out that the patients prefer CHCs with more medical staffs and more adequate financial input (Li Het al.2015). The reason of the higher utilization rate for hospital than CHCs is also the difference of allocation in financial capital, which requires the government to increase financial input as a powerful measure to improve the utilization rate and health equity of CHCs (Pan Xet al.2006). It is consistent with the above conclusion that consumers choose to visit hospitals instead of CHCs because of the higher medical level and better reputation of medical staffs (Jun Yet al. 2008; Song Jet al.2015), which indicates that more medical staffs with good attitude and cognitive ability should be assigned to CHCs(Wang Yet al.2006). The research shows that the establishment of the assessment mechanism can effectively promote the development of community service (Mei Jet al.2016), and the lack of a systematic and efficient performance assessment system could result from inadequate utilization of the feedback information to set the future plan in CHCs (Wong STet al.2010). It is intriguing that some studies which measured consumer satisfaction with CHCs services prove the relationship between patient satisfaction surveys and improvement in medical services (Li Zet al.2012; Wu Jet al 2016), and turn my attention to the consideration for the neglect of the mental features and behaviors of potential consumers. Researchers have been focusing on improving the function as first level safeguard of CHCs，there is no doubt that their achievements value a lot and do contribute to the development of CHCs while they both only explore the way out by dealing with its own problems ,trying to solve difficulties through perfection of management framework, optimization of medical treatment resources disposition and better medical ethics construction .The dilemma of CHCs can't be overcome only by self-change or fitting itself to the various and diverse types of needs, it is merely impossible to reach the expectation of people in time which is dynamic and always raises at a faster rate than the development of CHCs. Meanwhile the majority of researchers study the problems of position, service level and willingness to see a doctor based on the professional technical index, while this article discuss the current problems from the perspective of Community residents. Medical services consist of three parts, service providers, service consumers and the objective environment (competitors and national policies). There is a need for efforts of both three part, understanding of consumer which is subjective and the key point of consumers' decision whether to believe in CHCs or not, along with development of CHCs and support of government are integral to the final success. On the basis of the three parts, this article puts forward corresponding suggestions for improving the attractiveness and utilization of services. The CHCs mentioned here are defined as comprehensive grass-roots health service institutions with reasonable distribution which meet the needs o f community residents and community health service function, having beds for rational number and suitable types, aiming to solve community health problems and meet the needs of basic health care services, aimed at solving the community health issues and reach the standard of basic medical and health service, and providing

prevention, health care, health education, family planning, medical treatment and rehabilitation by professional technicians. In recent years, the government at all levels has increased the construction of CHCs and provided convenient and basic medical services for the community population. However, the community health service center still has the problems of being unappealing, inefficient and unprofitable, which must be analyzed and improved.

2 Existing Problems
2.1 Basic situation of CHCs from 2016- 2017

The gap between the community health service centers and other institutions in terms of number of visits still exits, and the index reflecting the performance and efficiency is unsatisfactory.

Table 1   Service Quality of Medical Institutions

	Number of visits（ten thousand）			Number of discharged patients（ten thousand）		
	2016	2017	Growth rate（%）	2016	2017	Growth rate（%）
Tertiary hospitals	142221.5	152430.9	7.2	6639.7	7365.9	10.9
Secondary hospitals	110332.0	115023.3	4.3	6804.8	7160.7	5.2
Basic hospitals	18518.2	19543.7	5.5	866.8	964.9	11.3
CHCs	61335.0	65188.8	6.3	307.6	301.4	-2.0
Township health centers	92073.2	93062.7	1.1	3279.9	3407.1	3.9
Clinics	54630.0	56570.0	3.6	-	-	-
Village clinics	174200.0	169670.0	-2.6	-	-	-

Table1shows the number of visitsof CHCs in 2017 was 6.3% higher than that in 2016, but the gross number is 613.35 million lower than that of other medical institutions .The discharge patients' number is an important indicator of the achievement and efficiency of medical work yet displays a negativegrowth(-2.0%).

Table 2   Beds Utilization of Medical Institutions

	Beds utilization rate（%）		Average length of stay(day)	
	2016	2017	2016	2017
Tertiary hospitals	99.1	99.2	10.1	9.8
Secondary hospitals	85.7	86.1	8.7	8.7
Basic hospitals	61.8	61.8	8.5	8.4
CHCs	55.9	56.7	9.6	9.6
Township health centers	62.1	63.2	6.5	6.6

Table 2shows that the Bed utilization rate of CHCs is only 56.7%, and the average length of stay(9.6 days)which reflects the medical resources utilization and qualityhaven'tbeen effectively controlledand shorten.

Table 3   Number of Medical Institutions 2017(one)

	2016	2017	Increment
Basic hospitals	34444	34422	-22
CHCs	36869	36639	-230
Township health centers	202230	212054	9824
Clinics	642091	637814	-4277

Table 3 shows that the number of CHCs has decreased by 22 over the previous year.

Data above shows increase in the number of visits in CHCs. However, there are great differences in both number of visiting patients and the discharged patients relative to the secondary and tertiary hospitals, even with township health centers at the same level, along with the low rate of beds utilization show the poor willingness for visits and the lack of attraction in CHCs. The number of discharged patients reflect that the opening beds and the beds turnover are insufficient (the number of discharged patients is the product of open beds and beds turnover), as well as the average length of stay supposed to be reduced showed that the medical technical level, quality, effectiveness and efficiency of CHC s are in

need of improvement.

Surveys carried out recent years in Guangzhou，Wuhan，Beijing，Urumqi(Li li et al. 2015;Li na et al. 2016; Ni Nana et al. 2016; Zhang Xin et al. 2016)both reflect low willingness to see a doctor in CHCs and the same problems above.

3 Analysis

3.1 Analysis from consumer's aspect

3.1.1 Consumers' incomprehension of CHCs' orientation

Consumers are not clear about the purpose and significance of hospital grading and the accurate positioning of CHCs in the three tiers of hospitals(Zhu Xiaofeng et al.2017).The conventional thinking ofmost people is that the purpose of grading is to rank hospitals, and they subconsciously to put the tertiary hospital first in the hierarchical medical system and assume the CHCs at the bottom of the system whose medical level and service attitude almost all aspects are poor, cannot provide excellent medical services and protect patients' life safety (Lai Wenchun et al.2016;Wang Yali,2015;Zhang Anqiet al. 2018;Tian Ye,2016). In fact, the grading of the hospitall is not equivalent to the actual hierarchy, only the classification of the disease's light, heavy, slow, urgent and the difficulty of treatment, to realize the reasonable allocation of different medical tasks to the corresponding hospital. Different medical institutions provide targeted medical services in a targeted manner, develop their respective strengths, and divert patients to seek medical treatment in order to achieve effective utilization of resources.

3.1.2 The halo effect of consumers

Before receiving the diagnosis and treatment of the CHCs, what information consumers can capture is the scale, appearance of the hospital, and hospital's visits amount through observation ，then the service attitude and professional degree by communicating with the staff and doctors in a short time. By comparing this information with other hospitals to form a preliminary judgment on the community health service, the initial jndgement of the CHCs is superficial, partial and cannot represent a whole. Relatively speaking, it is true that the scale of the CHCs, the technical equipment, the physician resources, the quantity and the quality is inferior to the larger hospitals, but this is due to positioning, and there is no problem in meeting its prescribed medical tasks. After the CHCs give a very bad first impression, the effect of halo was takes effect, and the bad impression is spread across all aspects of the hospital (Li Zhengquan,2008), then the consumer form a conflict psychologyand no longer willing to go to the CHCs for medical treatment.

3.1.3 Customers' herd behavior

Herd behavior exists obviously in seeking medical treatment as such special consumption activities that are associated with simultaneous expenditure of time and money ，whose treatment results are closely related to the most basic physical health. We are more willing to collect more information and listen to more advice before making a choice, besides the hope of eliminating the pain and restoring health through treatment, we expect to get a sincere and friendly service, maintain a harmonious relationship with the doctor and spend every penny on the edge of the blade (Zhao Ling,2008). The large hospital has always been the choice of most people, whether it is to seek advice from the people around or to consult the medical advice on the Internet，more information is directed to the large hospital. When obtaining enough information along with the function of guidance of mass behavior, patients will be more likely to rely on the large hospital for medical treatment.

3.1.4 Information asymmetry between consumers and Medical institutions

Medical itself is a kind of professional service with information asymmetry. There is a gap between consumers and physicians in the understanding of professional knowledge. The professional knowledge acquired by doctors and nurses comes from years of systematic study and practice, and it has repeatedly consolidated and improved to maintain advanced nature (Zhao Ling,2008). Consumers may know nothing about medicine, that is, they have browsed quite a lot of advice, learned enough information, still could not achieve informational equivalence with medical treatment providers. Many people even can't distinguish through the doctor's explanation of the illness what priority the situation rated, which makes it difficult to make objective and accurate judgments on medical services (Zhou Jianguo et al.2016).Therefore, many patients develop small diseases chose to go to the big hospital. As a layman, patients are not clear about the boundary between light disease and severe, big disease, they can't estimate what on earth the disease is, whether the illness is urgent, to which stage it has developed. In this case, the large hospital is the first choice for the majority of people, they hold the view that rely on the large hospital when you're not feeling well will never go wrong, so as to avoid going to CHCs

finding no access to the needed medical service ,resulting in the final transfer back to big hospitals, such a setback can not only waste time and money but also may cause failure to be diagnosed and treated in time.

3.1.5 Consumers live in Relationship society

People prefer to use interpersonal relationships everywhere in their lives, and they are accustomed to bringing about solutions to all problems through interpersonal relationships. Regardless of what they do, they like to create extra emotional bond in addition to accomplishing things. The more impactful contacts the better, the wider coverage the better. Whether it is clothes, daily necessities or service goods, as long as the quality is guaranteed, they will give priority to the providers with whom they have established relationships in order to enjoy the relaxation of familiarity, and to believe that nepotism can bring better attitudes and services, even better quality goods and more favorable prices (Chen Yanlin,2014).At the moment, emotion is the choice motivation, while transaction itself no longer matters. All the time, people have chosen to get medical treatment in the large hospital, the establishment of relationship net is more rooted in the large hospital, and then the olive branch is extended to the general population, which boosts the growth of the relationship net, forming a cycle of strengthening. When the relationship net of CHCs is not wide enough and solid, if the service provider is selected through a net, the result will be a large hospital.

3.2 Analysis from CHCs aspect

3.2.1 The positioning of CHCs is not clear

The functions of the CHCs include six integrated services: prevention, medical treatment, health care, rehabilitation medicine, health education and family planning technology guidance. However, in practice, many service centers do not fully develop comprehensive services, leaving patients with the impression that they can only treat minor ailments like cold, provide services as infusions and medications. Many patients do not even know that CHCs can provide hospitalization services. The CHCs, which is supposed to be closest to the residents, taking into account the daily medical and health needs of the residents, fail to manifest the advantages of favorableness and convenience for the residents ，meanwhile its resources have not been fully utilized and potential haven't been brought into full play. There are pharmacies to get medicines, and private clinics can provide infusion service, CHCs can do more than this, they should be able to identify their own status and to be distinguished from other institutions, embodying professionalism and comprehensiveness (Sun Jiali et al.2018;Tian Ye,2016).

3.2.2 Lack of human resources

The gross number of doctors in CHCs is quite depressing, and there is a lack of elite doctors. The primary reason is the imbalance between the rewards and efforts of the work, apart from this there is a shortage of resources, technologies, and equipment in the CHCs, as well as the lack of operating funds ,thus they cannot create the conditions for full use of wisdom and skills or opportunities of further improvement for willing employees. Last but not least, compared with large hospitals, the entire medical environment and technical qualification are inferior, the risk probability of medical accidents will consequently increase, in consideration of the tense relationship between doctors and patients and part of the patients are at daggers drawn with their doctors, tragedies can be triggered at any moment, in which case doctors can't be too evasive about medical accidents. In summary, the CHCs lacks the conditions for retaining qualified personnel (Zhang Mingyan et al.2016;Tian Ye,2016).

The allocation of general practitioner (GP) in CHCs is far from enough. General practitioners are generalists who deal with common diseases, frequently-occurring diseases, and general acute illnesses in the form of clinics. Another feature of GP work is home-based services, general practitioners often take care of family patients in the form of home visits, and establish their own family beds and medical records according to the patients' different conditions. General practitioners are still a relatively new concept. The training system is still immature, deficient in corresponding incentive mechanisms (Zhang Mingyan et al.2016), and has not yet been understood by the general public. However, the general practitioner is the necessary staffing for the CHCs.

3.2.3 Particularities of medical and health services

Providing medical and health services is the basic function of the CHCs. As a special commodity, medical services have severe information asymmetry and the characteristics of lacking of elasticity in price elasticity of demand. First, information asymmetry shows that the patient does not understand the medical expertise, and the same kind of service is provided to different patients, differences in service effects are due to gender, age, physical quality, living habits, and the objective environment. Even the same disease may adopt different items for individual health care. No evaluation criteria for health

services has been formed yet, accordingly patients are unable to make objective and accurate evaluation of doctors' medical and health services. In addition, the research on health economy in foreign countries shows that the coefficient of the price elasticity of demand is lower than that of other industry goods (service) (Lai Wenchun et al.2016). The demand of most medical and health services is inelastic and does not change obviously because of the tiny change of price. The patient won't choose a CHCs that has not yet won its trust over a slightly favorable price.

3.3 Analysis from medical and health service system aspect

3.3.1 Health care financial input

The financial investment taking up the bulk of operating fund is the premise of the construction, the fundamental foundation for the initial operation of the CHCs, and the key factor for the public welfare. Only when well built up to get the trust of the people, and complete their cardinal function treating the patients,can the CHCs give full play to the basic medical service function, actualize the income of the functional tasks, make it possible to turn around, and keep the normal operation and continue to build on this basis(Zhu Xiaofeng et al.2017). In fact, the state emphasizes the well-being of the people's livelihood, paying more and more attention to the medical and health services, and committed to make the public get better medical services and more equalized public health service. The investment of the state finance is increasing gradually, but the proportion in the financial expenditure is still lower, which is far from enough for the CHCs when allocated by layer distribution (Zhang Mingyan et al.2016).

3.3.2 Uneven distribution of medical resources

All along, the uneven distribution of medical resources in China is a salient problem, there are significant disparities in the distribution of health workforce (Chen R,2014).The CHCs is much worse than the secondary and tertiary hospitals, both in terms of technology and human resources, Secondary and tertiary hospitals continue to attract more excellent resources by virtue of their advantages, the gap between them and the CHCs is thornier to narrowed (Sun Jiali et al.2018). Medical resources occupy an important part of the hospital; it is the material basis of providing medical services. The full and high-quality medical resources are the indispensable guarantee for the good and smooth medical service delivery.

3.3.3 Competition in health service market

The implementation of medical reform has enabled the drug zero addition to be completely put into effect. The use of drugs to nourish medical care-the income of medical institution mainly come from drug selling - has always been an odd phenomenon in China's medical market. Before the medical reform, most of the hospital's income, apart from financial input and medical service income, came from the profits raised by drug markup. It is necessary to adjust the price system of the medical service and improve the price of medical service to adapt to the change of the income structure by abolishing the drug markup, actualizing the zero difference of the drugs and cutting off one of the three income channels of the hospital .While this adaptation process takes time, the number of patients will not diminish by the zero addition of drugs, the large scale of the patients also requires the increase of the size of the large hospital, and the survival and development of the hospital depends on its business income, which makes large hospitals increase the number of medical services while increasing the price of medical services ,thus strengthening the competitive relationship between the hospital and the CHCs in basic medical care(Lai Wenchun et al. 2016;Tian Ye 2016).

4 Suggestion

4.1 Keeping information open to consumers

By providing sufficient information to establish a foundation for consumers' trust. We are in the information era; new media is the strongest medium for the dissemination of information. CHCs can adopt new media technologies, establish an open information platform through web pages, WeChat and Weibo accounts to provide people with access to enough information relevant to the CHCs, clarify the positioning and functions of the CHCs so that consumers can understand what services the CHCs can provide, correct the subjective one-sided judgment that the CHCs can only provide infusion and medicine , and guide the masses objectively understand CHCs and abandon stereotypes, the same time pay attention to the masses' attitude, eliminate the doubts and worries of the masses through continuous interaction to increase willingness to get treatment in CHCs, make the best of feedback effect using method to trace the patient's medical experience survey, listen to the patient's personal feeling , based on which to improve the construction of CHCs.

4.2 Strengthen the construction of CHCs

4.2.1 Define the positioning of CHCs

CHCs must be accurately positioned. Compared with the secondary and tertiary hospitals, though the CHCs cannot solve the complicated and difficult diseases, it should carry out all the basic medical and health services for which it is responsible, throughout the whole process of disease prevention, treatment and rehabilitation, and focus on its own professional work, make a difference in the responsible field, so as to achieve the basic guarantee of the health of the residents.

4.2.2 Fundamentally Improve the Professional Service Capability of CHCs

CHCs in China started late, and all aspects are still in continuous improvement. The fundamental task of medical institutions is to provide prevention and treatment of diseases for patients .The ability to provide professional medical services is at the core of medical institutions, so CHCs should enhance the professional level of medical services, strengthen management and train professional general practitioners to ensure the quality and efficiency of service delivery, meanwhile enrich and update the technology, equipment and drug resources of the CHCs, shorten the average length of stay, and effectively increase the utilization rate of medical resources to provide a solid material foundation for the provision of medical and health services.

4.3 Actively seeking a way out in the health service market

4.3.1 Carrying out the responsibility of financial input

The CHCs has the nature of public welfare. If the total income depends on medical income, it will violate the characteristics of its gratuitous nature. Government should increase its financial input, set allocation structure right, and fully support the community's health infrastructure construction, technical equipment allocation, and medical personnel training in all aspects, so as to promote the community to expand service coverage and achieve equalization of public health.

4.3.2 Explore cooperation models with public hospitals

Policy alone is not enough to alleviate the tense competitive relationship between CHCs and large hospitals. The establishment of a suited mode of cooperation to solve the conflict of interest, along with the formation of resource sharing and sinking, can effectively relieve the pressure of the secondary and tertiary hospitals and encourage the development of the CHCs in the health service market.

4.3.3 Developing characteristic medical services

In recent years, the green diagnosis and treatment (non-drug treatment) has entered the public's field of vision. It carries out treatment with traditional Chinese medicine, such as Chinese medicine patch, diet, massage, cupping and so on rather than take medicine or provide infusion. It is especially popular in children's diseases, chronic diseases and geriatric diseases. For some patients with mild illness, long course of disease and special diseases, gentle and gradual treatment of Chinese medicine is a good choice. The CHCs can set up a combination of Chinese and Western diagnosis and treatment structure in this trend, and distinguish itself from diverse medical institutions with its uniqueness.

5 Conclusion

The development of community health service center is of profound significance to the grass-roots medical care of the country. It is an important measure to effectively solve the problem about the difficulties and high costs of public medical care. Joint efforts among the government, health administration department, CHCs and public are needed for the further development of the CHCs to give full play of the basic role for CHCs, and achieve satisfaction of the masses, medical institutions, and the government.

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Construction of Psychological Crisis Student Case Management Service System in Chinese Universities

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Abstract: By using the methods of literature research and comparative study, this paper puts forward that the case management team should be introduced into the psychological health service of the psychological crisis students in Chinese universities. It is believed that the case management service object in Chinese universities should include students with the suicide risk, ones with the psychological diseases and ones with the history of psychological disease treatment, and the case management team should be led by case managers, counselors, psychiatrist, ideological and political educators andschool leaders at all levels. A case management service system is constructed, which includes psychological evaluation, formulation and implementation of the programs, effect evaluation and improvement. It is concluded that the construction of a case management service system for psychological crisis students which is in line with China's national conditions will help to maximize the effectiveness of mental health services.

Key words: College students; Psychological crisis; Case management service system; Construction

1 Introduction

The term "case management" appeared firstly in the law of education of disabled children was promulgated by the federal government of the United States in 1975 (Ye Mengzhu, 2003). Its emergence is one of the most important advance in the field of human services. About the case management, different scholars have different opinions. Such as, the Case Management Society of America(CMSA) proposed that case management is a process of cooperation, including evaluation, planning, implementation, coordination, supervision and evaluation of selected services, It can meet the overall health needs of the case owners, improve the service quality and the cost-effectiveness through selecting reasonably the available resources and communication (CMSA, 2013). Hangan believes that case management is a way of focusing on work, highlighting priorities, reducing intermediate roles and processes in a team-cooperative way, based on the applicable target customers and resources, which can improve the experience of the client and their families in mental health services (Hangan, 2006).Xiu Huilan, a Taiwan scholar, believes that case management is the communication and coordination of the staff of different organizations, providing the necessary services for the client by teamwork, and expanding the effectiveness of the service (Peng Lu, 2014).It can be seen that case management is the process of providing service for the client by team members of different organizations. The process includes assessmrnt, planning, implementation, coordination, supervision and evaluation, which aims to achieve the docking of the client and the required resources, and to ensure the continuity of the service, so as to maximize the interests of the client.

Case management, as a management method to provide specific services or resources for service objects, firstly appeared in social work and clinical nursing. In 1960s, case management was introduced into the mental health service industry and gradually became a common way of providing mental health services to specific people worldwide. Research shows that case management services for patients with mental illness can effectively improve patients' treatment satisfaction and mental health treatment rate.Ziguras's cluster analysis of 44 mental health case management studies from 1980 to 1998 showed that case management has three advantages in family burden, family satisfaction and nursing costs;In addition, case management has obvious effects in reducing symptoms, increasing doctor-patient contact, reducing the rate of shedding, improving social functions and patient satisfaction(Ziguras,Stuart,2000). Bender's linear regression analysis of 3 data sources suggested that case management service is an effective tool to leave young people in mental health treatment, because it reduces service access, achieves multiparty coordination, and establishes a relationship between the customer and the liaisons, which can raise the mental health treatment rate of individuals and groups (Bender, Kapp, Hahn, 2011).Liu Xiangming and others have found that the use of case management mode for schizophrenic patientsin the community can improve their quality of life and self-care ability (Liu Xiangming, Liu Cuimei, Wang Dong, 2011). Xu Weiya's study found that the implementation of case management for patients with bipolar disorder in the community can effectively improve the social function and the

condition of the patients and reduce the recurrence rate (Xu Weiya, 2017). Li Zhilin and others think that case management shows the pattern of team cooperation and resource integration,and introducing case management into the field of mental health service in universities has unique advantages in dealing with difficult cases, especially crisis cases(Li Zhilin, Zhang Jiyu, Wang Qing, 2017).Yang Rui's research finds that students with learning disabilities can change their self-cognition, bad habits and improve their personality development by using the method of case management (Yang Rui, 2017). Therefore, by using the method of literature research and comparative research, this papertrys to make a comparative study on the status of psychological crisis case management service in universities at home and abroad. On this basis, this paper studies the service object, team composition and service process of the case management of psychological crisis students in China, aiming to construct a case management service system for psychological crisis students, which is in line with China's national conditions.

2 Comparative Study on The Current Situation of Case Management Service in Universities At Home and Abroad

In the United States, there have been many theoretical and clinical studies on how to implement case management in school mental health services. Such as, Terry, an American scholar, puts forward his own views on the composition and operation mode of case management team.He believes that the core staff of a case management team should be made up of a wide range of school staff and other health services associated with the need, which includes school leadership, student service / pastoral care staff, school psychologists or consultants, clinical psychologists, clergymen, social workers and young workers, and so on. At the same time, the role and responsibility of the members should be clearly defined.The case management team operates as a consultative team, such as regular meetings, sharing of goals and interventions designed for students, responding to critical events and planning preventive measures, and establishing alliances with some institutions to promote the participation of these institutions,etc.(Terry, 2006).In the mental health service of the Philadelphia University in the United States, the objects of case management include students with mental health problems, ones with alcohol and drug abuse, ones with behavioral disorders, and ones with academic problems or violent tendencies.Case management is the most distinctive team work at counseling and psychological service center of Madison University in Wisconsin, United States. Its main functions are evaluation, planning, consultation, monitoring and referral, that is, to discuss the students to be concerned, to make suggestions, and to make plans. It involves a variety of fields and levels, and consists of working groups with different expertise.In their case management system, different specialized psychological providers work together, keep in touch, and the case manager keeps in touch with the external professional institutions and community service providers, whichensures that the team can continue to understand and grasp all the circumstances of the case.At the same time, the team maintains effective links with the student management department or staff, such as the educational service department, the student department, the dormitory management department, the student family, the community service organizationetc., in order to realize the student information collection, summary analysis and joint processing(Li Zhilin, 2018).

In China, how to carry out case management in mental health service of universities is still in its infancy, and there is not much theoretical research and practical exploration in this area.Such as,Li Zhilin and others think, the object of the case management service in Chinese universities should include students with problems of safety and stability, ones with past history of psychotherapy, ones who need psychotherapy, ones who need to be transferred to the outside psychological service or be transferred to the school from the outside psychological service, and ones who need additional support and service or do not belong to mental health services but still need help. The case management team should consist of case managers, assessors and crisis intervention personnels (Li Zhilin, Zhang Jiyu, Wang Qing, 2017).Wang Shaowen pointed out that the procedure of case management for students with psychological problems should include the following steps: identifying the case owner, establishing a relationship with the case owner, assessing resources and diagnosing, formulating service plan, obtaining internal and external resources, coordinating resources and ending service (Wang Shaowen, 2014). By using the method of grounded theory, Peng Lu found that the case management of mental health services in 9 universities in Hubei Province was not perfect, and most of their service object were students with serious mental illness or suicide risk(Peng Lu, 2014).From table 1, it can be seen that in the composition of the case management team, there are no extra school professionals, especially the psychiatrist, as a member of the team; in the setting of case managers, there are no special case managers in 5 universities;in terms of the case management process, none of the nine universities

surveyed had developed an independent plan or had a rigorous evaluation of the effectiveness of the program..

Table 1　The Status of Case Management In Nine Universities Surveyed

University code	professional of outside school	Full-time psycho-logical teacher	case manager	Case management plan and effect assessment
A	no	having	having	no
B	no	having	no	no
C	no	no	having	no
D	having	having	no	no
E	no	having	having	no
F	having	having	no	no
G	no	having	having	no
H	Unknown	Unknown	having	no
I	no	having	no	no

Through the comparative study of the present situation of case management service in universities at home and abroad, it is not difficult to see that in the case management service object, the service objects of foreign universities are more extensive, which include students with psychological problems and ones with academic problems or other problems, but the service objects of Chinese universities are mainly students with psychological diseases or Suicide risk; In the composition of the case management team, the team of foreign universities consists of the professionals in all aspects,but the team of Chinese universities is mainly limited to the staff within the school and lack of the use of outside resources; In the case management service process, foreign universities have a very rigorous, professional and perfect service process, while the service process of Chinese universities is not professional and perfect.

3 The Service Object, Team Composition and Service Process of Case Management of Psychological Crisis Students in Chinese Universities

Comparing with the mature experience of case management in psychological health service of foreign universities, we find that the case management of psychological crisis students in Chinese universities should be defined and perfected from three aspects: service object, team composition and service process, so as to provide more professional and effective psychological health service for psychological crisis students.

3.1 Identify the service objects of case management of psychological crisis students

Theservice objects of case management of psychological crisis students　in Chinese universities mainly include the following kinds of students:

Students who have hidden dangers of life safety. When students are in danger of injuring themselves or hurting others, the first is to ensure their safety of life and directly contact the psychological crisis experts to evaluate them, and to bring them into the case management team to discuss its acute, danger and stability, so as to determine the further measures which include direct crisis intervention, transferring to hospitals or professional institutions, etc.

Students with a mental illness. When students suffer from psychological diseases such as depression, schizophrenia, or bidirectional affective disorder, they should be brought into the case management team and be treated with drug treatment and psychological counseling.

Students with a history of mental illness. For those who have been hospitalized or out-patient for mental illness, they should also be brought into the case management team.

3.2 Define the composition and function of case management teamof psychological crisis students

The functions of case management in university mental health service include resource integration, crisis management, psychological assessment and referral. In order to perform its functions, the university should have a fixed psychological crisis student case management team, and every professional in the team should have its functional requirements. Specifically, the composition and functions of case management team are as follows:

The first is the case managers. This is the core of the case management team. The case administrators of college psychological crisis students　are best equipped with full-time teachers of mental health education. The main functions are to evaluate the psychological situation of the psychological crisis students , to formulate individual case management schemes, to assist students to

connect with the resources in the school and outside the school, to follow up the referral students, to coordinate the inpatient students, and to find all kinds of resources and support. In addition, the case manager is the coordinator of the whole team, is responsible for the convening and process of the case management meeting, the sorting and integration of all kinds of information, and the communication of different personnel and departments.

The second is the counselors. Their main function is to provide psychological counseling for students. When necessary, they will communicate with the case manager after obtaining the consent of the students, so as to seek more resources and support for the students.

The third is the ideological and political educators. Ideological and political educators are the staff of Chinese universities to carry out ideological and political education and daily life learning management for students and to organize students to carry out various activities, including scientific, technological and social practice activities. In the case management of the psychological crisis students, their main function is to talk with the students regularly, to understand the students' psychological dynamics, to help the students to solve the problems in their study and life, and to urge the students to insist on drug treatment and psychological counseling.

The forth is the psychiatrist. Its main function is to diagnose and treat students and provide regular referral services to students.

The last is the school leaders at all levels. They include leaders of the leader of the student affairs office, deputysecretaries of departments, and presidents of school hospitals. Their main function is to provide resources for students.

3.3 Formulate rigorous, professional and perfect service process of case management of psychological crisis students

In the author's opinion, by drawing on the experience of case management in foreign universities, the rigorous, professional and perfect service process of case management of psychological crisis students should include fourlinks, such as psychological assessment, formulation scheme, implementation scheme, effect evaluation and improvement.

The first, evaluating students' psychological problems.The participants in this link are mainly case managers and psychiatrists. When a student has a psychological crisis, a case manager needs to make a preliminary assessment of its psychological condition. If it is found that a student may suffer from mental illness, he or she needs to be transferred to a psychiatrist to be diagnosed, and if necessary, students should be recommended for medical treatment or hospitalization. When the students return to school after hospitalization or suspension of school, the psychiatrists first assess the psychological recovery of the students. If the students have basically recovered their mental health, the case manager will evaluate the problems, difficulties and the possible resources that the students may face after their return to school.

The second, formulating a case management scheme. The participants in this session mainly include the leader of the student affairs office, the deputy secretaries of department, the case manager, and the ideological and political educators. When the students confirm their mental health by psychological assessment, the case manager convenes the leader of the student affairs office, the deputy secretaries of department and the ideological and political educators to hold a case discussion, and set up a case management scheme, the sequence and the methods of implementation.

The third, implementing of a case management scheme. The participants in this session include case managers, ideological and political educators, counselors, and parents. In this link, the case manager is mainly responsible for coordinating the resources of all parties to offer the most effective help to the student, keeping in touch with the ideological and political educators and counselors, supervising the implementation of the case management program and doing a record. Ideological and political educators are mainly responsible for supervising student to return visits and to take medicine and regular psychological counseling, and talking with students regularly to understand the practical problems that students may encounter during medical treatment or interpersonal communication in their life and study. Ideological and political educators should communicate with the case manager, and assist the case manager to help the students to solve the actual problems. They should also give full play to the role of the student cadres, let the student cadres care and help students, give emotional support and accompany in their study and life, build a psychological support system for the students, communicate with parents regularly and understand the situation in a timely manner. They also have to do a good job record. The counselor is mainly responsible for regular psychological counseling and consulting records, urging students to adhere to drug treatment, and offering timely feedback on the actual problems and difficulties that students talk about in the consultation to the case manager. Psychiatrists are mainly

responsible for regular referral, timely detection of students' problems and risks, and feedback to case managers. Parents should communicate with their children regularly, give emotional support, accompany, care and encourage, accompany them when necessary, and communicate the problems and difficulties of the children with ideological and political educators in time.

The last, evaluating and improving the service effect of case management. The participants in this link mainly include the leader of the student affairs office, the deputy secretaries of department, the case manager, ideological and political educator, the counselor and the psychiatrist. The case managers organize the relevant personnel to hold the effect evaluation meeting, and evaluate the implementation effect of the case management scheme according to the report of the parties. If the psychological condition of the students is improving, the program can be continued. If the effect is not ideal, then they should discuss the reason and improve the scheme.

4 Conclusion

In China, with the progress of society and the development of the times, students are facing increasing psychological pressure, and the incidence of psychological crisis incidents is gradually increasing.How to provide more professional and effective mental health services for psychological crisis students has become an important task of Chinese universities.As a mode of team cooperation and resource integration, case management has unique advantages in dealing with psychological crisis cases.Therefore, the implementation of the strict, professional and perfect casemanagement in the psychologi-cal health service of psychological crisis students will help to maximize the effect of mental health service. In the future, we should strengthen the exploration and research of the case management service system of the psychological crisis students .

Acknowledgement

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Externalities and Property as Guiding Factors for Management of Common Pool Resources

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Abstract: This article aims to reflect on how management can be the common pool resources oriented by principles of externalities and property. Thus, the guiding concepts for decision making regarding these two factors were those of the positive or negative externalities generated from the exploration and use of goods as well as the aspects related to the property of resources. Resources may be categorized, as being rivals and / or excluders, and their regularly generate externalities to other social actors in the present, as well as to their own possessors or potential users in the future. Therefore, based on the study of these relationships, could lead to a better decision-making process, concerning ownership of access, and on management as to the preservation and use of common pool resource. Moreover, it is necessary to understand that every resource consumed leads, at some point, positive or negative externalities to other individuals. In addition, the simple monetization of resources does not solve the problem of negative externalities. Therefore, based on the categorization of the property that has to be exercised and the externalities, it is possible to understand how to manage a resource. This situation helps to understand the exercise of control and usufruct of the resources.

Key words: Common pool resources; Externality; Sustainability

1 Introduction

The production and consumption system supply the demands of society by private goods and services. Consequently, it is necessary to exploit resources of the most diverse types for this system function. Thus, when dealing with resources, it can be said that several discussions can arise, mainly because of the advantage in free-market systems has always been to control these resources (Barney, 1991). However, there are some resources that are consumed collectively like the oxygen present in the environment, forests, schools in the seas and rivers, game animals, public parking spaces, streets and public avenues etc. (Ostrom, 2000; Ostrom, 2008; Hardim, 1968).

To discuss the use of resources is necessary understood how the ownership and management of these resources are. Although there are resources that are privately owned, there are also resources of property and common use such as those mentioned above and those are of collective use and are called common pool resource. We can say that based on the relationship between the availability and the use of these resources is that socio-environmental conflicts occur. In this way, the problems generated by the common pool resource come from their scarcity, which is increasingly frequent due to the crisis in their normal rate of regeneration, which is caused by economic action (Libiszewski, 1992). On the other hand, actions that impede the capacity of resources of resilience make the discussion about common pool resources emergency.

Common pool resources can be understood as the set of benefits that are shared by all members of a society, or at least most of them. This feature is also called the common pool resource. It is worth mentioning that this is a shared economic good, independent of any system of legal property rights (Ostrom, 2000; Ostrom, 2008; Hardim, 1968).

Starting from the reflection on the private goods and the common goods this article aims to reflect on how the common pool resources can be managed. For this purpose, it is argued here that by understanding better how the externalities of the use of these resources are generated, a guiding bias can be established to make decisions regarding their use. Although this topic has already been discussed by Hardin (1968) e Ostrom (2000; 2007; 2008), this topic still has relevance of being treated in order to contribute with the understanding and diffusion of the subject.

2 Common Pool Resources and Externalities

2.1 The property right on the goods

Individuals to meet their needs and desires need goods and services that are produced or available in nature. It is worth mentioning that the use of natural resources such as wood, ore, among others, occurs even for manufactured products. Besides, when it comes to production, it is necessary to remember that the production or transformation of natural resources, as well as their consumption, generate waste that will be sent back to the common environment – common pool resource. In the same way, when you remove common goods from nature you also remove your ability to generate ecological services (Huntsinger& Oviedo, 2014).

To understand the use of common pool resources in society, we must discuss the right of ownership. Thus, we can define in four property categories of common resources, namely: open access, private property, communal property and state property (Feenyet al., 1990).It is worth emphasizing that the property question raised here is related to the ability of the possessor of a good to make decisions and take care of the good; ownership is related to being able to manage to make the good sustainable.

Common resources that have open access are those where there is a lack of well-defined property rights. Moreover, in many cases, the access to these resources is not regulated, and in turn is "virtually" free. Examples of this free access to common resources may be fishing in some lakes or in the open sea, furthermore to the use or pollution of ambient air. In contrast, when private ownership of this type of property is exercised, it may exercise the right to exclude others from using its resources. Being that the case to regulate the use of these resources are invested powers in an entity, that can be an individual or an organization. It should be noted that property rights are generally recognized and regulated by the State (Berkes, 1989).

Another category of property is called communal property. It means when the resource is maintained by an identifiable community as interdependent users. These users can exclude strangers from the community while regulating the use by members of the local community. It should be noted that within this type of society the rights to use the resources are not likely to be exclusive or transferable, the rights of access and use are equal. Some examples of this type of property can be found in some coastal fishing and pasture properties, which are managed as communal property (Berkes, 1989; Ostrom, 2008).

Regarding Public property, the rights to the resources invested are exclusively of the government, which in turn makes decisions about access to resources, level and nature of the holding be regulated. The category of assets may refer to goods of which the public has equal access and use rights, such as highways and public parks. An important point in the nature of the public property regime is that it has the power of coercion of the police to assert its use or exclusion. Another very important point is the generation of revenue to administer state property part of the taxpayer payments through taxes and fees.

Therefore, when introducing the concept of property in the use of resources, it is possible to reflect on the exploration and capture of them. Accordingly, when individuals, governments and companies try to solve order problems related to resources access and exploitation, tends to see two types of solutions. On the one hand, the ownership of resources exercised by the State, occurring the administration and availability of access by government action. On the other hand, private property can be exercised, whether individual or corporate, making use of free competition in the market for regulation in the exploitation of resources (Bollier, 2008; Hardin, 1968). It should be stressed that the maintenance of a property, regardless of who owns it, will need social and financial resources that will be generated in different ways.

Then, based on the preference for private or state property, the discussion about the exploration or management of common property leads to reflection on one's own survival on the planet. This premise is true when we adopt the perspective that resources are all common, because the natural, social and even economic environment suffer from the influence of all the existing actors in society, and to a certain extent on the planet.

Although the management of natural resources is more frequently discussed as common goods, it is necessary to understand that better management of social and economic resources are also important for the well-being of a society. It is a fact that the crisis of 2008 affected every planet when the scarcity of financial resources in some localities. Notwithstanding the crises that occur at the beginning of the 21st century, it is increasingly evident that society is globally interconnected, not only by political, economic and technical systems, but also through biophysical systems supporting life on the planet (Mann, 2017; Morin, 2013; Henderson, 1991; 2003).

Thus, for a better use of resources by individuals, organizations or the State, it is required to understand the relationships arising from their exploitation and supply. In fact, the assets of our economy can be grouped according to two characteristics (Passuello, Oliveira & Mendes, 2009), which are:

a) Exclusion: people excluded from enjoying the economic good, because their access is regulated. Laws recognize and enforce private property regimes.

b) Rival: the use of an economic good by one person reduces the benefits to others.

Based on these two functions and the objectives that individuals seek to meet their needs and desires, goods can be categorized according to their production and consumption (Hines, 2008). This relation of rivalry and exclusion with respect to goods can be verified in table 1.

Table 1   Resources Regarding Their Functions

	Excluding	**Non-Excluding**
Rival	Private Property	Common Pool Resources
Non-rival	Products "Club" (communal property)	Public Goods

Source: Adapted by the authors, 2018 (Hines, 2008).

So, rival goods are those whose use by one person prevents their simultaneous use by another. The goods that are exclusive those whose used by a certain individual, and they can be protected. On the basis of these categories presented in Table 1, four types of goods can be described as follows:

a) Private goods are both rivals and excluders.

b) Common goods (common access resources) are rivals but whose nature makes it difficult or impossible for others to use them.

c) "Club goods" (communal property) are not rivals, but some individuals may be excluded from use.

d) Public goods are neither rival nor exclusive. But, they are difficult to manage when for access to all, as it is usually about the guardianship of the State.

Therefore, reinforcing the idea of management of common goods, it is known that these goods are rivals, but they are not exclusive. Thus, the available commons can be understood as shared resources that a community builds and / or maintains. Examples can be cited: common public resources such as libraries, parks, streets, etc.; common natural resources such as lakes, animals, vegetation, etc.; and common environmental resources such as atmosphere, water and biodiversity (Bollier, 2008). In turn, these natural or environmental goods contain an element of negative externality inherent in having no associated price when they are exploited or used (Passuello, Oliveira & Mendes, 2009).

Another way of understanding common goods is presented by Espeleta& Moraga (2011). These authors stress that the International Forum on Globalization proposes three types of common pool resources:

a) A first type that includes water, land, air, forests, fish stocks, i.e. the biological resources that are necessary for life.

b) A second type that can be categorized as culture and which includes knowledge.

c) The third type which is socially common property. This category is made up of resources which ensure public access to health, education and social security.

Based on these cultural and social dimensions of the common goods a new attitude can be adopted when exploring and consuming common goods. Ostrom& Hess (2007) describe that the ability to exploit what was once accessible generates fundamental changes in the nature of the resource, that is, this type of common good provides a new approach in the property ownership determination. The fact that it modifies this relationship is that these types of commons are neither rival nor excludable. Unlike natural resources, their "intangibility" means that the exclusive property of the good is not exercised. So, sharing is not only acceptable, but also beneficial since it improves its characteristics.

2.2 Exploration externalities and resources usage

As stated previously, people organize themselves in society so that their needs are fully and safely supplied, so that goods and services are needed for their subsistence. In addition, for a given company to function properly, resources must be managed based on a short-term economic vision, but also looking at the sustainability of medium- and long-term resources (Beck, 2014).

In this way, it is worth emphasizing that when thinking about a society one must understand that economic growth and socio-environmental development must always be linked (Sen, 2000). The problem created between privileging the short-term economic to the detriment of long-term

socio-environmental sustainability can be exemplified by the use of a high-value resource such as trees or river water, as their market values often do not account the socio-environmental cost to society due to its shortage.

Therefore, trees cut to make charcoal, furniture and other wooden utensils, as well as drinking water used for expensive washing, backyards, among other uses of little importance to maintain the life of the people, can generate serious damages to the subsistence in the planet (see: Mekonnen& Hoekstra, 2016; Kanemoto, Moran &Hertwich, 2016). It is worth noting that these losses occur on a large scale and accumulate more and more (Brown, 2003).

Thus, in the composition of the market value of the goods, it is often not considered the total costs, present and future, for the use of these resources. So it is admitted that the passing on of these costs affects the environment when its shortage, workers in reducing wages and citizens in the lack of public services or payment of taxes (Bollier, 2008; Sen, 2000; Beck, 2014).

So, in dealing with the use of natural, social or economic resources for the production of goods or services, present and future costs must be taken into account. Although the costs incorporation increases the price of goods, they can still be understood as value aggregators. The reason for this reinforcement is due to a greater awareness of the future availability of resources, despite the fact that the pricing of negative externalities is restricted to a limiting instrumental rationality; this is a form of perception common to all because the concept of environmental value is very loaded with subjectivity.

Therefore, the perception of value in relation to products and services depends on an evaluation of the other based on their personal beliefs and values. To facilitate the understanding of asset values, they are presented here based on three categories (Pearce *et al.*,1989), namely:

a) Value in use - is the value attributed to a good by the user;

b) The value of option - value that they attribute to the permanent possibility of using it;

c) The value of existence - is the value attributed to existence itself, regardless of current or future use expectations.

These approaches help in the evaluation of goods and services in general and of common goods in particular because in determining the use, choice or existence of a good, it determines losses or gains in relation to the consumption of resources in the future. Since the burden of consumption is often not assimilated by those who are consuming in the present, this is one of the main questions about sustainability: Future. Moreover, when the losses of unconscious and inconsequential exploitation of resources are highlighted and understood, the externalities of this process are exposed.

Externalities are represented by the cost or benefit that an agent, in the performance of an economic activity, imposes on third parties. Since this can happen positively or negatively on economic activity or even on another income or welfare economic agent without a corresponding compensation (Coelho, 2012; Gonçalves, & Ribeiro 2013; Cruvinel, Pinto, &Granemann, 2012).

In this way, externalities derived from the actions of an agent in society have natural, social or economic repercussions on resources for all (Eltz, 2012; Coelho, 2012). In a simple way, externalities are costs or benefits that are not included in the present prices of goods and services.

It should be emphasized that civil society, public sector and private sector have a relevant role in the implementation of initiatives that make it possible to maintain the competitiveness and sustainability of the production and consumption system, but that this present state of affairs does not affect other agents or the same agents in the future (Xavier, &Caldeira-Pires, 2004; Caldeira-Pires, Rabelo, & Xavier, 2002).

However, when there is a concern with the externality and it is compensated, it ceases to be an externality, and thus becomes internalized. According to Coelho (2012) two conceptions arise from this concern that try to explain the internalization of externalities. They are the Theory of Welfare Economics and the Theory of Economic Analysis of law. The former externalities would be market failures that the State must correct. The latter, it seeks to reconcile the application of legal norms to standards of economic efficiency (Gonçalves, & Ribeiro, 2013; Coelho, 2012).

Cavalcanti (2004), and Figueroa (2005) question the logic of commensurate with the immeasurable, that is, the use of a metric such as the monetization of all resources and goods indiscriminately. Thus, by monetizing goods in the form of economic valuation of externalities, it may become a trap for individuals, organizations, and the state. This question is related to the transfer by the internalization of natural resources that are not renewable, which generates damages to the society that cannot be recovered like the health of the people or the consumption of goods essential to life.

Therefore, in dealing with the common goods and the generated externalities of their exploitation or consumption it is important to understand that value or value measurement is not something easy, or

in some cases accepted. So, for the administration of common resources in the production of goods and services, it is necessary to base themselves on the concept of inalienability (Bollier, 2008). Since this concept is related to something that cannot be sold, then ownership of the common goods belongs to everyone and to no one, because its use benefits those who consume at first, but harms everyone by their scarcity in the future.

2.3 Externalities and common pool resources

At the beginning of this work we explored the concept of common goods that describes a wide variety of phenomena, since it refers to the social and legal systems that are used for the administration of resources that are shared use (Bollier, 2008). This could happen according to Ostrom (2000) in a fair and sustainable way. This is an idea contrary to what Hardin (1968) thinks, when he emphasized that any system of shared administration inevitably results in a "tragedy of commons".

Hardin (1968) described that a feature when it is free and shared access could ruin its existence. This situation he calls "tragedy of common goods". The author has attempted to prove that, like pasture and livestock of common access, where anyone can raise livestock unrestrictedly and free, property will be led to a common ruin.

According to Hardin (1968), restricted land case may be admitted that shepherds wish to maximize their production and increase the size of the herd whenever it is possible. In this situation, the usefulness of each additional animal has both a positive and a negative component:

• Positive: the shepherd receives the profit on each additional animal.
• Negative: grazing is slightly degraded for each additional animal.

The cost of overexploiting pasture is an example of a negative externality used as an example of a "commons tragedy". Another modern example of the use of common goods that can be cited is the existing congestion in large cities, so a public good suffers from overuse and loses its value to all. In the latter case, the negative externality generated by free access to the common good causes everyone to lose in mobility.

Hardin (1968) sets out two solutions to the problem of the scarcity of common goods, which are privatization or private property. Since the author was concerned with the way in which the population grows and consequently the availability of common goods is altered more and more people yearn to enjoy the common resources to meet their individual needs and desires, there is pressure on systems and resources, be they natural, social or economic.

Bollier (2008) draws attention to the fact that Hardin (1968) describes a system of open access to resources such as land, which is done without any kind of regulation. To do so, the described land resource presented without limits and without the existence of rules to manage the access to it and its use. In this way, anyone can take what they want, since no one is administering the commons.

On the other hand, thinking about the conscious management of common goods, Ostrom (1986) considers polycentric and multi-actor governance as a way of solving the problems of scarcity arising from the use of common goods. Therefore, for the author the interaction between national, regional and local governance can increase the likelihood of priority common goods conservation.

Ostrom (2000; 2008) argues that local citizens can create organizations with sufficient competence to decide how to manage collective assets, this being done by the aforementioned communal properties. In this way, the state through laws in any scope can incorporate the capacity of local actors in the exploration and use of common goods. Which in turn would lead everyone to a level of awareness about the preservation and future need of these goods. Research based on Ostrom's analysis has shown that human groups do not make unbalanced use of natural resources, as assumed by Hardin (1968).

Therefore, the idea of citizen management of common goods is to establish transparent and effective rules to give access to resources that are common in a shared way. So, with this set of rules one can ensure the proper preservation and use of the resource while protecting the community that shares these assets (Bollier, 2008).

Ostrom's (2000) studies show that as long as the principles and rules of collective ownership set are well-defined, and accepted and respected by all, it is possible to avoid the inconsequential exploitation of common property. In this dynamic, it is worth remembering that common goods are rivals, but they are not exclusive, so self-government makes access easy and maintained to all. Thus, Ostrom (2008) deals with the promotion of self-government, which would be a third way to the aforementioned nationalization and privatization. Moreover, with the use and development of cooperative institutions organized and governed by the users of the common goods themselves, a situation can be promoted that is beneficial to all.

Therefore, to administer the common goods one must attribute or recognize the value of an

externality and its internalization in the economic calculation. On the other hand, it is worth questioning the effectiveness of measuring by means of monetization the externalities arising from the exploitation of common resources. This aspect was greatly explored when discussing Carbon Trade (McHale, Hall, Majumdar& Grimm, 2017; Klein, Siegwolf&Körner, 2016).

In order to facilitate the understanding of the influential elements in the administration of common goods, one must seek to recognize the main aspects that interfere in the categorization and the exercise of ownership of these goods. Initially, one could consider goods as categorized by their aspects of being rival and / or excluding (Table 1). So that after this categorization it is possible to determine the type of property or access to the common goods and the generated externalities of its exploration and use.

Notwithstanding the type of common good, it is often the role of the state to harmonize the conflicting interest of the various agents in the use of these goods. This agent can regulate the economic cannibalization of the externalities that are triggered by society, as this can produce threatening situations that affect everyone in a planetary society and increasingly interconnected (Beck, 2014; Morin, 2013).

In this way, by understanding how to use the common goods, in addition to the costs of their exploitation, an awareness of the costs of use, choice or existence of a good can be spread. Thus, this conceptual framework helps in making decisions about who owns the property and can manage the commons in order to determine present and future responsibilities.

Therefore, by calling the assets available in a society "common", one assumes that it is shared and belongs to the people in general, ie, it does not belong to the government or to a private entity. A resource that is common serves broader purposes than those intended in the market (Bollier, 2008). In determining who will be entitled to ownership of a good, the externalities of its exploitation and use must be taken into account. It is worth emphasizing that the way humanity interacts with nature and transforms the planet will cause it to organize itself or defend itself (Gore, 2013; Morin 2013). In this way, by recognizing the current state of things and making decisions based on the externalities generated thereby, nature could become more resilient.

Contrary to this situation, not taking systemically into account, the future resources state in general and common property in particular, these could lead to deprivation of resources already in the present moment and its shortage in the future. As Sen (2000) points out, development consists in the elimination of deprivations of liberty that limit the choices and opportunities of people to exercise their condition as agent.

3 Conclusion

At the end of this study the issues related to property ownership were addressed, focusing on the management of common pool resources. This subject is addressed by two important positions. On the one hand, Hardin (1968) speaks of the scarcity generated by the shared use of common pool resources. On the other hand, Ostrom (2000; 2008) and Ostrom and Hess (2007) deal with sharing as a way of preserving common pool resources.

In order to deal with this theme, better understandings of the concepts that determine whether the access to the good is rival and / or excluding, as well as the generated externalities of its exploration and use are suggested here. These concepts can assist in the choices that arise when determined whom should be on charge of the common pool resources. Therefore, based on the study of these categorizations in terms of property, function (figure 1), and the kind of externality, a better decision-making process could be reached on the issues of access, and on management regarding preservation and use of common pool resources.

In addition, it is necessary to understand that the consumption of all goods could promote, at some point, positive or negative externalities to other individuals. Awareness of the externality types may help to decide the appropriate ownership and management. On the other hand, just the simple monetization of resources does not solve the problem of negative externalities. Therefore, based on the categorization of the property that has to be exercised and the externalities, it is possible to understand how to manage a good. This situation helps to understand the exercise of control and usufruct of the goods. It should be remembered that this property that is discussed here is related to the ability to determine the use and maintenance of the property.

Thus, taking into account some questions such as: Who should own the property of the common pool resource? What are the negative or positive externalities generated from the exploitation and use of the common good? What is the competence of the agent responsible for administering the common pool

resource? These and other questions can help not only the present state of the common good, but their ability to regenerate and sustain themselves for future generations.

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Hybrid of the Fuzzy C-means and Level Set Methods for Extracting Exudates on Fundus Image

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Abstract: Diabetic retinopathy is one of the diseases caused by diabetes mellitus. It can cause leakage of blood vessels in the retina or bleeding, and blurred vision. Early diagnosis of diabetic retinopathy is an important task to prevent blindness. The appearance of exudates is one of the symptoms of diabetic retinopathy. Ophthalmologists use the fundus image of patient to evaluate the exudates. Therefore, it is important to extract the exudates on the fundus image in the diagnosis of diabetic retinopathy. The exudates extraction of the fundus image is a difficult task for ophthalmologists because the fundus image often has poor qualities, such as the boundaries between objects in a less clear and a low contrast and noisy. A good extraction method becomes a necessity in the diagnosis of diabetic retinopathy. Segmentation method is one of method used for exudates extraction. There are many methods of segmentation. Level set method is one of the very well-known methods for image segmentation. It is also widely applied for many applications in image segmentation. The level set method has been successfully used in the medical image segmentation. It has several advantages over the methods of snake, region growing and thresholding. However, when the level set method is applied in the noisy images, it cannot work well. The noise in the images often causes the curve of the level set stopped prematurely in the process of evolution curve, resulting in unsatisfactory results. For this reason, this research uses the level set with fuzzy C-means. The fuzzy C-means is used as preprocessing to handle the noise of image for avoiding from the stopping premature of evolution curve in the level set. Based on these reasons, this paper proposes the hybrid of the fuzzy C-means and level set methods for extracting exudates on fundus image. From the experiment results, it is obtained that the hybrid of the fuzzy C-means and level set methods is able to work better in extracting the exudates on the fundus image than the standard level set method.

Key words: Level set; Edge stopping function; Fuzzy c-Means; Extract; Exudates; Diabetic retinopathy; Fundus image

1 Introduction

Diabetes mellitus is one of the chronic diseases which is caused by deficiency in production of insulin by the pancreas, or by the ineffectiveness insulin production. It is a characterized by the above normal increased blood sugar levels. Indonesia is among the top 10 countries in the diabetes mellitus patients. In 2013, diabetes mellitus patients in in Indonesia is estimated to reach about 8.5 million people with an age range of 20-79 years. This deasease causes many complication deaseses. Vascular complication is one of the complications of diabetes mellitus. Classically the vascular complications of diabetes mellitus are divided into microvascular and macrovascular. The microvascular complications are the diabetes mellitus complication caused by damage to small blood vessels, while the macrovascular complications are caused by damage to larger blood vessels. The most common microvascular complication of diabetes mellitus is diabetic retinopathy.

Currently diabetic retinopathy is the leading cause of blindness in the working age population in the western world (Semeraro et al, 2015). In the early stages, diabetic retinopathy is characterized by a narrowing of blood vessels in the eye which is caused by the accumulation of fluids and fatty material in the retina. It can lead to bleeding in the retinal blood vessel. This condition can lead to blurred vision and be left then it can cause severe vision damage as well as blindness. The risk of diabetic retinopathy can be reduced by early detection, controlling blood sugar, blood pressure, and lipids appropriately (Tarr, 2013).

Ophthalmologists use the retinal images of patients to diagnose diabetic retinopathy. This retinal image is known as the fundus image. The details of fundus images such as small blood vessels, microaneurism, and exudates may be in low contrast. Ophthalmologists usually use the fundus image of patient to evaluate the exudates. The exudates is one of the symtoms of diabetic retinopathy. Therefore, it is important to extract the exudates on the fundus image in the diagnosis of diabetic retinopathy. The exudates extraction of the fundus image is a difficult task for ophthalmologists because the fundus image often has poor qualities, such as the boundaries between objects in a less clear and low contrast and noisy. A good extraction method becomes a necessity in the diagnosis of diabetic retinopathy. Therefore, a method that automatically aided computers will help an ophthalmologist to recognize and

extract the signs of diabetic retinopathy disease.

Segmentation method is one of method which can be used for exudates extraction. The purpose of image segmentation is to divide the image into a separate set of regions with uniform texture attributes, etc. (Dhivya, Anitha, 2014). The image segmentation method can be applied to divide the fundus image area into two parts i.e. the exudate area and the non-exudates area. There are many methods for image segmentation. The image segmentation approach can be divided into four categories: thresholding, edge detection, area extraction and clustering (Yang, Huang, 2007). The thresholding method has several disadvantages, as it relies heavily on peaks and spatial details not considered. While the method of regional extraction is an expensive method in terms of time and memory (Kaur, Kaur, 2014). The edge detection methods are sensitive to noise and produce inaccurate results (Janoriya, Parsai, 2017). Level set method is one of the very well-known methods for image segmentation. It is also widely applied for many applications in image segmentation. The level set method has been successfully used in the medical image segmentation. It has several advantages over the methods of snake, region growing and thresholding. However, when the level set method is applied in the noisy images, it cannot work well. The noise in the images often causes the curve of the level set stopped prematurely in the process of evolution curve, resulting in unsatisfactory results. For this reason, this research uses the level set with fuzzy C-means. The fuzzy C-means is used as preprocessing to handle the noise of image for avoiding from the stopping premature of evolution curve in the level set. For this reason, level set and fuzzy C-means methods for image segmentation will be considered in this paper.

In this paper proposes the hybrid of the fuzzy C-means and level set methods for extracting exudates on fundus image. The results of the exudate extraction of the fundus image will provide the information of diabetic retinopathy sign for ophthalmologists in diagnosing diabetic retinopathy disease.

(a)   (b)

(c)   (d)

(e)   (f)
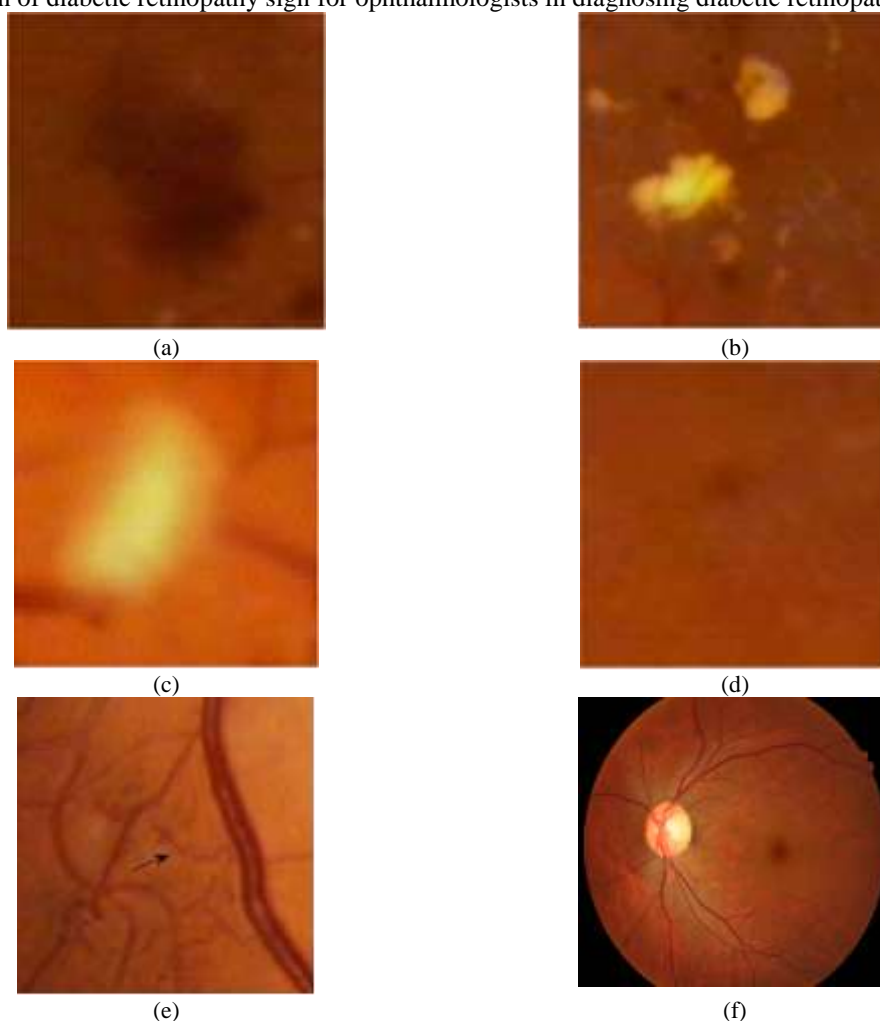
Figure 1   The Abnormal Findings on the Fundus Image Caused by Diabetic Retinopathy. (a) Hemorrhage, (B) Hard Exudate, (C) Soft Exudate, (D) Microaneurim, (E) Neovas-cularization, (F) Fundus Image.

2 Related Works

This section will describe some theory and the previous research related with this research, such as diabetic retinopathy and fundus image, image segmentation, Perona-Malik difusion filter and level set method.

2.1 Diabetic retinopathy and fundus image

Diabetes mellitus is a chronic disease which is caused by acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. It is a characterized by the above normal increased blood sugar levels. Diabetic retinopathy is a micro-vascular complication caused by diabetes that can cause blindness. The first detected abnormality is microaneurism that causes enlargement of retinal capillary enlargement. Broken microaneurism can cause hemorrhage to be seen in Figure 1. (a).

After that it may appear hard exudate as shown in Figure 1. (b). Hard exudate is a leaky lipid formation of weakened blood vessels. Along with the severity of retinopathy disease, the blood vessels may become inhibited causing microinfarct in the retina called soft exudate as shown in Figure 1. (c). The lack of oxygen caused by microinfarct causes the development of new brittle vessels (neovascularization), as shown in Figure 1. (d). This phenomenon can cause a sudden loss of vision. The diagnosis of diabetic retinopathy using fundus image is necessary because the disease is progressive, the example of the fundus image can be seen in Figure 1. (f).

2.2 Segmentation

Information technology is very rapid development in many fields. It has been utilized in medical, such as image processing technology. Image processing technology with artificial intelligence and robotics becomes a promising technology in medical. Anam et. al. proposed a texture analysis and modified level set method for automatic detection of bone boundaries in hand radiographs. The bone boundaries in hand radiograph is needed for segmenting the bone areas and the other areas (Anam et al, 2013). Anam et. al. also proposed a combination of PSO and fuzzy inference for calculation of coronary plaque boundary in IVUS (Intravascular Ultrasound) image. The plaque boundary in IVUS image is neccesary to calculate the plaque area (Anam et al, 2014). Boundary extraction of an image is one of the image segmention method.

Image segmentation is one of the image preprocessing methods in the classification or identification task. Image segmentation is a stage where the image is divided into homogeneous regions based on criteria of specific similarities between the gray level of a pixel with the gray level pixel neighbors. There are many the conventional image segmentation methods to such as gradient-based method (sobel, Prewitt, Canny and Laplacian methods) and template-based methods. Mazid in 2013 proposed a image segmentation method for segmenting the tobacco leaves by using Canny method (Mazid, 2013). Canny method has shortcomings can not produce smooth results. Li et al. proposed a segmentation method in 2005 by using the snake method. This method cannot work well when the image has two or more objects.

The other image segmentation method is level set method introduced by Osher and Sethian (Li et al, 2005). It is one of the very well-known methods and also widely applied for many applications in image segmentation. The level set method has been successfully used in the medical image segmentation. However, if the level set method compared with the conventional image segmentation methods has many advantages. The level set method is very robust and accurate for tracking moving interfaces are complex. The level set method has been widely applied in various fields, in particular for the image segmentation (Anam et al, 2013, Anam et al, 2014).

2.3 Fuzzy C-means algorithm

Clustering is a process of grouping objects based on the objects characteristics, so that all members of each cluster has a certain similarity. The clustering methods can be divided into two categories, i.e. the conventional hard clustering and the fuzzy clustering. The conventional hard clustering method restricts each element of the dataset to exclusively just one cluster. As a result, with this approach the segmentation results are often very crisp, i.e., each pixel of the image belongs to exactly just one class. However, in many real situations, the hard image segmentation is a difficult task because the image often has a limited spatial resolution, overlapping intensities, poor contrast and noise and intensity in homogeneities variation (Zadeh, 1965).

Due to the fuzzy situation, fuzzy set theory was proposed (Bezdek, 1981). It produced the idea of partial membership of belonging described by a membership function. The fuzzy clustering has been widely studied and successfully applied in image segmentation. Among the fuzzy clustering methods,

the fuzzy C-means (FCM) algorithm is the most popular method used in image segmentation (Pham, 2001). It is also one of the best known and the most widely and has been utilized in a wide variety of applications. The FCM algorithm has robust characteristics for ambiguity and can retain much more information than hard segmentation methods (Bezdek et al, 1983).

2.4 Level set method

Level set method was introduced by Osher and Sethian (Osher, Sethian, 1988). It has been widely applied for many applications, especially for detecting the image boundary. The level set method has been successfully used in the medical image segmentation. The contour of level set is represented by the zero level set of a higher dimensional function. It is called a level set function. The contour of level set formulates the motion of the contour based on the evolution of the level set function. The curve evolution of a parametric contour $C(x(s,t),y(s,t))$, is defined by equation (1).

$$\partial C / \partial t = FN \tag{1}$$

t and s denote a set point in time and a curve parameter, respectively. N and F are the inward normal vector to the curve C, and the speed function. The speed function F controls the motion of the contour. The curve evolution of (1) can be converted into a level set formulation by embedding the dynamic contour C as the zero level set of a time dependent level set function $\phi(x, y, t)$. It is assumed that the level set function ϕ gets the positive values outside the zero level contour, and the negative values inside. The inward normal vector can be expressed as equation (2), where ∇

$$N = -\nabla \phi / |\nabla \phi| \tag{2}$$

is a gradient operator.

From equations (1) and (2), the curve evolution in equation (1) is converted to equation (3),

$$\partial \phi / \partial t = F |\nabla \phi| \tag{3}$$

which is referred to as a level set evolution equation. In this paper, we use the level set $\phi(x)$ defined by equation

$$\partial \phi / \partial t = \mu div (d_p (|\nabla \phi|) \nabla \phi)$$
$$+ \lambda \delta_\varepsilon (\phi) div (g \nabla \phi / |\nabla \phi|) + \alpha g \delta_\varepsilon (\phi), \tag{4}$$

(10), where δ_ε is a dirac delta function, div is a divergence operator, and g is a edge stopping function, which is given by

$$g = 1 /(1 + |\nabla (G_\sigma * I)|) \tag{5}$$

equation (11), where G_σ is the Gaussian filter and I is the image to be processed (Li et al, 2010).

3 Proposed Method

This paper proposes a method for extracting exudates on fundus image proposes the hybrid of the fuzzy C-means and level set methods. The data used in this research is the fundus images as shown in Figure 2. The flowchart of the proposed method can be seen in Figure 3. In the flow chart, it can be seen that the first step is to input the fundus image. Furthermore, the image in the RGB (Red, Green, Blue) is converted to the CIE L*a*b format. CIE L * a * b has an element L (Luminance), a (range from green to red) and b (range from blue to yellow). Since the reddish-greenish and yellowish-bluish components of the format CIE L*a*b can differ the exudates area and non exudates area, the components are taken for the input of the fuzzy C-means algorithm. Therefore, the image of the fuzzy C-means result is used to input for the level set method. The final step is to extract the exudates in the fundus image by the level set method.

Input: X (matrix n x m), where n is the number of pixels in the fundus image and m is the number of components image (the reddish-greenish and yellowish-bluish components). c (≥ 2) is the number of cluster. We use c=2 because we want to segment into two areas (the exudates area and non exudates area) and $w = 2$ (weighted)

MaxIt (Maximum iteration)

ξ (Termination Criteria)

Output: V (Cluster Center)

U (Partition Matrix)

Step in Fuzzy C-means Algorithm
1. {Initialization}
t=1; Δ=1.
2. Generate partition matrix, U^0.
3. While ($\Delta \geq \xi$ and t<MaxIt) do
4. Calculate cluster center (V) for each cluster by using Equation (6).

$$v_{ij} = \frac{\sum_{k=1}^{n}(\mu_{ik})^w x_{kj}}{\sum_{k=1}^{n}(\mu_{ik})^w} \qquad (6)$$

5. Calculate distance each data to each cluster center   (d_{ik}) by using Equation (7).

$$d_{ik} = d(x_k, v_i) = \sqrt{\sum_{j=1}^{m}(x_{kj}\text{-}v_{ij})^2}. \qquad (7)$$

6. Update the membership degree for each object on each *cluster* (update partition matrix) by using Equation (8).

$$\mu_{ik} = \left[\sum_{j=1}^{c}\left(\frac{d_{ik}}{d_{jk}}\right)^{1/(w-1)}\right]^{-1}. \qquad (8)$$

7. Calculate objective function by using Equation (9).

$$J_w(U,V;X) = \sum_{k=1}^{n}\sum_{i=1}^{c}(\mu_{ik})^w d_{ik} \qquad (9)$$

with constrained

$$\sum_{i=1}^{c}\mu_{ik} = 1, 1 \leq k \leq n.$$

8. Calculate the difference of partition matrix on the current iteration with the previous iteration, by using Equation (10).

$$\Delta = \left\|U^t\text{-}U^{t\text{-}1}\right\|. \qquad (10)$$

9. $t = t + 1$.

(a)

(b)

(c)

(d)
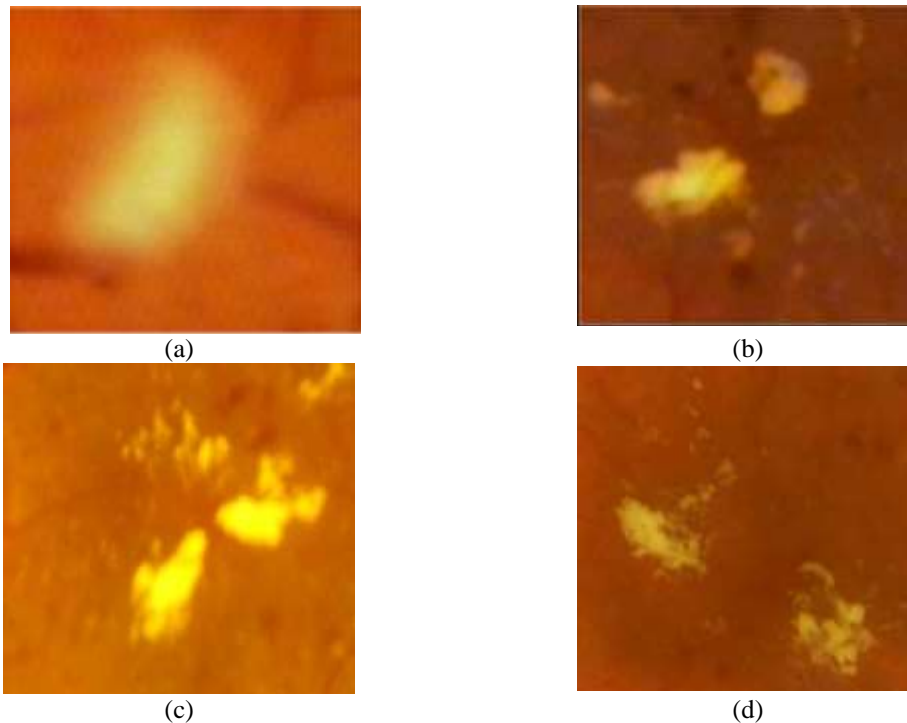
Figure 2   Fundus Image Used for the Experiment.
(a). Test Image 1st. (b) Test Image 2nd. (c) Test Image 3th. (d) Test Image 4th

4 Results and Discussion

For evaluating the performance of the proposed method, we use the four images of the fundus with the exudates. The various fundus images for evaluating are shown in Figure 2 (a)-(d). The images of Figures 4 (a) - 4(d) show the segmentation results by using the hybrid of the fuzzy C-means and level

set methods and the images of Figures 4 (e) - 4(h) show the segmentation results by using the standard level set methods. Figures 3(a)- 3(d) show that the hybrid of the fuzzy C-means and level set methods successfully exctract between the exudates areas and non exudates areas for almost all images. However, this method fails to differ the exuates areas and non exudates areas in several area as shown in Figure 4 (b), (c), (d). It is caused by the fuzzy C-means algorithm cannot work well to differ the exudates areas and non exudates areas.   Since some exudates areas have similar color intensity with the non exudates areas. To solve this problem, it needs to try other operation to enhance the quality of the fundus image.

5 Conclusion

It can be concluded that the hybrid of the fuzzy C-means and level set methods is able to work better in extracting the exudates on the fundus image than the standard level set method. The hybrid of the fuzzy C-means and level set methods can avoid to the curve of the level set stopped prematurely in the process of evolution for almost all images used.
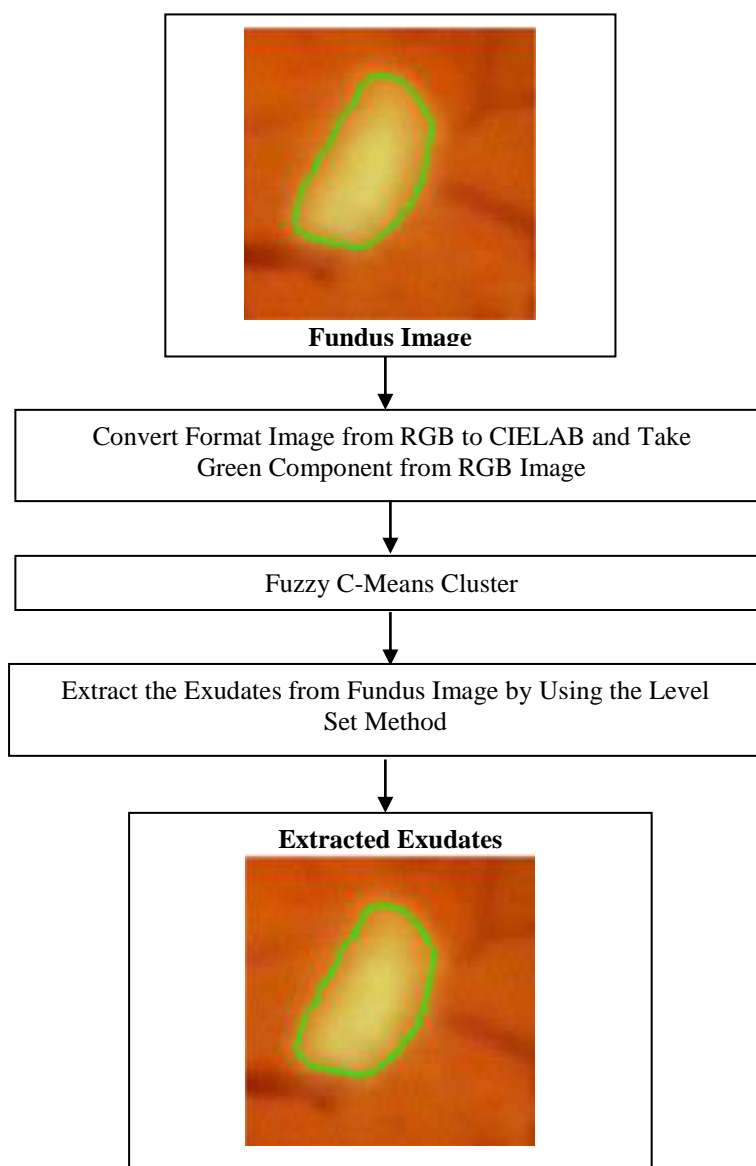
Figure 3   Flowchart of the Proposed Method
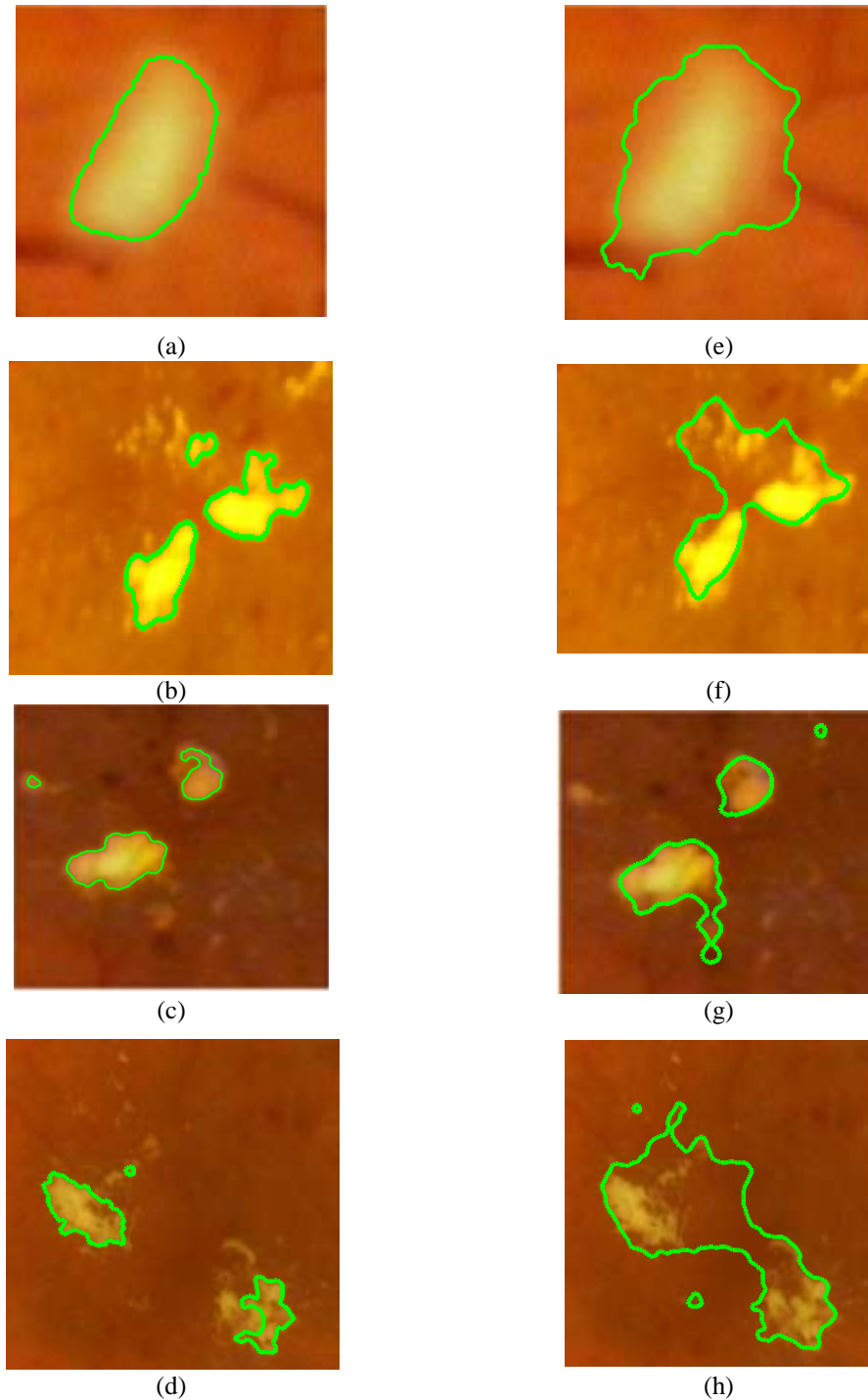
Figure 4   Exudates Extraction Results (a)-(d) Exudates Extraction Results by the Hybrid of the Fuzzy C-means and Level Set Methods. (e)-(h) Exudates Extraction Results by the Standard Level Set Method

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Research on Business Risk Early Warning Index of Information Technology Industry Based on Logit Regression

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Abstract: Making profit is the main purpose of the company. Nevertheless, high profit is always accompanied by high risk. Therefore, excellent risk management capacity is significant for managers. Business risk is one of the major risk that managers face in the operation of the company. In order to help managers, perceive and control business risk,we mainly investigate listed companies of the information technology industry. Then by selecting appropriate monitoring indicators, we adoptthe logit regression to establish a business risk early warning index model.In addition, we design criteria for determining business risk early warning level. The result shows that the business risk early warning index model has good risk forecasting capability and business risk is obviously increasing in the information technology industry from 2015 to 2016.

Key words: Business risk; Monitoring indicator; Early warning index; Logit regression

1 Introduction

In the market economy, business risk is inevitable in the company's production and operation. It mainly results from the fact that actual earnings are different from expected earnings owing to the uncertainty of supply, production, and sales. However, lots of managers only pay attention to huge benefits and ignore business risk. As a result, the company may suffer economic losses and even may go bankrupt. Based on this information, domestic and foreign scholars have been conducting in-depth research on business risk. They make great contributions to business risk early warning and company development.

In foreign countries,it is believed that business risk in the company mainly comes from three aspects: operation process of the company, strategic objectives of the company and the surrounding environment (Korol, 2013; Tapiero, 2015). By analyzing business risk factors, risk early warning models are put forward and applied widely, such as the univariate model and the Z-score model (Fitzpartrick, 1932;Korol, 2013). At the same time, some scholars apply the logit model to analyze business risk,evenperformsome accurate tests (Ohlson, 1980; Hertzel et al., 2011).

In China, according to the actual situation of Chinese companies, scholars do a lot of research on business risk.They subdivide business risk factors into external and internal factors (Chen, 2013; Xu et al., 2018). Grey correlation method and cluster analysis method are used to select business risk monitoring indicators (Yu, 2014). Meanwhile, when building a business risk early warning model, a logit model is considered a good method (Pei et al., 2015; Zhang et al., 2014).

Information technology industry is not only a new strategic industry, but also is a promising industry in the future. Therefore, based on the existing research results and the logit regression method, we take listed companies of the information technology industry as objectand explore how to establish a business risk early warning index model to monitor business risk. Finally, we propose some suggestions to help managers reduce business risk.

2 Data and Methodology

2.1 Sample selection and data preprocessing

In this paper, according to the classification of the listed companies in the CSRC in 2012, we take the information transmission, software, and information technology service industry as the information technology industry, and analyze the relevant data from 2015 to 2016. All empirical data are sourced from CSMAR.

In order to ensure the rationality of data, we select the listed companies on the main board, and remove some listed companies with missing data. At the same time, we use STATA 12.0 software to shrink data to reduce the impact of outliers.

2.2 Business risk monitoring indicators selection based on logit regression

2.2.1 Initial Business Risk Monitoring Indicators Design

Based on the principles of accessibility, comprehensiveness, and pertinence, we design some business risk monitoring indicators from the perspective of development capacity, profitability, and cash

flow, as shown in Table 1.

Table 1   Initial Business Risk Monitoring Indicators

perspective	initial business risk monitoring indicators(x_i)
development capacity	capital accumulation rate(x_1), fixed asset growth rate(x_2), total asset growth rate(x_3), net profit growth rate(x_4), operating profit growth rate(x_5), sustainable growth rate(x_6)
profitability	return on assets(x_7), total asset net profit rate(x_8), current asset net profit rate(x_9),return on equity(x_{10}), operating profit rate(x_{11}), cost profit rate(x_{12})
cash flow	net profit cash ratio (x_{13}), revenue operating cash return ratio (x_{14}), total cash recovery rate(x_{15}), operating index(x_{16}), cash fit ratio(x_{17})

2.2.2 Correlation Test

When the information in indicators overlaps, the reliability of the assessment result is exaggerated. Therefore, we use correlation test to eliminate duplication of business risk monitoring indicators.

By using SPSS19.0 software for correlation test, we find that the correlation of x_1, x_6, x_7, x_8 and x_9 is very high.We eliminate these indicators.Due to limited space, specific empirical results are not listed here.

2.2.3 Business Risk Monitoring Indicators Selection

In a logit regression method, the independent variables do not require strict linear assumption and the dependent variables can be continuous or discrete. Therefore, we usethelogit regression to select business risk monitoring indicators. If the indicator can significantly distinguish whether there is business risk, it should be retained; otherwise, it should be removed.

(1)Normality test

In the paper, we use the Kolmogorov-Smirnov test to check whether business risk monitoring indicators obey normal distribution.All results are shown in Table 2.

Table 2   Normality Test of Business Risk Monitoring Indicators

		x_2	x_3	x_4	x_5	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}
N		101	101	101	101	101	101	101	101	101	101	101	101
Normal Parameters[a,b]	Mean	2.47	0.65	2.22	-0.65	0.07	0.11	0.21	1.62	-2.03	0.04	1.43	-0.43
	Std. Deviation	28.10	1.64	21.16	14.16	0.16	0.24	0.29	14.42	34.98	0.09	17.77	16.69
Most Extreme Differences	Absolute	0.45	0.31	0.35	0.34	0.28	0.24	0.17	0.41	0.44	0.13	0.41	0.40
	Positive	0.45	0.27	0.35	0.27	0.18	0.16	0.17	0.41	0.40	0.08	0.41	0.31
	Negative	-0.45	-0.31	-0.33	-0.34	-0.28	-0.24	-0.17	-0.35	-0.44	-0.13	-0.37	-0.40
Kolmogorov-Smirnov Z		6.81	4.70	5.35	5.12	4.19	3.65	2.63	6.27	6.68	1.96	6.20	6.07
Asymp. Sig. (2-tailed)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Note: $a$indicates that test distribution is a normal distribution, b indicates that result is from the data

From Table 2, we can see that business risk monitoring indicators do not obey normal distribution.

(2)Difference test

When indicators obey the normal distribution, the difference test is performed by the T-test. When the indicators do not obey normal distribution, the difference test is performed by Mann-Whitney U test.According to the results of Table 2, we use the Mann-Whitney U test. The results are shown in Table 3.

Table 3   Differential Test of Business Risk Monitoring Indicators

	x_2	x_3	x_4	x_5	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}
Mann-Whitney U	351	433	316	195	0	55	1	220	423	270	230	410
Asymp. Sig. (2-tailed)	0.045	0.032	0.743	0.698	0.00	0.00	0.00	0.009	0.254	0.002	0.001	0.054

As can be seen from Table 3, x_4, x_5, x_{14} and x_{17} fail the difference test and they are removed.

(3)Logit Regression

Alogit regression model has the following formula:

$$ln\frac{P}{1-p} = \alpha + \beta_1 * n_1 + \beta_2 * n_2 + ...\beta_j * n_j, \ j=1, \ 2...17 \tag{1}$$

In formula (1), P represents the probability that whether net profit of the listed company is

negative.

When P is equal to 0, it means that the listed company hasn't business risk. When P is equal to 1, it means that the listed company has business risk.We use indicators which successfully pass above test to build the logit regression. The logit regression results are shown in table 4 and table 5.

Table 4   Classification Table^{a}of Logit Regression

			Predicted		
	Observed		Y		Percentage Correct
			0	1	
Step 1	Y	0	94	3	96.9
		1	2	13	86.7
	Overall Percentage				95.5

Note: *an* indicates that the cut value is 0.5

Table 5   Logit Regression Results Between Business Risk Monitoring Indicators

		B	S.E.	Wald	df	Sig.	Exp(B)
	x_2	3.772	2.938	0.542	1	0.747	1.179
	x_3	1.464	9.541	5.231	1	0.000	0.000
	x_4	1.268	1.063	3.287	1	0.014	.231
	x_5	0.200	3.389	0.012	1	0.826	1.221
	x_{10}	11.273	0.207	6.608	1	0.011	0.000
	x_{11}	6.339	2.801	5.621	1	0.000	0.010
Step 1^a	x_{12}	9.576	0.205	2.503	1	0.114	4242.564
	x_{13}	0.178	4.373	1.222	1	0.079	1.195
	x_{14}	0.805	0.767	0.256	1	0.573	2.237
	x_{15}	0.106	1.542	8.211	1	0.000	0.000
	x_{16}	-0.728	0.537	1.923	1	0.683	0.483
	x_{17}	2.405	5.153	7.519	1	0.010	0.009
	Constant	-8.509	4.890	1.324	1	0.030	0.000

Note: *an* indicates that the model is input x_2, x_3,x_4, x_5,x_{10},x_{11},x_{12},x_{13},x_{14},x_{15}, x_{16},x_{17} in step 1

According to the logit regression results, it can be seen that the accuracy rate of business risk prediction is 95.5% and the significance of x_3, x_4, x_{10}, x_{11}, x_{15} and x_{17} is better under the significance level of 0.05. Therefore, these indicators are selected to build a business risk early warning index model and the model can have good risk prediction capability.

3 Business Risk Early Warning Index Model for Listed Companies of Information Technology Industry
3.1 Business risk early warning indicators preparation

Business risk early warning indicators can initially reflect early warning information. We compare business risk monitoring indicators with the early warning threshold to form business risk early warning indicators. The formula for preparing a business risk early warning indicator is as follows:

$$y_i = \frac{x_i - k_i}{|k_i|} \ , i = 3,4,10,11,15,17 \qquad (2)$$

In formula (2),x_i means actual value of a business risk monitoring indicator, y_i means a business risk early warning indicator and k_i means the early warning threshold of a business risk monitoring indicator.

In this paper, we set the early warning threshold as the upper quartile of a business risk monitoring indicator.Ifthebusiness risk monitoring indicator is greater than the upper quartile, the company hasn't business risk. If thebusiness risk monitoring indicator is less than the upper quartile,the company has

business risk.

3.2 Business risk early warning index model

In order to comprehensively reflect business risk, we use the entropy-weighted method to synthesize a business risk early warning index model. The business risk early warning index model formula is as follows:

$$BREWI=y_3*\omega_3+y_4*\omega_4+y_{10}*\omega_{10}+y_{11}*\omega_{11}+y_{15}*\omega_{15}+y_{17}*\omega_{17} \tag{3}$$

In formula (3), $BREWI$ represents a business risk early warning index, $\omega_3, \omega_4, \omega_{10}, \omega_{11}, \omega_{15}$ and ω_{17} represent weights of business risk early warning indicators.

Due to limited space, according to data from listed companies in the information technology industry from 2015 to 2016, we only list the following business risk early warning index results.

Table 6　Business Risk Early Warning Index

code	BREWI		code	BREWI		code	BREWI		code	BREWI	
	2015	2016		2015	2016		2015	2016		2015	2016
000503	0.007	-0.334000835	0.052	-0.157000948		0.014	-0.123002065		0.132	-0.120	
000555	0.113	1.152000839	0.051	0.010000971		0.002	-0.123002072		-0.207	-0.967	
000662	-0.005	-0.014000889	0.068	-0.040000997		0.160	0.033002093		0.029	-0.045	

3.3 Business risk early warning index analysis

In order to analyze business risk of listed companies in the information technology industry, we use the upper quartile, the median, and the lower quartile of business risk early warning indexes as business risk level criteria. Simultaneously, the $\mu1$ represents the upper quartile, the $\mu2$ represents the median, and the $\mu3$ represents the lower quartile. When $BREWI\in(\mu3,\max BREWI)$, it means that the listed company has no business risk; when $BREWI\in(\mu2,\mu3]$, it means that the listed company is in a light business risk level; when $BREWI\in(\mu1,\mu2)$, it means that the listed company is in a medium business risk level; when $BREWI\in[\min BREWI,\mu1]$, it means that the listed company is in a heavy business risk level.

By measuring $\mu1$, $\mu2$ and $\mu3$ of business risk early warning indexes in 2015 and 2016, business risk early warning levels of listed companies in information technology industry are reflected in the following figures. The red line represents $\mu1$, the orange line represents $\mu2$ and the yellow line represents $\mu3$.
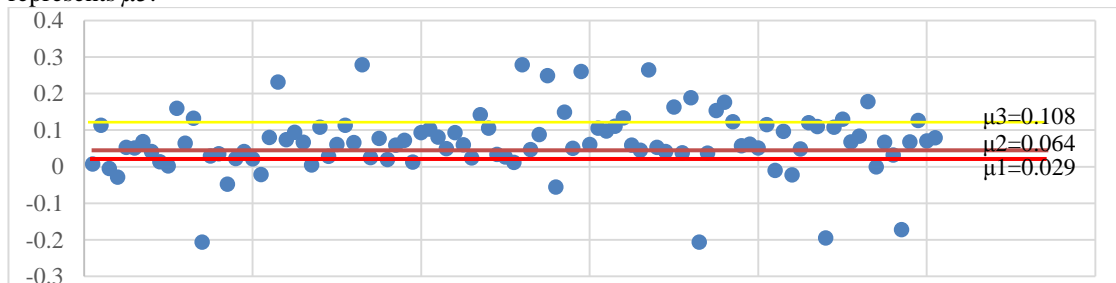
Figure 1　Business Risk Early Warning Level in 2015
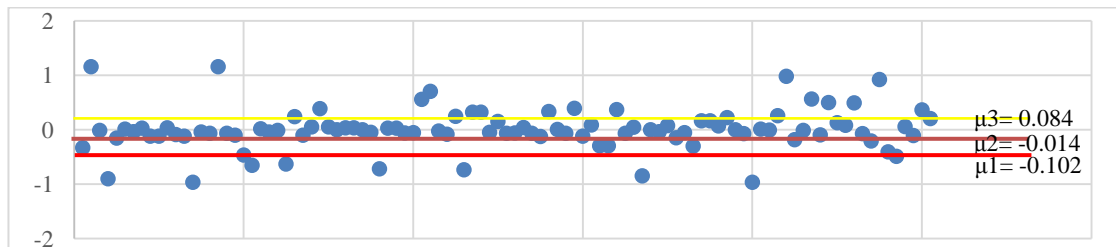
Figure 2　Business Risk Early Warning Level in 2016

We can see that business risk of listed companies in information technology industry has deteriorated and the gap between companies' business ability has increased. Because in 2016, some policies were introduced to encourage development of the information technology industry. If managers could seize the opportunity to profit and control risk, business risk would decrease, or business risk would increase.

4 Conclusion

In this paper, we build a business risk early warning index model through the logit regressionand analyze business risk of listed companies in the information technology industry from 2015 to 2016. Unfortunately, we find that business risk is increasing obviously during this time. In order to reduce business risk, we propose the following suggestions for managers. First, managers should improve costs and expenses of management. Second, managers need make full use of various assets, including idle assets. Third, managers had better strengthen the competitiveness of products in the market and avoid the bad debts of accounts receivable.

Notably, internal factors are dominating factors that lead to business risk of the company, which are key points we discuss in this paper. In furtherresearch, we will try to combine internal and external factors to build a more scientific and comprehensive index model.

Acknowledgement

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Analysis of Multi-agent Game of Social Co-governance in Food Safety Risks

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Abstract: This paper uses the game theory method to analyze the interests of multi-agents in the social governance of food safety risk. According to domestic and foreign experience, when the risk of food safety develops well, all parties involved in the game can obtain more benefits. This also shows that social co-governance has the necessary conditions for the cooperation of various game players. Due to changes in government functions, diversified food safety management has become a trend. The cooperation game of each subject can realize a kind of benefit distribution scheme that each subject is satisfied with, which is also the main direction of this article.
Key words: Food safety risk; Social co-governance; Multiple entities; Game

1 Introduction

Compared with the monopolistic governance that is more monopolized, the first issue that must be considered in the process of multi-governance of food safety risks is the conflicts, choices, and even conflicts of interest among various stakeholders. According to the related theories of game theory, stakeholders will maintain their own interests, which makes the subject unable to achieve complete rational behavior. Corresponding to this, several parties involved in social co-governance, including government, platform organizations, consumers, and food companies, have played different roles in society. They have different starting points, competing for different interests, and have no resources in society. On average, there are differences in the decisions to be made based on self-interest. Therefore, the process of building food safety risk and social co-governance is actually a process of coordinating the relations between several parties to achieve a balanced process. In this dynamic balance, the society is maintained. Stable.

As the main parties involved in the joint governance of food safety risks, the government, platform organizations, consumers, and food companies represent different stakeholders. However, while the interests of all parties involved in the game, there are uncertain interest objectives and conflicts of interest in all parties of the game. From the perspective of the entire game process, if a single static game is used for years, each player has two strategies of cooperation (C) or non-cooperation (N) (Bailey A P, 2014). However, in real life, the governance of food safety risks is greatly affected by the government's macro-control and the executive power of companies (DengGanghong, 2015). Consumers are playing more of an outsider's role and can't make rational and free decisions in the game. Therefore, this study selected a cooperative game model for analysis.

2 Cooperative Game Model Analysis

There are several differences between cooperative games and non-cooperative games. First, the premise of the cooperative game is that the parties involved in the game have common interests, that is, the cooperation game must be a "positive-sum game." Second, all parties involved in the game must have the necessary information exchange, and all parties should eliminate the obstacles of information asymmetry between the game parties through information exchange (Kong D, 2012). The parties involved in the game have a clear and stable expectation of the cooperation results, and can have an accurate judgment of future trends. Third, all parties involved in the game must be founded on the basis of equality, voluntariness and mutual benefit. All parties in the game can share profits in cooperation, at least their own interests will not be compromised. Fourth, the cooperation game must include a binding contract, and this contract has credibility, and any party who violates the contract will be punished.

Since all parties involved in social co-governance have their own interests and needs, if all parties only consider themselves and ignore other parties, they cannot achieve their own interests.

According to the concept of game theory, the ultimate interests of one party not only depend on their own decisions, but also have a great relationship with other parties involved in the game. The Nash equilibrium indicates that at least one such result exists. In the case of complete disclosure of information, the party that participates in the game has a clear expectation of the strategies of other parties can make any party to do any strategy cannot improve the results. Prior to the analysis, it is assumed that all parties involved in the game are equal, and one party can issue an irreversible threat to the other party and achieve a cooperative game through a contract or a specific strategy.

According to the above analysis, it can be known that the main body of cooperative governance in food security risk social co-governance is based on the cooperation game, that is, parties participating in the game have common goals (Wishing, 2015). As long as the main players participating in the cooperative game receive no less than the non-cooperative benefits, the parties constrain each other's actions in the form of a contract, thereby obtaining a satisfactory distribution plan for each subject.

3 Establishment of Game Model of Social Security for Food Safety Risks

There are two game modes in game theory, zero-sum game and non-zero-sum game. The so-called zero-sum game refers to the fact that the two sides of the game are confrontational in nature and the interests of one party are based on the losses of the other party. The non-zero-sum game refers to the fact that the relationship between the two sides of the game has a consistency of interests, and is not completely confrontation and conflict. Certain behaviors on both sides of the game can benefit both parties. The social co-governance of China's food safety risks also has the characteristics of such interest consistency. According to foreign experience, parties involved in social co-governance can achieve common profits(Wu Yan, 2012). This also shows that there is a common goal for all parties involved in social co-governance, which is the basis for the cooperation game.

3.1 Participants

The participant in game theory refers to the decision-making body involved in the game. His goal is to maximize his own payment level by choosing behaviors. This article mainly selects several major stakeholders involved in the food safety social co-governance to conduct analysis and modeling, namely government, platform organizations, consumers and food companies (Wang Chen, 2007).

Government (G). The government is the communicator of social governance. The government manages the organizational groups and consumers in the society through the enormous resources and release policies in hand (Xie Min, 2007).

Platform Organization (P). The regulation of food as a regulatory power can also be used as a supplementary information disclosure mechanism to guide the healthy development of the food market.

Consumer (C). Consumers are the triggers of food safety, and they are also the most important stakeholders in governance. Food safety accidents are generally initiated by consumers. As consumers pay more attention to their own interests, they have played an increasingly important role in social governance. The more important role.

Food Business (E). Food companies are responsible for food safety, including food production companies and other companies in the food supply chain. Under the food safety supervision system, food companies are relatives of administrative management and are in the position of being controlled (Yan Yan, 2008).

3.2 Model assumptions

It is assumed that all parties participating in the food safety social co-government will invest their own resources, and at the same time, all parties will jointly assume various risks in food safety. The parties involved in social co-governance all have their own expected benefits, and they distribute their benefits in food safety through their own negotiating power and the degree of fear of negotiation. It is assumed that all parties involved in social co-governance have a common goal, that is, the overall benefits of food safety, which is also the basis for all parties to participate in cooperation. Assuming that the cost of participating in social co-governance is V, the negotiation power of each subject participating in the cooperative game is ui (iG,P,C,E), and the degree of

concern about the negotiation is fi (iG,P,C,E) when negotiating The revenue received by the parties at the time of the breakdown is Xi (iG,P,C,E), and the gains obtained by the parties based on the negotiations are u(Xi) (iG,P,C,E), and the gains the parties receive when the negotiation breaks down For Vi (iG,P,C,E). Fi is determined by the individual functions involved in the game, which is negated by the negotiating party i. Vi is the lowest level of the overall income distribution for the subject i participating in the game. Since the model established this time is the result of multiple negotiations of the parties involved in the game, Vi can also be seen as the gain of subject i after the last negotiation. Among them, u(Xi)=Xi-Vi, which shows that u(Xi) is the net income of subject i in the cooperative game (Zhao Dawei, 2017).

3.3 Model establishment

According to the principle of Nash equilibrium, the parties involved in the cooperative game must have an equilibrium strategy when making decisions. When there is an allocation strategy in the global distribution set E(V) that is not super-optimized by any other allocation, it is called Pareto optimal. The key question whether the cooperative game solution exists is whether it can form a value of common interest, which is called the "negotiation welfare function". Unlike non-cooperative games, parties involved in cooperative games not only consider the maximization of their own revenue, but must also consider the existence of constraints. These constraints can be expressed through Nash's axioms. The "negotiation welfare coefficient" in cooperative games is the common interest of different subjects, and reflects the concept of joint recognition by all parties involved in cooperative games. The parties involved in the cooperative game negotiate under the conditions of "negotiation welfare coefficient" and obtain their own benefits through negotiation. The concept of Nash equilibrium is a direct reflection of individual rationality, and Nash's negotiating solution is a reflection of the collective rationality in the distribution of interests among game parties. Since Nash's negotiating solution is a Pareto optimal solution, the result obtained through negotiation is a direct reflection of collective rationality. There is a necessary condition for Nash's negotiating solution: Each subject participating in the cooperation is premised on self-interest (Zhou Qingjie, 2010). Based on the above analysis, we can see that the food safety social co-governance model satisfies the following conditions: ① individual rationality and collective rationality of each subject participating in the cooperative game; ②the core of the cooperative game is a non-empty set; ③super-additive; ④ independence independent choice, that is, to satisfy the existence of the model solution.

The gains from the negotiation of the social co-government parties are greater than the gains from the negotiated break-up, that is,$X_i \geq Y_i > 0$ is satisfied. On the basis of Nash's axioms, Nash's theorem has been generalized by introducing the concept of negotiating power γ_i and the degree of concern about the breakdown of the negotiation f_i. Which meets:

$$\sum_{1-C}^{N} \gamma_i = 1$$
$$\frac{\partial X_i}{\partial \gamma_i} > 0$$
$$\lim_{\gamma_i \to 0} X_i = V_i = 0$$
$$\lim_{\gamma_i \to 1} X_i = X$$

The parties involved in the game must also accept the constraints under the premise of satisfying the above formula:

$$\sum_{i=G}^{N} X_i = X$$

Under this constraint, choose the maximization of self-interest. That is, game player i chooses the largest one of the objective functions $\prod_{i=G}^{N} u_i \cdot \gamma_i$. A new objective function, $\prod_{i=G}^{N} u_i \cdot \ln \gamma_i$, is obtained by applying a regular transformation to the objective function and taking the natural logarithm. The new objective function and the constraint condition together construct a Lagrangian function:

$$L = \sum_{i=G}^{N} u_i \cdot \ln \gamma_i + \lambda \left(\sum_{i=G}^{N} X_i - X \right)$$

Among them, λ is a variable.. Take a first-order condition to get:

$$\gamma_i \frac{u_j}{u_i} - \lambda = 0$$

$$\gamma_i \frac{u_j}{u_i} = \gamma_j \frac{u_i}{u_j} \ (i \neq j)$$

3.4 Analysis of cooperative game model results

According to, $f_i = \frac{u_i(X_i)}{u_i'(X_i)}$, the formula of the degree of fear of the breakdown of the negotiations by the game subject, X_i is related to it. Therefore, the degree of concern of the subject i participating in the game is constantly changing along with the income X_i obtained. Assuming that $u_i(X_i)$ is a concave function, for any $u_i(X_i) > 0$, we get:

$$\frac{\partial f_i}{\partial X_i} = \frac{[u_i'(X_i)]^2 - u_i(X_i)u_i''(X_i)}{[u_i'(X_i)]^2} > 0$$

According to the above formula, we can know that the degree of concern of each stakeholder involved in the cooperation game is positively related to the benefits.

For the food safety social co-governance model that we have established, we can draw the conclusion that: 1. The degree of concern of the various stakeholders involved in social co-governance on the negotiation is directly proportional to their own gains in the negotiations.

For further explanation, assume that only two subjects, i and j, play the game. The negotiating power of the two subjects is γ_1 and γ_2 respectively ($1 > \gamma_1 . \gamma_2 > 0$, $\gamma_1 + \gamma_2 = 1$). Under the conditions of meeting the above axioms, both parties involved in the game negotiate the right of social co-governance. If i derives the gain from the negotiation as X_i, then the gain of the other subject y from the negotiation is $V-X_i$. Then you can get the following formula:

$$\frac{X_1}{V - X_1} = \theta \frac{\gamma_1}{\gamma_2} \ (\theta > 0)$$

Assuming $\frac{\gamma_1}{\gamma_2}$=y, we can simplify the above companies:

$$X_1 = \frac{\theta V_y}{1 + \theta_y}$$

By deriving the above equation, we can get:

$$\frac{\partial X_{1i}}{\partial y} = \frac{V\theta}{(1 - \theta y)^2} > 0$$

From this we can conclude that the net income of one side of the game is proportional to its own negotiation power.

According to the social co-governance model, we can draw the conclusion 2: The participants who participate in social co-governance have stronger negotiating power and can get more net income in the final income.

Taking into account the extent of both parties' concerns about the breakdown of the negotiations, they will reach a mutual compromise solution. After many negotiations reached a critical point, the utility boundary. According to the popularized Nash negotiation model, the participants involved in the game will negotiate to maximize the following:

$$U = \max \cup_G \gamma G \cup_I \gamma I \cup_C \gamma C$$

According to the formula of the degree of fear of the breakdown of the negotiations by the game player, $f_i = \frac{u_i(x_i)}{u_j(x_j)}$, and satisfying at the optimal solution:

$$\frac{f_i}{\gamma_i} = \frac{f_j}{\gamma_j}, \ \ i,j = G, P, C, E (i \neq j)$$

Replace f_i with the following:

$$\frac{u_i(X_i)}{u_j(X_j)} = \frac{\gamma_i}{\gamma_j} \times \frac{u_i'(X_i)}{u_j'(X_j)}$$

From this we can draw the conclusion that the benefits of each subject participating in social co-governance will depend on its own negotiating power and the ratio of profit evaluation at the optimal solution.

Based on the above analysis, it can be known that if the bargaining power of each subject

participating in the game is determined, the degree of realization of each subject at the solution point is determined by the specific characteristics of each party. If one of the players participating in the game is too negotiating power, there will not be much gain.

The model of social co-governance is the interest distribution model of each subject in the joint governance of food safety risks, and the way to realize the distribution of benefits is through many negotiations. In other words, the benefit distribution model of social co-governance is endogenous and is determined by the bargaining power and utility function of each subject participating in the cooperative game.

This concludes that in order to maximize the benefits of the various players in the cooperative game, the main body needs to increase its own negotiation power. For the model of social co-governance, platform organizations and consumers need to increase their own negotiating power to obtain more benefits, that is, they need more investment in food safety risk management.

4 Conclusion

Based on the above analysis, we can draw the following conclusion: The precondition for the formation of a cooperative game in social co-governance is the complementarity between the various players participating in the game. Participating parties reach a final benefit distribution agreement through consultation and negotiation, and restrict the behavior of all parties through a binding contract. Food safety is related to the interests of all parties. The benefits of the cooperation of the subjects who satisfy the cooperative game conditions are not less than the benefits of individual individuals when they are not cooperative. At the same time, the cooperation game is based on the conditions of fairness. Any subject's destruction of the cooperation game will lead to the decline of its own interests. Therefore, all parties involved in the cooperative game need to cooperate sincerely to achieve greater benefits.

In addition, there are different interests in social governance, including government, platform organizations and consumers, and food companies. However, although there are conflicts of interest distribution between these subjects, at least there is an allocating scheme acceptable to all subjects so that each subject can get no less than uncooperative profits through cooperation. In general, the greater the benefits from cooperation, the more economically compensated the less profitable party, and the amount of compensation is determined. The compensation mechanism can promote the enthusiasm of all parties involved in the cooperation, and it can also form a positive guiding role, which is conducive to the healthy development of food safety risks.

Finally, the distribution of the benefits of the socially coordinated stakeholders is related to their bargaining power. Because of the influence of various factors such as history and policies, the parties involved in the game are different in their negotiating power. In order to achieve the goal of diversified management, it is necessary to support the disadvantaged players (consumers, platform organizations, etc.) in the game. The realization of such a process requires the active participation of consumers and platform organizations, and the government and the company's strong support to realize it, so as to truly manage social diversity and maximize the interests of all parties.

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Impact of Economic Value Addition of Economic Innovation on US Equity Risk Premium

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Abstract: This paper examines the impact of EVA of economic innovation of OECD countries and USA on US equity risk premium using Ordinary Least Square (OLS) regression and Vector Autoregression (VAR) framework. The results show that the EVA of OECD and USA negatively impacts US equity risk premium. This implies that, when the economic value addition of innovation decreases, the equity holders increase the risk premium required for possible unsuccessful innovations (risk of innovation) undertaken at the expense of owners' capital. Equity holders are more concerned about the process of innovation than the value of innovation. As such, the economies of innovation of emerging countries (including USA) such as OECD have become an important source of information for US equity market. It also reveals that the US equity market is more sensitive to cross-market information transmission on economic innovation. All lag coefficients of VAR regression are statistically insignificant and the residual diagnostic does provide successful results. VAR regression results provide some evidence for the existence of efficient conditions in the US equity market.
Key words: Economic innovation; Economic value added; Market efficiency; Impulse response; Equity risk premium

1 Introduction

One of the concluding remarks of the classical book of Schumpeter, (1912) is that the innovation itself is risky. The principle financial objective of capital providers is to maximize their wealth. The capital providers therefore expect an additional premium for approving their agents (i.e. managers of owners' capital or funds) for taking risk in the course of managing owners' capital employed. The choice between life and death of a firm is rest with the managers of owners' capital and is determined by their ability to be innovative (See e.g. Audretsch 1995; Baumol, 2002, p. 1; Cefis and Marsili, 2005). Benefits of innovation on the other hand do not only accrue to the firms involved in the innovation activities but other firms, society or even related industries (See e.g. Porter and Kramer, 2011). Therefore, the transmission of information on firms' innovation between markets is inevitable at this incredible pace of current advances in information technology (information transmission between equity exchanges has been extensively discussed by Eun and Shim, (1989), Koutmos and Booth, (1995), Bottazzi and Peri, (2003), Amanjot and Manjit, (2016), Maderitsch, (2015), Bhuyan*et al*, (2016), Thenmozhi, and Chand, (2016), Al Rahahleh and Bhatti, (2017), Al Rahahleh*et al*, (2017)).

Spending on research and development does not always guarantee a successful innovation (Link and Scott 2011). The success of innovation depends on how efficient and effective the innovation process is handled and the resources are used. The monetary benefits of innovation can be determined by, for example, comparing the difference between value of patent (innovation output) and the research and development expenses (innovation input). This however disregards the cost of capital tied up in the innovation process (i.e. funds deployed on research and development activities leading to innovation) of the firm. As such, one would charge the cost of capital employed on the amount invested in research and development to arrive at the residual benefits accruing to the firm on research and development activities (e.g. Economic Value Added (EVA)). If the owners (capital providers) approve their managers to engage in innovation activities at the expense of owners' capital, of course, they expect an additional premium for accepting such a risk. Nanda and Rhodes-Kropf, (2016) examine the impact of financing risk on the type of new ventures that engaged in innovation and find that the financing risk impacts innovative ventures with the greatest real option value at the financing stage. EVA, in fact, measures the economic value addition of innovation attributable to an economy (See Jakub *et al* 2015 for similar arguments).

The objective of this paper is to examine the impact of economic value addition of economic innovation of OECD countries and USA on US equity risk premium using Ordinary Least Square (OLS) regression and Vector Autoregressive (VAR) framework. The standard EVA computation method will be used to estimate the time varying residual benefits accruing to firms at market level. The section two introduces the methodology and the regression equations under OLS and VAR frameworks. Section

three briefly outlines the data set used and the sources of data. Some descriptive statistics are also provided. Section four reports the findings and section five provides concluding remarks.

2 Methodological Framework

Assume that firm j in the market with k number of fully equity financed firms raise finance where the whole sum of money so raised is entirely devoted for the purpose of innovation[1]. As such, output of each firm is clearly a function of innovation. Each firm classifies research and development expenditure (R&D) (let it denote D) under intangible assets (at cost) and recognizes the difference between value of corresponding patents (A) and the cost of R&D as profit and loss for the period. In particular, assume that the books of accounts are clearly divisible for each line item so that the firms can forthwith identify the revenue and capital expenditure for innovation. The financial results of innovation process (F) of firm j at time t could then be written as $F_{jt} = A_{jt} - D_{jt}$ and the aggregate financial results (taxes are ignored) of all firms (on innovation activities) in this fictitious economy (c) would then become, $F_{ct} = \left(\sum_{j=1}^{k} A_{jt} - \sum_{j=1}^{k} D_{jt} \right)$. Each firm has a stated capital (capital invested) of which D_{jt} is applicable to capital raised on innovation, so that all firms have $D_{ct} = \sum_{j=1}^{k} D_{jt}$ amount of capital invested in this section of business operation. Since these firms are not necessarily be listed in the stock exchange, an ascertained cost of equity is not readily available. As these firms are engaged in innovation which is risky, the owners (or managers) of each firm consider equity market return as the most suitable opportunity cost of capital (See carefully Jakub et al 2015). The EVA of economic innovation at time t can therefore be written as;

$$EVA_{ct} = F_{ct} - \left(R_{mt} * \sum_{j=1}^{k} D_{ct} \right) \tag{1}$$

Equity market risk premium (EMRP) of this economy could be computed as simple as $R_{mt} - R_{ft}$ where R_{mt} is the return on market portfolio at time t and R_{ft} is the risk-free rate of the economy which is proxied by one-year US treasury bill rate.

The relationship between EMRP and EVA of economic innovation could be examined by the following equations for both OECD and USA.

$$R_{mt} - R_{ft} = \theta + \beta_1 EVA(USA)_{ct} + \beta_2 GDPGR(USA)_{ct} + \varepsilon_t \tag{2}$$

$$R_{mt} - R_{ft} = \Omega + \beta_3 EVA(OECD)_{ct} + \beta_4 GDPGR(OECD)_{ct} + u_t \tag{3}$$

Where θ and Ω are the intercept terms. EVA and $GDPGR$ denote the economic value addition and gross domestic production growth rate of USA and OECD[2]. ε_t and u_t are the error terms of the regressions which are assumed to be well behaved. $GDPGR$ is included in the sense of Vassalou (2003) as a control variable. Any impulse response of the dynamic systems of equations forming the above relationship can be examined by the following Vector Autoregressive equations for OECD and USA.

The following systems of equations examine the impulse response of equity risk premium and EVA of USA and OCED countries.

US Equation

$$R_{mt} - R_{ft} = \omega + \sum_{i=1}^{p} \psi(R_{mt-i} - R_{ft-i}) + \sum_{i=1}^{p} \varpi EVA(USA)_{ct-i} + \epsilon_t \tag{4}$$

$$EVA(USA)_{ct} = \sigma + \sum_{i=1}^{p} \xi EVA(USA)_{ct-i} + \sum_{i=1}^{p} \varkappa (R_{mt-i} - R_{ft-i}) + o_t \tag{5}$$

OCED Equation

$$R_{mt} - R_{ft} = \mu + \sum_{i=1}^{p} \eta(R_{mt-i} - R_{ft-i}) + \sum_{i=1}^{p} \zeta EVA(OECD)_{ct-i} + v_t \tag{6}$$

$$EVA(OECD)_{ct} = \alpha + \sum_{i=1}^{p} \pi EVA(OECD)_{ct-i} + \sum_{i=1}^{p} \gamma(R_{mt-i} - R_{ft-i}) + z_t \tag{7}$$

Where ω, σ, μ and α are the constants of equations (4), (5), (6) and (7) and the rest of the coefficients are assigned to capture the evolution to either variable with a 1σ shock to each variable at a time.

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[1] Excess return is therefore justified by innovation.
[2] Average in case of OCED.

3 Data

Equity index data are obtained from the New York Stock Exchange[1]. 1-year treasury bill market rates are obtained from U.S. Department of the Treasury[2]. Gross domestic spending on R&D[3] and Patent data are obtained from OECD Data Library[4]. Gross domestic production growth rates are obtained from the World Bank national accounts data, and OECD National Accounts data files available on World Bank Group data library webpage[5]. Initial sampling period of Patent covers data from 1985 to 2015 and the known data from 1985 to 2015 showed a trend of rising volatility. Based on the available data, the average growth rate is calculated first, and then the data for the period 1980-1984 are derived based on the moving average growth rate. Same basis is used to compute the R&D expenditure for the year 1980. Equity index data are not subject to any computations. Some descriptive statistics are given in Table 1.

Table 1   Statistical Properties

Variable	Mean	Median	Max.	Min.	JB	ADF	LM
R_m	0.072	0.103	0.272	-0.526	35.779*	-6.36*	NA
R_f	0.047	0.049	0.131	0.001	1.363	-1.417	NA
$R_m - R_f$	0.026	0.043	0.244	-0.542	22.992*	-6.745*	0.8911
$GDPGR(USA)_c$	2.649	2.776	7.259	-2.775	5.186	-4.229	NA
$GDPGR(OECD)_c$	3.470	3.398	6.460	0.103	0.041	-3.323	NA
$EVA(USA)_c$	-307026	-293444	-130859	-505763	1.982	0.856	NA
$EVA(OECD)_c$	-730692	-702591.2	-305336.2	-1251974	1.994	1.092	NA

Note:

1. JB - Jarque–Bera test statistic for normality. Under null hypothesis for normality, critical value of χ2 (2) distribution at 5% significance level is 5.99.

2. ADF- Augmented Dickey–Fuller test statistic for stationarity of data for maximum 8 lags. Under null hypothesis for data having unit roots, the critical value at 5% significance level is -2.95 (MacKinnon (1996) one-sided p-values).

3. LM is the ARCH LM test statistic for number of observations multiplied by the R-squared value for 3 lags. Under null hypothesis, critical value of χ2 (3) distribution at 5% significance level is 7.815 (OLS equation, $R_{mt} - R_{ft} = c + \varepsilon_t$)

4. *Statistically significant at 5%, assuming conditional normality and **Statistically significant at 10%.

As per the results outlined in Table 1, US stock market return exhibits an unconditional nonnormal distribution as null hypothesis of JB test is clearly rejected. Data has also shown to have unit roots (non-stationarity) as ADF test statistic is well below the critical value of -2.87. However, US TB rates obey the disciplines of a well-behaved regression variable such as normality and stationarity. The unconditional distribution of US risk premium is however non-stationary and nonnormal. Serial correlation in risk premium is not observed as null hypothesis of ARCH-LM test is accepted. *GDPGR* for USA and OECD are nonstationary (marginally exceeds the critical value) but the distributions are clearly normal. Surprisingly, both $EVA(USA)_c$ and $EVA(OECD)_c$ variables are stationary and normally distributed as appropriate candidates for regression. The negative values of EVA indicate the risk of innovation as sunk cost of unsuccessful R&D.

4 Results

The regression results of equations (2) and (3) show that there is a significant negative relationship between EVA of economic innovation of OECD countries and USA, and US equity risk premium. This implies that, when the economic value addition of innovation decreases, the equity holders increase the risk premium required for possible unsuccessful innovations undertaken at the expense of owners' capital. It is shown that the EVA of OECD countries is negatively (significantly) related to US equity risk primum, which indicates that equity investors of USA are more vigilant about the sources of information pertaining to innovations of emerging economies. It also implies that US equity market is

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more sensitive to cross-market information transmission on economic innovation. Moreover, the coefficients of $GDPGR$ in both USA and OECD equations become statistically insignificant, confirming that the news related to future GDP growth as a risk factor in equity returns are reflected in the EVA of economic innovation.

Table 2   OLS Regression Results

Equation	(2)				(3)			
	β_1	t-stat	β_2	t-stat	β_3	t-stat	β_4	t-stat
Coefficient (NW)	-8.78E-07*	-3.221	0.018	1.297	-3.42E-07*	-3.100	-0.013	-0.905

Note:
1. NW stands for Newey and West (1987) procedures for the estimate of regression coefficients on the robust standard errors for consistent heteroskedasticity and autocorrelation.
2. *Statistically significant at 5% significance level assuming conditional normality.

As outlined in Table 4, the results of VAR show that none of the coefficients in the systems of equations are statistically significant as t-statistic is below 2 for all lag coefficients of either equation. The structure of VAR has however been unable to explain the underlying process as expected. VAR stability condition test shows that the residuals of two equations are nonstationary as 12 roots fall outside the unit circle. It is usual to observe some insignificant coefficients in VAR type of regressions. In such case, researchers usually carryout residual diagnostics to ensure the appropriateness of the VAR specification. Except for stability condition test, the residual diagnostic tests are clearly satisfactory. Errors are not serially correlated as null hypothesis of no serial correlation under residual serial correlation LM test is accepted. The results of Jarque–Bera joint test for normaily show that the residuals are multivariate normal. Null hypothesis of no cointegrating equations is accepted as the trace statistic of Johansen cointegration rank test is below the critical value (5%). As such, the initial conditions of the systems do provide a fundamental solution to the problem and the relationship is limited to a significant linier (contemporaneous) relationship between equity risk premium and EVA of economic innovation.

Table 3   VAR Test Results of Impulse Response of Systems of Equations and Residual Diagnostics

Lags	US Equation			OECD Equation		
	$R_{mt} - R_{ft}$ to$EVA(USA)_{ct}$	$EVA(USA)_{ct}$ to $R_{mt} - R_{ft}$	VAR-LM	$R_{mt} - R_{ft}$ to$EVA(OECD)_{ct}$	$EVA(OECD)_{ct}$ to $R_{mt} - R_{ft}$	VAR-LM
1	-7.32E-08 (-0.009)	581334 (0.427)	5.284	-1.42E-07 (-0.062)	686272 (0.301)	4.522
2	7.65E-06 (0.876)	-263514 (-0.158)	7.964**	2.33E-06 (1.029)	480438.8 (0.227)	2.391
3	3.05E-06 (0.257)	-633274 (-0.294)	5.872	6.47E-07 (0.153)	210006.5 (0.070)	6.584
4	-1.90E-06 (-0.187)	90631 (0.106)	3.155	2.05E-06 (0.676)	-350351.2 (-0.179)	2.721
5	-2.90E-06 (-0.385)	316458 (0.384)	6.250	1.16E-06 (0.541)	774006.9 (0.526)	6.010
6	-2.54E-06 (-0.245)	-111261 (-0.142)	0.344	1.54E-06 (0.761)	-565375.2 (-0.397)	3.734
7	-1.47E-06 (-0.105)	-388455 (-0.295)	0.818	1.80E-06 (0.925)	-992524.9 (-0.721)	3.293
8	-5.16E-06 (-0.444)	-71776 (-0.060)	0.894	-4.68E-06 (-1.205)	899096.6 (0.385)	4.879
9	-5.03E-07 (-0.039)	453909 (0.335)	1.978	-1.82E-06 (-0.255)	1613837 (0.380)	2.675
10	2.01E-06 (0.103)	128557 (0.068)	8.303**	-2.95E-06 (-0.509)	2308758 (0.709)	7.404
VAR	12			12		
VAR-N	2.182			7.433		
JCT	14.48/3.00E-05			14.60/0.366		

Notes
1. Asymptotic t-statistics appear in parenthesis.
2. VAR-LM is the VAR Residual Serial Correlation LM Test. Null Hypothesis: no serial correlation at lag order h. Probabilities from chi-square with 4 df.

3. VAR is the stability condition test for roots of characteristic polynomial, under null hypothesis for all roots fall outside the unit circle. Number of roots outside the unit circle is reported.

4. VAR-N is the VAR residual normality test (Orthogonalization: Cholesky -Lutkepohl). Jarque–Bera (joint) test statistic is reported. The null hypothesis: Residuals are multivariate normal.

5. JCT is the Johansen Cointegration Rank Test for 1 to 2 lag intervals. Null hypothesis: no cointegrating equations.Trace Statistics for 'None' and 'At Most 1' are reported, respectively.

6. *Statistically significant at 5% significance level, assuming conditional normality of errors. ** Statistically significant at 10%.

5 Conclusion

The economics of innovation suggest that the survival of a firm depends on its ability to be innovative in the business. Innovation however exposes firms to risk as the success of innovation is uncertain. Equity holders of these firms therefore demand an additional compensation for holding (or investing) securities as the innovation impacts the shareholder risk. As such, the economies of innovation cannot be interpreted without reference to the expectations of capital providers, (if Schumpeter, 1912) is respectfully acknowledged. The EVA of economic innovation provides a prudent assessment of residual benefits of economic innovation that takes into account the opportunity cost of capital invested as well as economic excess of innovation.

The regression results as in (2) and (3) show that the US equity risk premium is negatively related to EVA of economic innovation of USA and OECD countries. When the EVA of economic innovation is reduced, the equity holders increase the risk premium as a compensation for the risk of an unsuccessful innovation (innovation that does not meet the excepted outcome). Economies of innovation of emerging countries such as OECD have become an important source of information for US equity market (i.e. investors of the market). Equity holders are more concerned about the process of innovation (i.e. how efficient and effective the innovation process is handled, in order to provide the required return on firms' investment in innovation) rather than the value of innovation (i.e. value of patents).

VAR regression results do suggest that the shocks to residuals of systems of equations do not persists over time. None of the coefficients of lagged variables have become statistically significant and the residual diagnostics ensure the specification of VAR. If financial markets are efficient, there should be no correlation between current price changes (or increments) and lagged price changes or lagged economic variables of the same country or other countries (e.g. innovation, economic growth). Instead, the underlying variables should reflect the relevant information simultaneously (See especially Hsu *et al* 2007). The findings of VAR regression therefore provide some evidence for the existence of efficiency in the US equity market.

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Using Exponential Smoothing Method in Forecasting Domestic Credit to Private Sector of Ghana

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Abstract: The private sector of Ghana faces many problems with respect to raising capital for their operations; this is largely due to government relying heavily on the local credit market for funds for developmental projects. This study uses exponential smoothing method (ESM) in EViews to build a single sample model to forecast future domestic credit to private sector (DCPS) values in Ghana. Secondary annual data on DCPS spanning the period from 1982 to 2016 is used. The findings show that an exponential smoothing model with multiplicative error, additive trend and no seasonality fits the data best. The model had very small residual measures, which demonstrates a good model for forecasting. The estimated model is used to forecast the DCPS values for Ghana from the year 2017 to 2020. The results of this study will help private business people plan for the future. The results will also help policy makers to make informed decisions and formulate policies to improve the DCPS figures, since the private sector is the engine of growth, and crowding out would not be in the best interest of the government and the nation as a whole.
Key words: Domestic credit forecast; Regression forecasting; Ghana private sector; Bank credit

1 Introduction

The private sector is the focus for the current government of Ghana who took office after winning the December 2016 general elections. Most of the promises made to the electorates to compel them to vote massively in favor of this government are private sector driven. The big ones that will resonate in the ears of the electorates for a long time, and may be the yardstick to measure the performance of this government after the four years tenure are the "one village, one dam" and "one district, one factory". Therefore, for this government to remain appealing to the voters in the next election, it has no choice, but to strengthen the private sector to help in fulfilling their promises.

According to　(Hauner, 2008), there is a huge negative impact of domestic credit to government on bank deepening in developing countries, but no effect in advanced economies. The study also found that, though, credit to government increases profitability, it decreases efficiency drastically in developing countries, meanwhile, in advanced economies, there is no significant impact on profitability, but there is a positive impact on efficiency. (Hauner, 2008) concluded that, though the practice shows no effect on developed economies, it has long-term negative repercussions on financial development in developing countries and might eventually cause crowding out of the private sector. In another study, (Kumhof& Tanner, 2005) opined that domestic banks are very much exposed to government debt because private lending is more risky under the existing legal and institutional imperfections. This exposure puts banks and their borrowers at the mercy of governments' debt policies.

This study aims at building a time series model that can be used to forecast future domestic credit figures to create awareness in the private business community, which will help them to plan. It will also inform policy makers to make informed decisions, which will help in national development. The results of this study will also enrich further, the already good literature that exists in forecasting.

The rest of the paper is organized as follows: Section 2 reviews existing literature relating to this study, section 3 discusses the methods used in data collection and analysis. Section 4 enumerates all the findings of the study and it contains the discussions. Finally, section 5 concludes the study and lists some recommendations.

2 Literature Review

Domestic credit to the private sector (DCPS) has been in focus in recent times, with most of the studies establishing relationships between DCPS and economic growth. (Osman, 2014) applied autoregressive distributed lag (ARDL) as an approach to cointegration to show that there is a positive long-run and short-run relationship between private sector credit and economic growth. (Lane

&McQuade, 2014) established that domestic credit growth in European countries is strongly related to net debt inflows but not to net equity inflows. (Perez, 2017) studied the long run determinants and short dynamics that impact credit growth performance and found that there is a long run relationship between credit growth, domestic banks' equity and non-performing loans. (Shijaku&Kalluci, 2013) evaluated the long-run determinants of bank credit to the private sector and established that there exist an adjustment mechanism that brings bank credit back to equilibrium. Their work further found that lending is positively linked to economic growth. In addition, they proved that banking and financial intermediation, coupled with financial liberalization stimulate higher lending demand.

Other studies have been done on fitting appropriate models to predict relationships between domestic credit and other variables in the context of Africa. In Nigeria, (Emecheta&Ibe, 2014) applied reduced vector autoregressive (VAR) and established a significant positive relationship between bank credit and economic growth. In a similar work, still on Nigerian, (Emenike, 2016) used cointegration method to establish a long-run relationship between monetary policy and private sector credit. (Olowofeso, Adeleke&Udoji, 2015), however, used cointegration to show the existence of a significant positive relationship between private sector credit and output.

Existing literature has shown that little research has been done on Africa in the area of DCPS, and there is no evidence of any study that talks about the DCPS data of Ghana. Another gap in the literature is the lack of the usage of exponential smoothing method (ESM), though several studies including (Kim & Jung, 2018) have praised ESM for its optimal results in the framework of innovative space model. ESM has been used extensively in the sciences, example, (Shao-Hsien & Tsai, 2018) used ESM for prediction and analysis of thermal diffusion for understanding the influence and change brought by electric current on nickel base materials. Also, (Duan&Niu, 2018) applied ESM to forecast lake area changes in Wuhan (Makridakis et al., 1979) investigated the relative accuracy of different time series forecasting methods, and concluded that the exponential smoothing method gives more accurate forecast figures than the many other complicated methods. Meanwhile,(Makridakis and Winkler, 1983) investigated the accuracy of average forecast results obtained from the use of different methods, and found that forecast accuracy improves, and variability of the accuracy among different combinations decreases as the number of methods in the average increases. Furthermore, (Winkler and Makridakis, 1983) concluded from their study that combined forecast obtained through weighted averages were more accurate than the individual forecasts, and even outperforms forecasts obtained from simple unweighted average of the same methods.

Though, there are many approaches proposed by existing literature, the researchers chose ESM because of the popularity it has gained for its simplicity, accuracy in forecasting and having gained the praise of many astute researchers including(Makridakis et al., 1979), for being the best single sample forecasting model.

3 Research Methodology

After a detailed analysis of the pattern in the DCPS data, time series analysis is proposed for forecasting future DCPS values. The method used is the exponential smoothing method with linear trend.

3.1 Data collection method

The data used in this study is a secondary data retrieved from the database of the International Monetary Fund (IMF). It comprises of annual DCPS figures of Ghana as a percentage of gross domestic product (GDP) from 1982 to 2016. This period is chosen since 1981 marks the end of coup d'états in Ghana, hence data from this period is bound to capture the right effects.

The variable being analyzed is DCPS by banks in Ghana; which refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable that establish a claim for repayment. The financial corporations include monetary authorities and deposit money banks, as well as other financial corporations where data are available.

3.2 Data analysis

Exponential smoothing is a relatively simple but robust approach in practice. It is widely used to produce a smoothed time series (Gardner, 1985) and it performs well in empirical studies (Boudoukh, Richardson & Whitelaw, 1997). More importantly, previous studies show that all exponential smoothing methods are optimal forecasts in the framework of innovations state space (ISS).

The analysis is in three parts, firstly, the raw data is summarized to present the data in an intelligible

format for the characteristics of the data to be easily seen, followed by the fitting of the time series model. Finally, residual analysis is done to measure the strength of the model with respect to forecasting. EViews is used to carry out the analysis to achieve the objective of this research.

The forecasting method used in this study is the exponential smoothing method (ESM). Extensive work has been done to study the theoretical properties of ESM, for example, (Gardner, 1985); McKenzie (1984, 1985).

The problem that arises in the fitting of an exponential smoothing method for forecasting is the choice of the most appropriate α. (Gardener, 1985) discusses various theoretical and empirical arguments for selecting an appropriate smoothing parameter. The value of α falls in the interval from zero to one, although, some researchers think that, $0 \leq \alpha \leq 2$ is appropriate for an ARIMA model. (Gardner, 1985) reports that among practitioners, an α smaller than 0.30 is usually recommended. However, in the study by (Makridakis *et al.*, 1982), α values above 0.30 frequently yielded the best forecasts. (Gardner, 1985) finally concludes that it is best to estimate an optimum α from the data, rather than to "guess" and set an artificially low value.

The mathematical model for an exponential smoothing method with Trend is given by:

$$\widehat{DCPS}_t = \alpha DCPS_{t-1} + (1 - \alpha)\widehat{DCPS}_{t-1} + EstimatedTrend \qquad (1)$$

Where, $\widehat{DCPS}_t$ is the forecast at time t

$\widehat{DCPS}_{t-1}$ is the forecast at time t-*1*

α *is* the smoothing constant.

3.3 Residual analysis

The appropriateness of the model for forecasting purposes can be determined by residual analysis. The model is deemed good if it yields small residual values. The two measures normally used are the Mean Absolute Deviation (MAD), and the Root Mean Square Error (RMSE).

$$MAD = \frac{Sum of forecasting errors}{Number of forecasts}$$

$$Let Forecast_i = the forecast value for the period i,$$
$$DCPS_i = the actual value for the period i$$
$$and \varepsilon_i = the error for time i$$
$$then, \quad \varepsilon_i = DCPS_i - Forecast_i$$
$$MAD = \frac{\sum_{i=1}^{n} \varepsilon_i}{n} \qquad (2)$$

$$MSE = \frac{Sum of squares of forecasting errors}{Number of forecasts}$$

$$\therefore MSE = \frac{\sum_{i=1}^{n} \varepsilon^2_i}{n} \qquad (3)$$

$$RMSE = \sqrt{\frac{\sum_{i=1}^{n} \varepsilon^2_i}{n}} \qquad (4)$$

The model with the smallest MAD and/or the smallest RMSE is the best model.

To forecast out of sample, the model is adjusted to accommodate as follows:

$$Forecast n periods away = \alpha(Last value) + (1 - \alpha)(Last forecast) + n(Trend) \qquad (5)$$

4 Results and Analysis

4.1 Descriptive statistics and trend identification

Table 1 Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DCPS	35	1.5423	19.586	9.7640	5.6778

Table 1 above presents the raw data in an intelligible manner, bringing out all the characteristics and features in a summarized format. From the table, the minimum recording of DCPS from the year 1982 to 2016 is 1.5423, which was seen in 1983, and the maximum is 19.585, which occurred in 2016. The series has a mean value of 9.764 and a standard deviation of 5.678.
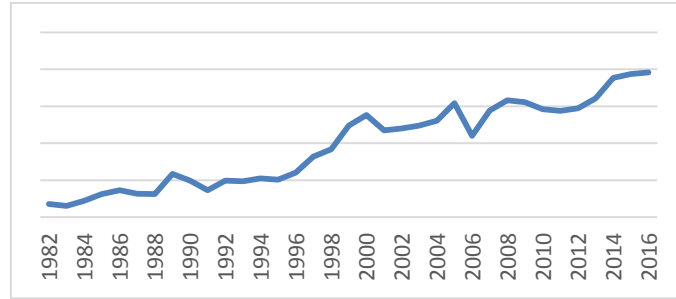
Figure 1   Time Series of Original Data

Figure 1 above shows that the series contains trend and has an intercept.

4.2 Exponential smoothing model for DCPS

Table 2   Estimated Exponential Smoothing Model

Parameters	
Alpha:	0.544242
Beta:	0.000000
Initial Parameters	
Initial level:	1.160855
Initial trend:	0.471277
Compact Log-likelihood	-73.30356
Log-likelihood	-60.74782
Akaike Information Criterion	154.6071
Schwarz Criterion	160.8285
Hannan-Quinn Criterion	156.7547
Sum of Squared Residuals	1.057703
Root Mean Squared Error	0.173839
Average Mean Squared Error	2.823497

Table 2 presents the best-estimated exponential smoothing model for the data to be a type with multiplicative error, additive trend and without seasonality. The model fitted has very low error values, thus, the root mean squared residuals is 0.17, the average mean squared error is 2.82 and sum of squared residuals is 1.06, which implies that the model will yield good estimates when used in forecasting future DCPS values, which is evident in Figure 2 below. From the model output, $\alpha = 0.5442$ and $Trend = 0.4713$, so, from equation (1), the fitted model is:

$$\widehat{DCPS}_t = 0.5442 DCPS_{t-1} + 0.4558 \widehat{DCPS}_{t-1} + 0.4713 \tag{6}$$
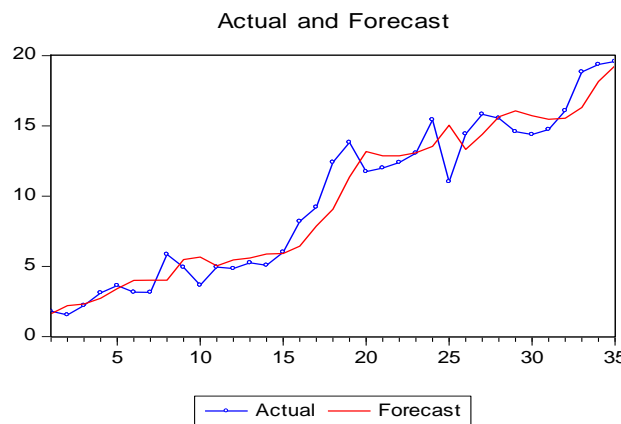
Figure 2   Graph of actual and forecast

4.3 Forecast
Using equation (5), forecast values for DCPS for the years 2017 to 2020 are obtained.

Table 3 Forecast Values

Year	Forecast
2017	19.90
2018	20.68
2019	21.50
2020	22.34

5 Conclusion

In this paper, we have fitted an exponential smoothing model to the domestic credit to the private sector data of Ghana. The fitted model has minimal forecast errors, which proves a good model and is consistent with findings from (Makridakis et al., 1979).

The DCPS forecast values churned out by the fitted model show that the four years that follow the sampling period would see only 13.98% improvement in DCPS (i.e., from 19.60 in 2016 to 22.34 in 2020), which is woefully inadequate, looking at the initial low figure. Meanwhile, government's proposed developmental plan – which includes "one district one factory" and "one village one dam" - is so much private sector dependent, hence will require availability of serious funds to the private sector to fuel it. This is not promising for the future of the private sector of Ghana, and is not in support of the economic growth agenda planned by the government.

For more accurate and reliable forecasting values, we recommend a further research to employ a couple of forecasting methods from the list in (Makridakis and Winkler, 1983), and compute the weighted average of the figures from the individual methods.

Government and regulatory authorities must take a cue from the forecast values churned out by this study and formulate policies that will improve future DCPS values to aid in nation building.

Acknowledgement

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Research on the Equity Pricing of Cross-border M&A under the Belt and Road Based on "Income-market" Orientation

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Abstract: Concerning the phenomenon of cross-border M&A failure due to pricing problems in the Belt and Road, this paper combines the three basic methods of company valuation—asset base approach, income approach and market approach, giving different roles according to their respective scope of application. Starting from the assets, the future cash flow forecast and the equity value of target company, this paper builds a fusion of mainstream evaluation methods of equity pricing system, and strives to make the equity pricing as much as possible to close to the real value of target company, improving the success rate of cross-border M&A in Chinese companies.
Key words: Equity pricing; Cross-border M&A; The belt and road; Income approach; Market approach

1 Introduction

With the continuous progress of the Belt and Road initiative, the pace of "going out" of China's manufacturing companies have gradually accelerated (Ouyang W et al., 2018). According to statistics, China's foreign investment was active in 2016, with the largest amount of money in history. The manufacturing industry topped the list with 200 projects and a total transaction volume of USD 30.11 billion. However, in recent years, there has been an increase in the number of cross-border M&As that do not increase profits (Fonseca J D et al., 2015). According to the statistics of the Ministry of Commerce, the failure rate of cross-border M&As by Chinese companies is as high as 50-70%. In many of the reasons for the failure of M&As, improper pricing is the first to bear.

Market approach is the most important method for value assessment in Western countries. Because it relies more on the market, requiring a greater degree of openness to the domestic market, which limits the application of market law in our country, the Chinese company generally adopts the income approach when assessing the value of target company (Niquidet K, 2010). In recent years, with the continuous improvement of Chinese capital market, the external conditions of Chinese application of market approach have been greatly improved. In today's highly developed economic globalization, only by fully grasping the cutting-edge technologies at home and abroad, contacting the most advanced theories, and combining national conditions, can companies make the most appropriate decisions (Ghoul S E et al., 2010; Blonigen B A et al., 2014). The purpose of this paper is to introduce a market approach that is less preferred when evaluating the value of target companies, and to combine market approach with the cost and income approaches commonly used by Chinese asset appraisers. From the perspectives of pre-merger and post-merger acquisition, companies can be provided more full equity pricing theoretical basis and data support when conducting cross-border M&As, thereby increasing the success rate of cross-border M&As. From a theoretical point of view, each method has its limitations, and the calculated results cannot guarantee the closest to the market's needs (Humphery-Jenner M et al., 2016). This paper combines the two most widely used equity pricing methods, combining the advantages of the two, thus enriching the role of Chinese equity pricing system and helping companies to correctly formulate cross-border M&A pricing decisions in the context of the Belt and Road initiative.

2 Cross-border M&A Equity Pricing Model Based on "Revenue-Market"

In this paper, the idea of cross-border M&A is designed by integrating the three valuation methods that are currently recognized in the world—the asset-based approach, the income approach, and the market approach. In this set of cross-border M&A equity pricing system constructed in this paper, it is mainly divided into three stages to estimate the value of the target company. In the first stage, the application is the asset base approach, through reviewing the relevant financial statements that have been audited, recalculating the market value of the target company's financial assets and real estate, and demonstrating the feasibility of the M&A plan from the perspective of analyzing the scale of the target company (Ghoul S E et al., 2016). In the second stage, the income approach will be adopted to predict the cash inflow of the project in the future through the NPV model, and the risk return rate of the project is used as a discount rate to estimate the future earnings of the target company.In the third stage, the

market approach is adopted. Through comparable precedent trading method, similar cases are found in the market, the movement of stock prices in target companies after these acquisitions is calculated, and the volatility of target company stock prices caused by M&As is estimated. Then calculating the ultimate target company's equity capital value based on the estimated stock premium rate. The specific model framework is shown in Figure 1.
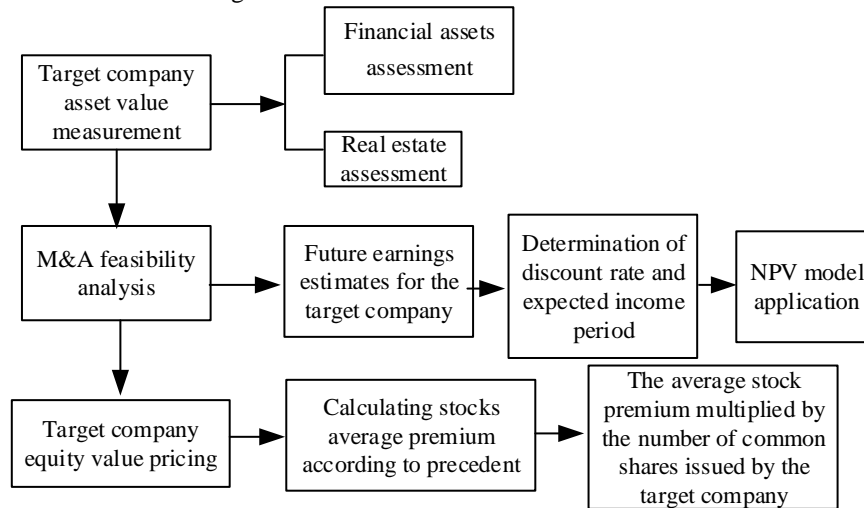
Figure 1   Cross-border M&A Equity Pricing Model

3 "Income-Market" Oriented Cross-border M&A Equity Pricing Process

3.1 Target company asset value measurement

This article will mainly take the M&As of resource-based companies under the Belt and Road initiative as a prerequisite. For resource-based companies, most of the valuable assets they own are minerals as well as machinery and equipment that they own. The mineral resources owned by the target companies are often an important consideration for the Chinese companies to evaluate whether or not to conduct cross-border M&As. The assessment model uses a cost summation method, to adjust the book value of various assets in the target company's balance sheet to market value, then estimating the value of the company's overall value by summing the value of investor claims (Huang A G et al., 2016). The formula of asset value evaluation is shown in (1). First clearing the assets and liabilities included in the assessment scope, and distinguishing different asset classes, selecting specific assessment methods to estimate. Then analyzing and summarizing all kinds of results and calculate evaluation values.

$$Asset\ valuation = Asset\ replacement\ \cos t - Entity\ depreciation\ of\ assets - Functional\ depreciation\ of \tag{1}$$

$$assets - Economic\ depreciation\ of\ assets$$

3.2 Analysis of M&A feasibility analysis

3.2.1 Future earnings estimates

For mining companies focusing on resource development, future earnings mainly depend on the market value of the mining resources. If the future price trend of the mineral shows a positive state, it can be reasonably predicted that the company can obtain a more substantial cash flow in the foreseeable future.

Therefore, based on the analysis of the price of mineral resources mined by the target company, a reasonable estimate of the future earnings of the target company will be conducted.

3.2.2 Related parameter settings

In current corporate valuations, the CAPM model and the WACC model are the most commonly used models for calculating discount rates. This paper uses the WACC model to determine the discount rate.

$$R = \frac{E}{D+E} \cdot K_E + \frac{D}{D+E} \cdot (1-T) \cdot K_D \tag{2}$$

Among them, E is the market value of equity capital; D is the market value of debt capital; K_E is the return on investment required by equity capital; K_D is the return on investment for debt capital requirements and T is the applicable income tax rate for the evaluated company.

Determining the revenue period usually needs to consider the product life cycle and market

attitude. Unless clearly specified in the contract, it is difficult to have an accurate judgment. Therefore, this paper will adopt the current routine method of determining the revenue period, assuming that the target company's income period is 5 years.

3.2.3 NPV model application

Using net present value of net cash benefit and net cash investment to calculate net present value and evaluating the investment plan according to the size of the net present value. Net present value equals the total present value of future returns minus the present value of investment, as shown in formula 3.

$$M = BV_0 + \sum_{t=1}^{n} \frac{EVA_t}{(1+r)^t} + \frac{EVA_{n+1}}{(r-g)(1+r)^t} \tag{3}$$

Among them, BV_0 is the initial investment capital; n is the number of years in the forecast period; r is the cost of capital and g is stable growth rate for the follow-up period.

3.3 Company equity value pricing

This paper uses the comparable market transaction method in the market approach. Finding several comparable companies that have similar acquisitions, calculating and analyzing the price changes of these comparable companies before and after the merger, and finally calculating the estimated equity capital value according to the relevant formula. For the selection of comparable corporate transaction activities, this paper will mainly start from the same industry or the same region. Most companies in the same industry will operate in the same industry rules, and changes in consumer attitudes can be more accurately reflected in the operating performance of other companies in the same industry (Yang X et al., 2009; Jiang Y et al., 2011). For companies in the same region, the target companies and comparable companies operate in a similar area, which means that the policies they face will be more consistent.

This also makes their impact on the policy similarly reflected. Therefore, comparable trading activities that belong to one industry or one region will be more representative. Calculating an average change value according to the target company stock price change after the Chinese company acquired the related company in the country where the target company was previously located. Then using the change value as the reference value and multiply the target company's common stock price on the agreement day, and then getting the equity value of the target company. Market approach valuation procedures are shown in Figure 2.
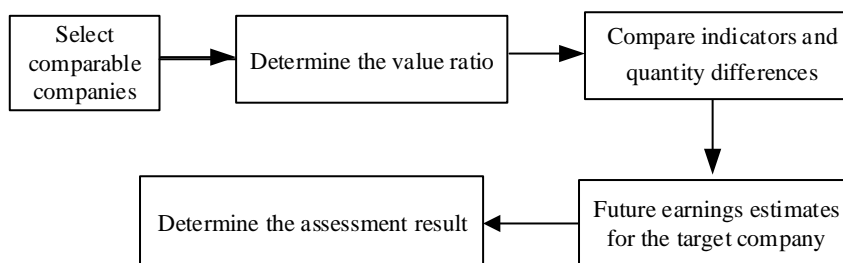
Figure 2   Market Approach Valuation Procedure

4 A Case Study

4.1 M&A background introduction

On October 19, 2016, a company in China (hereinafter referred to as "A") and a resource company in Country X (hereinafter referred to as "B") signed a subscription agreement. The main terms are: (1) A subscribes for 207,135,646 ordinary shares issued by B at a subscription price of $0.747 per share, amounting to $154.7 million; the deadline is January 31, 2017 or a later date agreed by both parties. (2)A provides B with a $60 million shareholder loan (ten years, 10% per annum) for repayment of over-financing and operating capital; the deadline is January 31, 2017, or a later date agreed by both parties. In November of the same year, X Foreign Investment Review Committee formally approved A's spending of US$200 million to acquire 51% of B's equity, which is the largest investment project of Chinese private enterprises in X so far.

4.2 M&A equity pricing

4.2.1 Asset valuation

According to the annual audited financial report of B on June 30, 2016, the total value of assets was US$ 342,652, including current assets of US$ 138,295, and non-current assets of US$ 204,357,000. The

composition of non-current assets was mainly mineral development assets; current liabilities were 227,089 thousands of dollars, non-current liabilities of US$7.7 million, both of which mainly constitute interest-bearing liabilities. The assets of B are mainly the resources of molybdenum, copper and iron used in its two major mineral projects. Checking B's resources, as shown in table 1 and table 2.

Table 1   Molybdenum Project Resources

Classification	MT	Molybdenum%	Copper%	Average g/ton
Proven resources	206.8	0.06	0.10	1.5
Control resources	445.4	0.04	0.07	1.1

Table 2   Iron Ore Project Resources

Classification	Ton	Iron%
Control resources	6,110,000	58.90%
Inferred resources	1,160,000	57.20%

4.2.2 M&A feasibility analysis

According to the CPM Group and CRU's forecast for molybdenum prices, this paper will use molybdenum prices at $16.50 per pound. Selecting several analysts to make different price forecasts for iron ore, taking an average of $92.40 per dry metric ton. Analysts believe that the long-term actual copper price will be between 1.60 USD/lb. to 2.92 USD/lb., and the average long-term copper price will be 2.15 USD/lb.

The current capital cost of B=90.78% ×16.60%+9.22% ×7.36% ×(1-30%)=15.50%.

Feasibility analysis of iron ore projects owned by B is shown in table3.

Table 3   Iron Ore Project Feasibility Analysis

Year	2016	2017	2018	2019	2020	2021
Sales revenue	-	28.8	59.2	59.3	56.5	57.2
Operating costs	-	（32.1）	（45.2）	（45.4）	（46.4）	（42.4）
Net profit	-	（3.3）	14	13.9	10.1	14.8
Original investment	（5.9）	（7.5）	-	-	-	-
Net residual value	-	-	-	-	-	-
Net cash flow	（5.9）	（10.8）	14	13.9	10.1	14.8
Discounted at 15%	1.000	0.870	0.756	0.658	0.572	0.497
Present value	（5.9）	（9.396）	10.584	9.146	5.777	7.356

Net present value= -5.9-9.396+10.584+9.146+5.777+7.356=17.567. From the results, the iron ore project is financially viable, and it is expected to bring about a net cash flow to the company in the next five years. Starting from the whole, although only one of the mines of B was analyzed this time, it is expected that the molybdenum mine that has not yet been put into production will have more benefits.

4.2.3 Company equity pricing

On October 19, 2016, according to the data of the X-nation stock exchange, the common stock price of B was US$1.20 per share. Taking into account the ratio of premiums generated by other Chinese companies in M&As/shareholdings of X-state companies in 2016, taking an average of 16.60%, it is expected that the common stock price of B will be US$1.399 per share (US$1.20/share*16.60%+ $1.20/share). According to the agreement reached by both parties, a will subscribe for 51% of the shares, i.e. 207,135,646 shares. Under this condition, a will pay USD 289,782,768, which is approximately USD 290 million. There is a difference of approximately 90 million in the 200 million U.S. dollars agreed in the actual M&A agreement. This is mainly because there is still a subjective component in the selection of comparable trading schemes, and the average value cannot be a true reflection of the premium of the target company's share price that the acquirer can obtain after the merger and acquisition. Although there may be errors, market approach is still a useful method of assessing the value of equity in target companies. Under this method, the equity value of Company B on October 19, 2016 was USD 487,377,990.

5 Conclusion

This article discusses the issue of equity valuation of Chinese companies in cross-border M&A under the background of the Belt and Road. By combining the current three mainstream company valuation methods, a set of value evaluation systems that are more in line with the company's value proposition is constructed. Based on the Chinese context, it may be an innovative fusion that the market approach is combined with the Chinese domestic equity pricing method, which enriched and improved the Chinese company's cross-border M&A equity pricing model. This not only helps companies make rational pricing decisions, thereby increasing the success M&As, reducing the losses caused by improper pricing, but also helping the government to formulate better M&A pricing guidance policies based on the actual situation of companies and international cross-border M&A market conditions. As the equity market changes with each passing day, future research can be combined with the financial instruments in the international market on the basis of the pricing model of this paper to enhance the theoretical and applied value of the model.

Acknowledgement

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The Impact of Risk-taking on Investment Return among Small and Medium-sized Enterprises: Based on the Study of Financial Constraints' Interfering Interaction

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Abstract: Small and medium-sized enterprises are often disturbed by external financing constraints in the process of taking risk, which makes it difficult to benefit from the investment. This paper takes data of small and medium board non-financial listed companies from 2007 to 2016 as the research samples. It is found that higher risk-taking level will bring higher investment return. When small andmedium-sized enterprises choose to take lower risk when they face higher financing constraints, the possibility of benefitting from investment is low. Compared with the low financial constraints, it isfound that, when SMEs face high financial constraints, risk commitment has a weak impact on investment returns, and financial constraints play interfering interaction in the process of SMEs' risk-taking.

Key words: Investment return; Risk-taking; SMEs; Constraints' interfering interaction

1 Introduction

As the basic force to promote the growth of national economy, small and medium-sized enterprises need to enlarge the scale and increase the investment so as to create more wealth. The risk-taking of small and medium-sized enterprise is mainly reflected on the choice of investment plan and expected income level. When enterprises choose to expand investment, they can optimize the allocation of resources and improve the efficiency of capital utilization. When companies choose to take higher risks, they will have greater opportunities to gain returns on investment, and then enhance their competitiveness and expand financial performance (Low, 2009; Cucculelli and Erimini, 2012; Li Wengui, Yu Minggui, 2012). Higherinvestment return must be accompanied by higher risk. Small and medium-sized enterprises do not have enough financial support to afford the financial losses caused by higher risk. Also, it is very easy to fall into financial difficulties for there is no accurate possibility of making profits. Therefore, SMEs are likely to avoid risk when making investment decisions. Risk averse enterprises may abandon some of the investment opportunities which has high risk and positive cash flow. It is not conducive to maximize the value of enterprises (Yu Minggui, Li Wengui, Pan Hongbo, 2013). This conservative investment strategy is not good to the growth and development of small and medium-sized enterprises.

Most of the literatures analyzed the influencing factors of risk-taking from enterprises' inner environment, but seldom considered the external financial constraints when analyzing the relationship between risk-taking and investment. However, this paper believes that the risk-taking preference of small and medium-sized enterprises depends not only on the internal development of the enterprises, but also on the external financial environment.

2 Methodology and Hypothesis

The investment activities of small and medium-sized enterprises are based on comprehensive judgment of investment risk and income. And the shortage of cash flow caused by financial constraints will restrict the investment activities. Therefore, enterprises need to assume the risks rationally according to the financial constraints they face, so as to ensure the profit from the investment.

Lu Xin (Lu Xin, 2013) found that financial constraints will restrict R&D investment, especially for SMEs whose financial constraints are more serious. Excessive investment will make the enterprise face greater investment risk, large scale enterprises have sufficient strength to undertake the risk, but small and medium-sized enterprises may fall into financial distress. However, it is an irrational choice for SMEs to give up investment in order to avoid risk, because it will make the wealth flow to large enterprises, which leads to uneven distribution of resources and poor development of SMEs. Hilary (Hilary, 2009) pointed out that when the company took high risk, it would produce higher R&D inputs, thus improved the company's competitiveness and innovation, and then created more value to ensure the long-term development of the company. Nakano and Nguyen (Nakano, Nguyen, 2012) also believed that although enterprises taken excessive risks had bankruptcy crisis, most of the enterprises' success were

based on the high risk-taking. The risk-taking of the enterprise has two sides. Lv Wendong (Lv Wendong, 2015) and He Weifeng (He Weifeng, 2016) all pointed out that when the enterprise took high risk, on the one side, it would increase the capital expenditure and accumulation, thus accelerate the capital circulation and improve the enterprise's performance, on the other side, such great risk crisis were harmful for enterprises, they were prone to fall into financial difficulties.

Taking risks properly and selecting investment plans accurately can increase the wealth of enterprises and get corresponding remuneration. However, financial constraints restrict the external financing channels and sources, which limit the cash flows of the enterprises, resulting in a failed investment without ideal return. Based on this, this article puts forward the following hypotheses:

H1：Under the premise of continuous operation (not in financial distress), SMEs will get higher investment returns when they take higher risks.

H2：When SMEs take lower risks and higher financial constraints, they will not get enough profits from investment.

Enterprises' risk-taking activities need to consume a lot of resources and have a strong resource dependency (Fazzari et al., 1988; Almeida and Campello, 2007; Lu Xin, Zheng Yangfei, Li Jianming, 2013). If the enterprise cannot get sufficient resources, they cannot invest effectively and may even fail (Li Yanxi, 2007; Lian Yunjun, Su Zhi, 2009). It can be seen that when small and medium-sized enterprises face higher financial constraints, it is difficult to expand investment, and thus the investment income gained by risk-taking is reduced. Although risk-taking can positively promote investment returns, higher financial constraints will impede this promotion. Therefore, this article puts forward the following hypotheses:

H3: Financial constraints play regulating role in the relationship between risk-taking and investment return among SMEs.

H4：Compared with the low financial constraints, SMEs' risk-taking has weak impact on investment returns when they face relatively high financial constraints.

3 Empirical Designs
3.1 Data
This paper takes small and medium board listed companies as research samples and eliminates the followingdata: (1) ST companies; (2) financial listed companies; (3) companies with missing data. Finally, the balanced panel data of 865 small and medium-sized listed companies in 10 years were obtained, and 4401 valid samples were collected. All data were collected from the CSMAR, using Excel 2003 and SPSS 22 for statistics and analysis.

3.2 Model and definition
According to the previous literatures, the calculation of financial constraints was carried out by constructing financial constraint index. Choose the top 33% data of the samples ordered in both size and interest guarantee multiple as a low financial constraint group. Choose the later 33% data of the samples ordered in both size and interest guarantee multiple as a high financial constraint group. The current financial constraint index calculation methods mainly include the multiple discriminant analysis method and the binary logistic regression method. Those methods calculate the coefficient and then calculate the financial constraint index of the company according to these coefficients. Kuang Xuewen (Kuang Xuewen, 2010) used two methods to calculate the index. It was found that the financial constraint index calculated by the two methods was significantly correlated, but the discriminant accuracy of the binary logistic regression model was obviously higher than the multiple discriminant analysis method. Therefore, this paper chooses the binary logistic regression model, and use 5 indexes to build the model. The 5 indexes are Asset Liability Ratio (Lev), Rate of Return on Common Stockholders' Equity (ROE), Financial Slack (SLACK), Increase Rate of Main Business Revenue (BRI) and Current Ratio (CR). SLACK = (monetary capital + transaction financial assets +0.5*net inventory+0.7*net accounts receivable - short term borrowings) / total assets，The model is built as follows:

$$FC = \delta_0 + \delta_1 LEV + \delta_2 ROE + \delta_3 SLACK + \delta_4 BRI + \delta_5 CR \qquad (1)$$

The regression results are shown in Table 1.

Table 1   Financial Constraint Index Model

	B	Wald	Sig.	Maximum	Minimum	Mean	Std. Deviation
Lev	-7.580	82.557	0.000	2.394	0.008	0.315	0.195
ROE	-3.388	36.031	0.000	9.397	-2.706	0.106	0.319
SLACK	4.435	52.612	0.000	0.886	-1.008	0.355	0.207
BRI	-1.019	15.707	0.000	84.992	-0.753	0.308	2.600
CR	0.124	3.236	0.072	104.667	0.227	4.233	6.351
CONSTANT	1.152	7.770	0.005				
Number	1111	1111	1111	1111	1111	1111	1111

At the same time, this paper, referring to the measurement of risk-taking put forward by Guo Jin, Liu Zhiyuan and Peng Tao (2017), uses the volatility of profit to represent the proxy variables of risk and constructs model (2) and model (3). The models take 5 years as an observation time, and measurethe volatility of ROA by rolling computation. Among them, i represents the listed company, t represents the year, k represents the industry of each company, X represents the quantity of industry company, T represents the observation time, the observation period of this article is [t-2, t+2]. Model (2) is used to adjust the mean value of ROA according to the industry and year in order to eliminate the impact of industry and year, model (3) is used to calculate the standard deviation of adjusted ROA. And the adjusted ROA is the risk-taking level of enterprise.

$$\text{ADJ\_ROA}_{it} = \frac{EBIT_{it}}{ASSET_{it}} - \frac{1}{X}\sum_{k=1}^{X}\frac{EBIT_{kt}}{ASSET_{kt}} \tag{2}$$

$$\text{Risk} = \sqrt{\frac{1}{T-1}\sum_{n=1}^{T}\left(ADJ\_ROA_{in} - \frac{1}{T}\sum_{n=1}^{T}ADJ\_ROA_{in}\right)^2} \tag{3}$$

In order to test the relationship between financial constraints, risk-taking and investment income, the FC * Risk is added into the model. The following model is established:

$$\text{Ing} = \beta_0 + \beta_1 FC + \beta_2 Risk + \beta_3 FC \times Risk + \beta_4 LEV + \beta_5 DFL + \beta_6 Growth + \beta_7 Size \tag{4}$$

Since risk-taking takes the volatility of ROA as a proxy variable, it is necessary to adjust the industry and the year when calculating the risk. However, the profits of enterprises are discrepant in different industries, so the corresponding level between risk-taking and investment return is not significant. Based on this situation, we broaden the selection requirements of the variable, and thus set the dependent variable as a measure of whether the enterprise gains from investment. The specific setting situation and the definition of other variables are shown in Table 2.

Table 2   Definition

Variable name	Variable symbol	Variable definition
Investment Return	Inr	Using dummy variables, take 1 when the cash received from investment is positive, otherwise the value is 0.
Financial Constraints	FC	Restrictions on enterprises' external financing
Risk-taking	Risk	The degree of risk preference of an enterprise in making investment decisions
Asset Liability Ratio	Lev	Liability / Asset
Financial Leverage	DFL	Earnings per Share /Change Rate of EBIT
Growth	Growth	Increase Rate of Main Business Revenue
Size	Size	Ln(Total Assets)

3.3 Description

From table 3, we can see that small and medium board enterprises in China are confronted with great volatility in financial constraints, the minimum value of FC is -90.197, and the absolute value is far bigger than the maximum value which is 16.065. However, the average value, 0.187, is still positive.

This indicates that the number of negative values is less, that is, the low financial constraints are less, and most of the enterprises have a big problem of financial constraints. The standard deviation of risk-taking is 0.671, which is small. The maximum of risk is 8.699, the minimum is 0.008, and the difference between them is not huge. It shows that the Risk is concentrated and less volatile. Risk-taking is a common phenomenon in all enterprises.

Table 3　Description

	N	Minimum	Maximum	Mean	Atd. Deviation
FC	1111	-90.197	16.065	0.187	4.097
Risk	1111	0.008	8.699	0.118	0.671
Lev	1111	0.008	2.394	0.315	0.195
DFL	1111	0.746	1.239	0.999	0.109
Growth	1111	-0.753	84.992	0.308	2.600
Size	1111	18.593	25.705	21.454	1.063
Valid N	1111				

4 Results

In this paper, the multiple discriminant analysis method is selected to test the model (4) because hypothesis 2 is the judgment of the enterprise's possibility of benefitting from investment in different financial constraints and risk-taking. Using the multiple discriminant analysis method, the enterprise can make discrimination on the profit of investment according to its internal development situation, and can also have a more accurate understanding of investment plan.

The non-normalized Fisher discriminant function is as followed：

$$Inr = -18.705 - 0.343FC + 0.168Risk + 0.07FC \times Risk - 5.568Lev + 1.533DFL - 0.354Growth + 0.889Size$$

Small and medium-sized enterprises are easy to be trapped in financial crisis, which leads to bankruptcy. Although the coefficient of Risk is positive, it has to keep continuous operation before benefitting from high risk investment. Thus, hypothesis 1 is proved. The result of the discriminant function also shows that the coefficient of FC is negative, and the coefficient of Risk is positive. It indicates that the lower risks and higher financial constraints SMEs have, the lower possibility for them to get profit (divided into Inr=0 group), which proves H2.

Table 4 is the result of binary logistic regression of model (4). From the list I we can see that financial constraints and investment benefits have a significant negative correlation. When enterprises face higher financial constraints, it will lead to the failure of the enterprises' benefits. The coefficient of financial constraints and risk commitment is positive. It means that in the significant level of 10%, the financial constraints and risk-taking are positively related to enterprises' investment returns. Financial constraints play a regulatory role in the relationship between risk-taking and investment return among small and medium-sized enterprises. Hypothesis 3 is verified. From table 4, it's also found that the coefficient of FC*Risk is far less than the coefficient of Risk, which indicates that financial constraints play interfering interaction. Compared with the lower financial constraints, the impact of risk-taking on investment returns is weak among SMEs when they face high financial constraints. Hypothesis 4 is verified.

Table 4　Empirical Results

	Whole Samples	High Financial Constraint	Low Financial Constraint
Dependent Variable：Inr	I	II	III
FC	-0.289***	-0.297***	-0.223
	（0.061）	（0.08）	（0.15）
Risk	0.126	0.118	3.991
	（0.112）	（0.114）	（4.11）
FC×Risk	0.085*	0.096*	0.496
	（0.047）	（0.054）	（1.786）
Lev	-4.495***	-4.37***	-4.363***
	（0.823）	（1.259）	（1.223）

Continual Table 4

	Whole Samples	High Financial Constraint	Low Financial Constraint
DFL	0.73 （0.897）	0.595 （1.418）	0.388 （1.601）
Growth	-0.29*** （0.074）	-0.428* （0.254）	-0.193 （0.145）
Size	0.671*** （0.107）	0.431* （0.239）	0.722*** （0.202）
（Constant）	-13.244*** （1.902）	-8.188 （5.162）	-14.109*** （4.898）
N	1111	587	524

5 Conclusion

The results show that financial constraints interfere with the impact of risk-taking on investment returns. In the face of higher external financial constraints, small and medium-sized enterprises are limited in financing channels. They cannot provide sufficient resources to support venture capital, and the free cash flows of SMEs are reduced. Thus, it is difficult to get return from investment. At the same time, because of the existence of financial constraints, the utilization ratio of capital is reduced. Even if SMEs are willing to take higher risks and expand investment, they cannot get high remuneration. This situation hinders the growth and development of small and medium-sized enterprises, and even makes it easier for them to fall into financial crisis. The risk-taking level of SMEs requires managers to consider carefully after a comprehensive measurement. Risk taking is the objective fact of each enterprise while financial constraints are the variables that can be effectively controlled through government's regulation and enterprise's management. Therefore, for the development of small and medium-sized enterprises, it is necessary to reduce the financial constraints and concentrate on reducing financing difficulties. Only then can SMEs improve the efficiency of investment that caused by the high risk-taking.

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Study on Management of the Tax Risk of Small and Medium-sized Enterprises

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Abstract: At presentsmall and medium-sized enterprises(SMEs) play an integral part in the national economy in China. Through theoretical research, this paper analyzes the nature of the problem, and combines the empirical analysis of the questionnaire to study the problems existing in the current level of tax risk management of SMEs. First of all, this paper analyzes the causes of the tax risks of SMEs and the tax risks of SMEs by combining the characteristics of SMEs and the theoretical models of management and psychology (opportunism exist, boundedrationality hypothesis, information asymmetry theory, etc.). The reasons for the tax risks of SMEs are divided into internal and external reasons. The purposeof both theoretical research and empirical research is to solve problems, therefore, taking reference of relevant theories and results of empirical research, from some aspects such as the tax risk management goal, management organization, risk response, information communication, supervision improvement, and risk early warning and so on
Key words: Medium-sized enterprises; Tax risk; Management; Tax

1 Introduction

Due to the relatively heavy burden of taxation, the competenceof SMEs in dealing with tax problem will directly affect their successes and failures. If this problem can be properly treated, the enterprise can gain a rapid development, but if not, enterprises will face huge lost for that or even bankruptcy. Therefore, the tax risk ofSMEsserves as the same importance of any other risk, especially for those with a rapid growth cycle, and to some degree, it even decides the survival and development of these enterprises.

The very first researcher of the growth process of SMEs is professor, Lawrence L. Steinmetz who proposed the S-Curve was able to authentically reflex the growth process of SMEs. It mainly analyzes the direct control phase, command and management phase, indirect control phase and department organization phase. In this paper, by comparing many studies of the life cycle of SMEs both at home and abroad, the researcher will point out there are two phases in the life cycle of those enterprises; development and selection phases. Development phase can be divided into three periods: start-up stage, growth stage and mature stage; And selection phase has two cases: one is going directly into the recession stage, another is coming into metamorphosis stage and turning into a large-scale enterprise with new life cycle. See Figure 1.
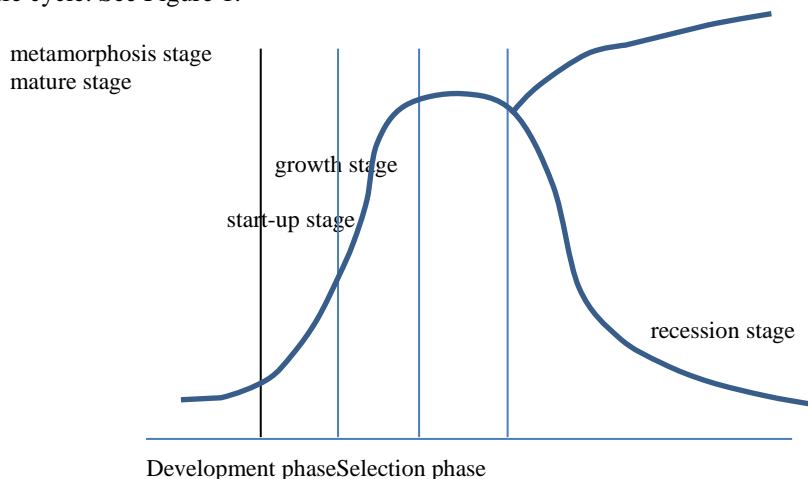
Development phaseSelection phase
Figure 1   Growth Cycle Chart of Small and Medium Sized Enterprises

(Michael Carmody, 2008) believed tax risk was uncontrollable, applicable law or regulation frequently changed, and the criteria of accounting and corporate management were changeable. All

these would lead to tax instability and assets risk. Liu, Rong (2010) pointed out tax risk was a kind of uncertainty in taxation responsibility, mainly existing in the transaction process as well as financial reports and the compliance of relevant laws and regulations. Wang, Zhenhuan (2011) concluded that tax risk was the possibility of paying an overdue tax, paying fine or receiving criminal sanction out of the violation of the tax law. Cai, Chang (2012) suggested tax risk was the possibility of future loss of interest because enterprises didn't correctly follow the tax law. And it included two cases: paying more or less taxation than asked. Su, Lijie (2014) concluded that there were two kind of problem in taxation: one was tax evasion, and enterprises would pay fine or even be involved in penal law; Another was the inappropriate understanding and improper use of tax law, leading to tax overpaid. In an analysis report in 2017 from Jiangsu Branch, Industrial and Commercial Bank of China, it was pointed out that tax risk refers to that tax payers didn't pay their taxation strictly as the tax law or didn't rightly understand tax law terms and preferential tax policies, resulting in paying more or less in taxes.

From the studies above, it can be found that many experts extended the definition of tax risk that can be understood in these two ways: one is the possibility of punishment by tax authorities because of the paying less in taxes; the other is the possibility of unnecessary taxation burden out of the incorrect understanding of tax law or policies.

2 Theories Related to Corporate Risk Management

The whole process of risk management is progressive and all factors are closely connected. The basis is corporate internal environment. By setting reasonable management goals, all possible risk will be identified, and a series of risk assessment would be made. And information communication and monitoring are two factors that affect the whole process of risk management and timely correction will be made. These 8 factors are an organic integrity and they are interactive in the process of risk management. See Figure 2 for the specific framework:
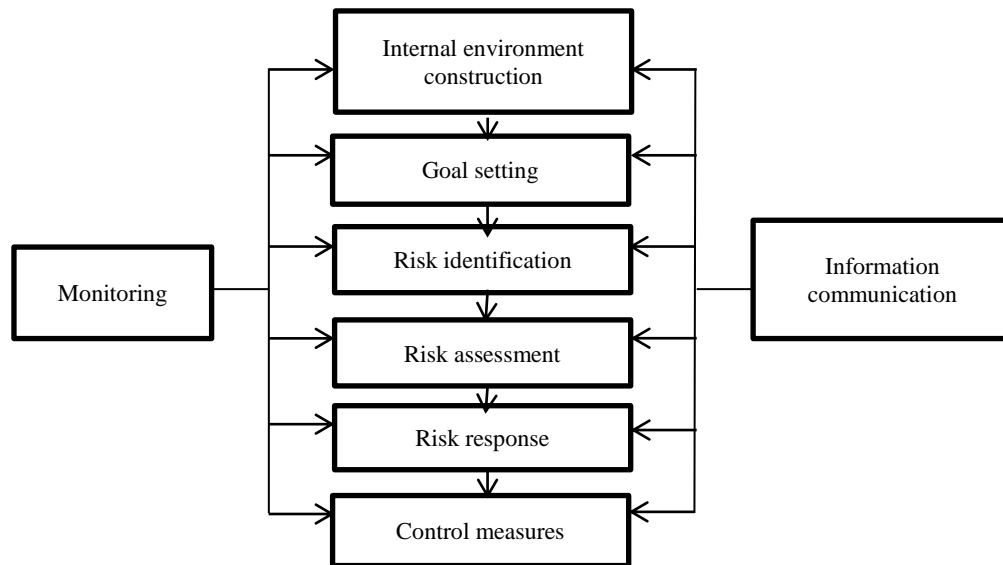
Figure 2   Flow Chart of COSO-ERM Risk Control

Combining with the theories discussed above, this paper believe corporate tax risk management can be defined as: in order to avoid suffering from lost for tax risk, establish a set of complete tax risk management system, including management of goal setting, construction of tax risk organization, identification of tax risk, establishment of tax organization, internal control of tax risk, information communication of tax risk as well as monitoring system f tax risk.

3 Analysis on the Reason of Tax Risk

From the literature review, it was found tax evasion was the most fundamental reason of tax risk. However, this paper believe this is a misunderstanding: many experts and scholars are tackling with tax risk by taking enterprise as a whole, but in practice, all departments are independent, containing decision-making department, production department, sales department and financial department. There is a game relation among them and this often leads to tax risk.

3.1 Analysis on the internal reason of tax risk insmall and medium-sized enterprises (SMEs)

The internal reason for tax risk have: the lack of tax law leads to the weak awareness of tax risk defense and control, as well as insufficient internal control. Of them, the lack of awareness in tax risk mainly reflect in fun-raising, investment, production, conclusion of contract, fulfillment of contract and product distribution. In comparison of large-scale enterprise, SMEshave comparatively less fund-raising channels and are facing heavier market pressure. In face of clients and suppliers, they are usually in a passive position. Therefore, many SMEs often only stress the importance of maximizing the interest and ignore the management of tax payment and finally suffer from larger loss at tax cost. The incomplete internal system is primarily caused by the problems in production process. These problems are easier to lead to business risk, and of course include tax risk. Compared with large-scale enterprises, SMEs have a looser management in personnel quality, which would ask for higher cost. These in return result in problems in financial management and internal control, which also play a core role in the tax risk.

3.2 Analysis on the external reasons of tax risk in small and medium-sized enterprises (SMEs)

The external reasons for tax risk have: the defective tax legislation, tax collection and management, as well as changes in tax laws. Tax law and regulation can easily and directly affect the tax risk of enterprises. So there is little difference in the reasons of this kind of risk between large-scale and SMEs. The difference lies in the attention and awareness of relevant changes because the personnel quality is higher and there is better monitoring in large-scale enterprises. Moreover, the ability of tax risk control of these enterprises are stronger than that of SMEs. Under this circumstances, the former can easily decline its risks in taxes. For the latter, the lack of outside information directly affects the decision-making abilities of the leadership. Sometimes, even they master efficient information, out of their incompetency, they cannot respond timely. Thus, this kind of tax risk will lead to a bigger influence on SMEs.

4 Construction of the Tax Risk Management Mechanism inSmall andMedium-sized Enterprises (SMEs)

Based on COSO-ERM, this chapter takes tax risk of SMEs as one of the business risk, and through constructing the tax risk management mechanism of SMEs, it is aimed at helping them efficiently control tax risk.

4.1 Mechanism framework of tax risk management in small and medium-sized enterprises (SMEs)

In September 2004, COSO issued the Enterprise Risk Management-Integrated Framework (COSO-ERM) which definitely stated the 8 components of enterprise risk management: internal environment, goal setting, risk identification, risk response, control measurement, information communication as well as monitoring. This whole process is closely connected. Taking tax risk as one of the business risk and referring to the enterprise risk management framework, this paper will construct a tax risk management mechanism for SMEs. See the specific management mechanism framework in Figure 1.

4.2 Management goal of tax risk in small and medium-sized enterprises (SMEs)

The tax risk of SMEs is different from investment risk, because common business risks are non-juristic, while the investment risk of SMEs is juristic. From a legal perspective of, the goal of tax risk management is "zero risk", yet in reality, it's extremely hard to reach "zero risk". The main reason lies in the definition for tax risk that has been elaborated above: on the one hand, the violence of tax law and regulation will be punished; And on the other hand, although paying higher taxes don't violate any law or regulation, it can cause loss to enterprises. Thus, it also belongs to tax risk, especially for SMEs. To earn bigger market, share and extend sales channel, some enterprises would rather to pay more taxes to gain survival opportunity without regard to tax cost. Thus, in the sight of enterprise survival and under the circumstance of without violating law, these enterprises can have a better control of tax risk and make corresponding defense measures. Furthermore, in many cases, owing to information asymmetry, opportunism, etc., these enterprises would passively face bigger tax risks. Thence, zero tax risk is not a simple subjective judgement, but a relatively complicated tax risk management question. This paper holds the idea that the goal of tax risk management of SMEs should not be zero tax risk, instead it should be to decrease tax risk and avoid loss to greatest degree through efficient internal communication and identification of potential tax risk, on the basis of abiding by the tax law. And then, to propose some constructive and targeted suggestions to the production and business process.

4.3 Improvement in monitoring mechanism insmall andmedium-sized enterprises (SMEs)

As analyzed above, the internal control and risk management system is only formulaic burdens,

and it didn't be strictly followed during the operation process. Therefore, in order to make sure the tax risk management system in SMEs is efficiently working, the researchers designed a monitoring and improvement mechanism in tax risk management. In the assessment, the following three aspects should be considered: first, the cost and feasibility of the implementation; second, the impact of the risk; and third, the full comparison of the various programs. After the assessment, the company should choose the appropriate solution according to its own situation. Since the probability and degree of impact of various tax risks are different, a four-dimensional space map can be constructed according to the probability of occurrence of tax risk and the degree of influence (see Figure 3), and four different coping strategies are adopted. For tax risks with high probability of occurrence and small degree of influence, the corresponding strategy is risk mitigation; for tax risks with low probability of occurrence and small degree of influence, the corresponding strategy is risk control; for tax risks with high probability of occurrence and high impact, the corresponding strategy is risk avoidance; for tax risks with low probability of occurrence and high impact, the corresponding strategy is risk transfer.
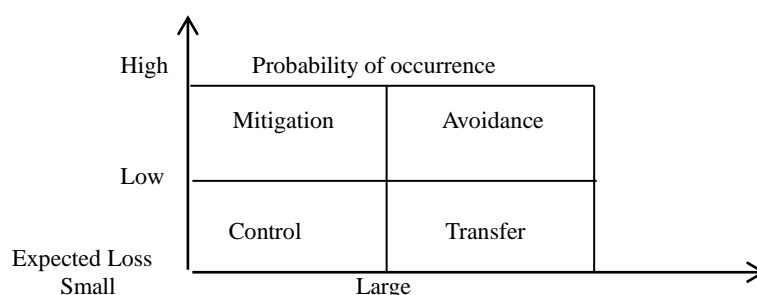
Figure 3   Different types of tax risk response for SMEs

It should be noted that in the choice of tax risk strategy, SMEs should be different from large enterprises. Because large companies usually have a wide range of business. If there is a problem with a business, it often does not have much impact on the entire enterprise. For SMEs, their business operations are relatively simple and their capital operations are relatively tight. Once the tax risk of a business causes losses, the impact on the enterprise is much greater than that of the large enterprise. Therefore, SMEs should adopt strategies to avoid and transfer tax risks as much as possible, and use tax mitigation strategies with caution to make their tax risks within the most controllable range. See the specific content in Table 1

Table 1   Tax Risk Processing System Function Table

Corporate Management Tax Risk Management (Finance Department)	Solution of tax risk
Avoid corporate tax risks	Sell, abandon a product or a business, prohibit unacceptable tax risk activities, reset policies and configuring resources
Control corporate tax risk	Regularly evaluate and monitor tax risks to develop an emergency response plan
Mitigate corporate tax risk	Rationally adjust business model and reduce tax risk trigger probability
Transfer corporate tax risk	Separate businesses or products that face high tax risks through separation, leasing, outsourcing, etc.

Based on the above analysis, we will enter the tax risk summary system. The work of the system is mainly to summarize and analyze the effects of various tax risk response strategies, and to provide reference materials for the revision and improvement of relevant management systems including tax risk management. The tax risk summary system can be performed in the following four steps, as shown in Table 2.

Table 2   Tax Risk Summary System

The tax risk summary system	concrete content
Examination	Check the causes of tax risks, related warnings and countermeasures
Evaluation	Conduct a comprehensive evaluation of tax risk management, including the evaluation of the effects of tax risk warning and tax risk assessment

Continual Table 2

The tax risk summary system	concrete content
Improvement	Suggest improvements to the problems existing in the tax risk management system and implement them in relevant departments
Archive	Establish a tax risk response strategy file to provide experience and reference materials for the improvement and improvement of corporate tax risk management

5 Conclusion

It's comparatively late for China to start its studies in corporate tax risk management, so there are only a few study results can be found. In this paper, the researcher analyzed the reason, current situation, construction of management system of tax risk in SMEs, and two main conclusions were achieved: 1, This paper analyzed the mechanism of tax risk in SMEs, and explained the reason of tax risk from theoretical perspective. 2. This paper constructed a set of tax risk management mechanism by referring to COSO-ERM model, and from the management goal, management organization, tax risk identification and assessment, information communication, monitoring improvement, tax risk warming and tax risk response, it established a tax risk management system for SMEs, which is especially beneficial for the mechanism construction of tax risk management and monitoring. Since tax risk belongs to Management Science, this paper studied corporate taxation from the perspective of Management Science and psychology.

As one of its innovations, this is an interdisciplinary research. But it's unavoidable to find some shortcomingsin this study, and for lack of Management Science and psychology knowledge, the theoretical model has some defects. In the future, we should have built up a series of tax risk 'early warning' system to help SMEs to detect signs of tax risks. As a consequence, the managers of SMEs are able to assess and analyze potential tax risks and then manage risks more effectively, and utilize tax risk 'early warning' system to conduct early -warning analyses of tax risks of enterprises.

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Text Sentiment Analysis of Garbage Incineration "Nimby" Event Based on K-nearest Neighbor Algorithm

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Abstract: In order to identify the emotional tendency of garbage incineration "Nimby" events, a K-nearest neighbor algorithm is proposed to analyze the events by analyzing the structure of the text and the characteristics of emotional expression. The text of garbage incineration "Nimby" case is divided into partial emotions and overall emotions. Through the construction of the model, the overall sentiment of the entire event text is calculated and the construction of a garbage incineration "Nimby" case library is facilitated.
Key words: Garbage incineration; Nimby; K-nearest neighbor algorithm; Sentiment analysis

1 Introduction

Garbage incineration is the best way to dispose of domestic waste as "reduced, harmless, and resource-based" and has caused the country's great attention and importance (Chen Y H, 2015). However, during the process of waste incineration projects, it is faced with the problem of "difficulties in landing" caused by "Nimby" (He Yanling, 2009). The existing research on the "Nimby" of MSW incineration remains at the problem solving and management suggestion level (Li Y, Liu L, 2017). With the study, the best way to achieve the transformation of the crisis is to build a library of waste incineration "Nimby" crisis resolution cases, and to better understand the emotions of "Nimby" events through text sentiment analysis of historical events. Through the text extraction of garbage incineration "Nimby" cases, considering the internal structure of the text and the characteristics of emotional expression, a sentiment analysis method based on the K-nearest neighbor algorithm is proposed, and a hierarchical model of sentiment analysis is built, which is conducive to the extraction of textual knowledge.

2 Text Emotional Model

In order to accurately analyze the complex emotions in the text, the concepts of global emotion and partial emotion are first introduced (Ravi K, Ravi V, 2015; Zhao Yanyan, 2010). Global and partial are a pair of philosophical categories that reflect the interrelationship of things and the process of their inclusion and combination, and they are a universal link that reveals the interaction and relationship between the whole and part of objective things (Yang L, Jian Z,2013; Hesse B W,2015). The overall situation is the whole, which is the sum of all parts and aspects of things. It has leadership, decisive, and major roles for each part and all aspects (Stavrianou A, 2013; Boiy, Erik, Pieter, 2007; Haddi E, Liu X, Shi Y, 2013). Through analysis, we find that the emotions in the text also conform to philosophical laws such as global and partial. Through the analysis of a large amount of corpus information, the emotions in the text are divided into two types: global emotion and partial emotion. Global emotion refers to the emotion expressed in the entire text; and partial emotion refers to the emotion expressed in a certain part of the text. This specific part can be a word, a phrase, a sentence, or a paragraph. Each partial emotion in the text interacts and interacts with each other, ultimately determining the overall emotion of the text. (Figure 1)

According to the semantic structure of the text, the hierarchical model is divided into four levels: T is the emotional tendency of the text, $p_1, p_2, p_3, \ldots, p_m$ are the emotional tendencies of each natural segment, $s_1, s_2, s_3, .., s_n$ are The emotional tendency of each sentence in the segment, $w_1, w_2, w_3, ..., w_q$ is the emotional tendency of the word. According to the partial and overall analysis of emotions, the emotional tendency of words determines the tendency of sentences to be lighter, and the emotional orientation of sentence sentences determines the emotional tendencies of natural segments. The emotional information of natural segments determines the overall emotional orientation of the text. This hierarchical emotional model clearly shows the internal emotional context of the text. Through this model, the emotion of the text can be analyzed in multiple angles, fine-grained levels, and levels.
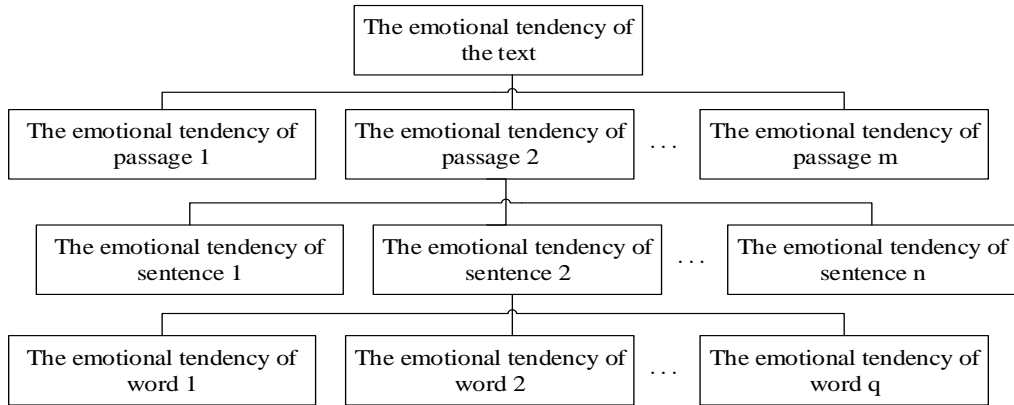
Figure 1   Textual Emotional Representation Model

3 Sentiment Analysis

According to the hierarchical analysis model established, the text sentiment calculation method can be divided into two steps: ①Calculate and obtain the emotional sentiment value of each paragraph in the text, that is, partial emotion; ②Obtain the overall emotion of the text according to the partial sentiment calculation. The following will elaborate on these two steps.

3.1 Partial sentiment analysis

First, determine the emotional orientation of each segment. The emotion recognition of paragraphs is regarded as the emotional annotation of sentences in paragraphs, so the conditional random field model can be used. Because the subjective content and objective content of the segment exist at the same time, if the objective content is eliminated first, the subjective content is directly analyzed by emotion, which is inevitably effective in avoiding the influence of the objective content on the emotional judgment. Based on this, we propose a two-tier CRF model to analyze the segment.

The model specifically includes the following two steps:

(1) In the first-level CRF model, the subjectivity and objectivity of sentences included in the segment are first marked. In this way, through the labeling of the first layer, the objective sentence is filtered, leaving only the subjective sentence to be processed, avoiding the influence of the objective sentence on the next level.

(2) The sentence marked as subjective is taken as the input of the second-level CRF model, and the evaluation of the sentence in the second layer is completed. According to different layers of tasks, CRF models at different levels adopt different model features. The first layer of model features are subjective features. We define sentences that contain emotional words as subjective sentences. Therefore, subjective features are emotional words. For sentences containing emotional words in the emotional lexicon, and mark them as subjective sentences, otherwise mark them as objective sentences. The characteristics of the second layer model are the characteristics of appreciation. The sentiment words in the comprehensive emotional vocabulary we have established include two attributes, one is the evaluation of emotional words, and the other is the value of devaluation (an inclination tendency is assigned to 1, a depreciation tendency is assigned to -1, and a neutral emotion is assigned to 0). For the emotional words contained in a sentence, the devaluation of the sentence is taken as a feature of the model. Through the above steps, the emotion of the sentence in the paragraph is completed, and the emotion of each paragraph can be determined.

3.2 Text sentiment analysis based on K-nearest neighbors

Emotional tendencies include two types: Commendatory and derogatory, so emotion recognition can be regarded as two types of classification problems, namely the identification of defamation and derogatory. Based on this, the K-nearest neighbor algorithm is used to identify the sentiment of the text. The algorithm is a simple, effective, non-parametric method. Its essence is a predictive monitoring algorithm. Its rules are data samples. In the following, taking two classification problems as examples, a formal description of the K-nearest neighbor method is given: Based on the vector space model (VSM), each instance is considered as a point (vector) in Rn space. Assume that the instance data of n class identifiers are (X_1, y_1), (X_2, y_2), ... (X_n, y_n), where X_i is the vector representation of the instance, and y_i is the class corresponding to the instance. The value of the category is 0 and 1, which means two types. For a given instance x, its type can be judged by Equation (1):

$$y = \frac{1}{k} \sum_{x_i \in L_k(x)} y_i \tag{1}$$

Where: if the y value is greater than the given threshold of 0.5, X belongs to class 1; when it is less than 0.5, X belongs to class 0. Where $L_k(x)$ represents the value of the closest K instances to a given instance X. In practical applications, in order to improve the accuracy of the K-nearest neighbor method, an improved K-nearest neighbor algorithm-weighted K-nearest neighbor method is often used. In this algorithm, the decision weights are calculated for each instance. For X, the distance between X and the K nearest neighbors $(X_1, y_1), ..., (X_K, y_K)$ is defined to be $d_1, ..., d_K$, respectively. The decision weight β_i is calculated as follows:

$$\beta_i = 1 - \frac{d_i}{\sum_{i=1}^{k} d_i} - \frac{k-2}{k} \tag{2}$$

Weight-based neighboring decision rules can be described as:

$$y = \frac{1}{k} \sum_{X_{i \in N_K(X)}} \beta_i * y_i \tag{3}$$

After determining the K-nearest neighbors of instance X, the decision weights of each instance are calculated, and the size of the decision weights is used to determine the extent to which they play a role in predicting the category assignment of X.

For a text's global emotion, we use a weighted K-nearest neighbor method for all partial emotions in the text to obtain the overall emotion of the text. Because each segment in the text has different weights, each partial emotion plays a different role in affecting global emotions. Relatively important segments of emotions exert a great influence, while relatively unimportant segments of emotions play a minor role. The weighted K-nearest neighbor method usually determines the weight according to the distance from the target point, but in the global sentiment prediction, the weight of each segment is not determined according to the distance of the traditional meaning, but according to the importance of the segment itself. definite. Therefore, the calculation of the weight is also different from the weight calculation in the weighted K-nearest neighbor algorithm. According to the above analysis, the calculation of global emotion is as follows:

$$P(T, s_j) = \sum_{i=1}^{k} P_T(P_i, s_j) W_i \tag{4}$$

Where: $P(T, s_j)$ represents the global sentiment of the text T, and $\sum_{i=1}^{k} P_T(P_i, s_j)$ represents the cumulative sum of emotions in the middle segment P_i of the text T, ie, the partial emotion of the text. When $P_T(P_i, s_j)$ is a propensity, the value is 1, when it is derogatory, the value is -1, and when it is neutral, it is 0. w_i denotes the weight of segment P_i.

The calculation of segment weights is a key step in determining global emotions. Each segment in a text has a different contribution to the text. In this article, we define the segment's weight more specifically as the contribution rate of the segment, and the contribution rate refers to the contribution of the segment to the text theme and content. The title and sentence are respectively expressed as vectors of feature items. The smaller the angle between the vectors, the higher the similarity between the title and the sentence. Sentence and title similarity. Calculated as follows:

$$\text{Sim}(S_i, T) = \frac{S_i T}{\|s_i\| \|T\|} \tag{5}$$

Where: T is the vector of the title, S_i—the vector of the sentence. The similarity threshold δ is determined by experiments. Through repeated experiments in this paper, δ = 0.75 is finally determined. When the similarity between a sentence and a title is greater than the threshold, the sentence is considered to be similar to the title, and the sentence is considered to contain the sentence. The segments are relatively important to consider all the above factors. The contribution rate of a segment is defined as follows:

$$v_{C_i} = 1 + \frac{S(P_i)}{N_{P_i}} + \alpha \tag{6}$$

Where: v_{P_i} represents the contribution rate of the i-th segment, N_{P_i}—the number of all sentences contained in segment P_i, and $S_{(Pi)}$—the subject sentence contained in segment P_i Number, α—the value given when the segment contains the first or last segment, n—the number of all sentences in the segment P_i that are similar to the heading. The value of α must be determined by statistical analysis of the experiment. Through the above calculation steps, the contribution rate of a segment, that is, the weight of a segment can be determined. Obtain the emotion of the segment and the weight of the segment, and use a weighted sum predict the overall emotion of the text.

3.3 Results

This article crawls through webpages and obtains more than 200 web pages. After data cleaning and screening, we chose to retain 29 garbage incineration "Nimby" texts. The sentiment evaluation of text is divided into two parts. First, the partial emotion of the text is obtained, and then the overall emotion of the text is obtained by the K-nearest neighbor algorithm. Firstly, the two-stage CRF model is used to identify the emotions of garbage incineration "Nimby" incidents, and a comparative analysis is used. There are different analysis methods (machine learning methods, Bayesian classifiers) to determine the emotional analysis of the entire text sentence. Andthe results are as follows:

Table 1   Results of Text Sentiment of Garbage Incineration "Nimby" Event

Case	1	2	3	4	5	6	7	8	9	10
Commendatory	42.35	42.72	45.09	40.49	42.97	42.345	44.795	42.46	50.735	43.86
derogatory	57.65	57.28	54.91	59.51	57.03	57.655	55.205	57.54	49.265	56.14
Case	11	12	13	14	15	16	17	18	19	20
Commendatory	37.15	51.29	49.29	66.33	40.44	39.47	51.14	51.03	17.28	57.55
derogatory	62.85	48.71	50.71	33.67	59.56	60.53	48.86	48.97	82.72	42.45
Case	21	22	23	24	25	26	27	28	29	
Commendatory	51.95	46.26	46.35	62.61	49.6	45.31	45.445	45.82	49.03	
derogatory	48.05	53.74	53.65	37.39	50.4	54.69	54.555	54.18	50.97	

4 Conclusion

Based on the analysis of text structure and the characteristics of emotional expression, this paper proposes to establish a "global + local" sentiment analysis model for garbage incineration "Nimby" events, and carries out a two-stage analysis of the text. Firstly, the two-level CRF model is analyzed, and then the weighted K-nearest neighbor algorithm is used to make the text sentiment analysis more scientific.

Acknowledgement

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Research on the Countermeasures of Prevention and Resolution of Local Government Debt Risk

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Abstract: Based on the recent measures proposed by the Hunan Provincial Finance Conference to prevent local government debt risk, this paper firstly analyzes the status quo of local government debt, summarize the types of local government debt, and then focuses on clarifying the scale and structure of local government debt in China by collecting and analyzing relevant data. The amount of China's local government debt is large, but the growth rate is relatively stable, and the debt risk is controllable. On this basis, it analyzes the causes and consequences of government debt risk. Finally, it puts forward measures to prevent and resolve local government debt risk, and looking forward to the development trend of local government debt risk in the future.
Key words: Local government; Debt risk; Debt status; Risk management

1 Introduction

Recently, Hunan Province held a high-level financial work conference and adopted the measures of "Stop the construction of a batch of projects, delay the construction of a batch of projects, reduce a part of the debt, and cancel a part of the debt to resolve stock debts and strictly control the increase in debt; Besides, strictly controlling land supply, project management, corporate bond issuance and rectification of platform company. These four major points are adopted to prevent local government debt risk. At this point, the prevention of local government debt risk has been elevated to a new height by the central government.

All over the world, the problem of local government debt has caused at least three crises including Latin American countries debt crisis in the 1980s, Southeast Asian financial crisis and financial crises in Argentina and other countries in the 1990s, and recently the global economic recession is caused by government debt problems in European and American countries. All indicate that the problem of local debt risk is an important factor that hinders world peace and development.

On account of the general concern of local government debt risk, this paper makes analysis of government debt risk categories and status quo based on the existing theoretical results, explores the origin of debt risk from the source combined with the fishbone chart, and then puts forward the countermeasures to prevent and resolve debt risk.

2 Types and Current Situation of Local Government Debt Liability

2.1 Types of local government liability

Local government liability appears under the influence of reformation in China's socialist market economic system , accompanied by the concurrent transformation from planned economic system to market economic system, specifically referring to the governmental conducts aimed for raising capitals，which could be explained as to widely contract loans to investors under the guarantee of government credibility. As an important form of government income, local government liability is also an important tool for macro-control of the economy and a redistribution form of national income.

According to Figure 1, the risk of local government liability can be classified from different standards. This paper chooses the method of "matrix analysis" to analyze government liability. First, government liability can be divided into direct liability and contingent liability, depending on whether specific conditions are required for its occurrence. Direct liability will occur under any conditions, while contingent liability is incurred under certain conditions where the government needs to assume certain obligations. Second, according to the legal confirmation, local government liability can be divided into implicit liability and explicit liability. Implicit liability is a kind of debt that has not been agreed by law or contract and has to be assumed due to some external factors, while explicit liability is the type of debt that must be undertaken because of legal contract. If the two ways of making classification are combined, the local government liability can be divided into four types: direct and explicit liability, direct and implicit liability, contingent and explicit liability and contingent and implicit liability.

Direct explicit liabilities refer to the credit debts that local government owns on the basis of the existing conditions and in accordance with the law, which are mainly for the local infrastructure

construction, including enterprises, land resources and local public resources.

Direct implicit liabilities refer to the credit debts indirectly owned by local governments under existing conditions and without licit accordance, including local pension funds and health insurance funds under direct control.

Contingent liabilities refer to the credit debts that are legally contingent upon a particular future condition, including the capitals borrowed from domestic and foreign financial institutions, units and individuals with government guarantees.

Contingent liabilities are liabilities that may occur under certain conditions without legal or contractual accordance, including official credit, loss reporting, and natural disaster liabilities.
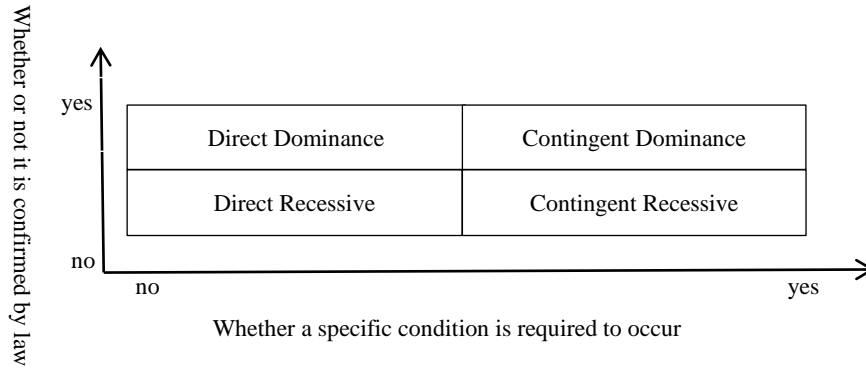
Figure 1   The Local Government Debt Category Matrix Diagram

2.2 The status quo of local government debt

In the process of studying the current situation of local government debt, this paper is based on the data from the National Audit Office, the Ministry of Finance, and publicly available data. After integrated processing, this paper conducts a preliminary analysis of the current situation of local government debt in China from 2014 to 2017 from both scale and structure.

(1)Scale of local government debt

Table 1   Comparison of the Scale of Local Government Debt in China, 2014-2017 (In Billions of Yuan)

Year	Special Debt	General Obligation	Total Debt
2014	59801	94272	154073
2015	54949	99619	154568
2016	55244	98312	153556
2017	61384	103322	164706
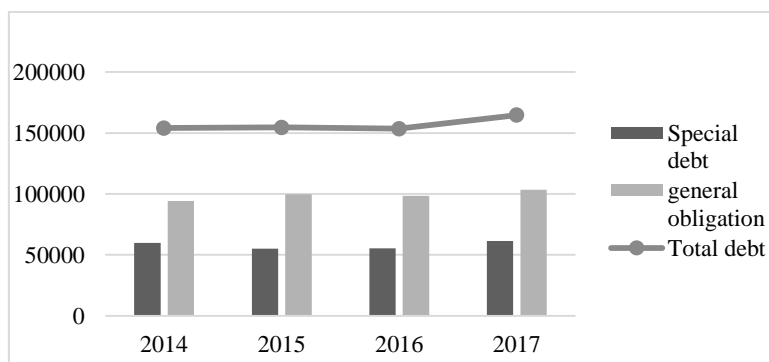
Figure 2   Growth of Local Government Debt in 2014-2017 (In Billions of Yuan)

By the end of 2017, the scale of China's local government debt reached 164706 million yuan, of which the general debt was 103,332 billion yuan, accounting for a large proportion. First, from the analysis of total debt, the total local government debt in 2014-2017 stabilized at about RMB 1.6 trillion, and the overall trend is upward. The growth rate is stable. Second, from the analysis of debt growth rate, local government debt will increase from 2016 to 2017 faster; other years have not changed significantly.

All explained that China's local government debt changes have been relatively stable in recent years, and the debt risk is controllable.

Table 2   Comparisons of China's Local Government Debt and Gross Domestic Product (GDP), 2014-2017
(In Billions of Yuan)

Year	GDP	GDP Growth Rate	Total Debt	Debt Growth Rate
2014	636463	7.4%	154073	0.299%
2015	689052	6.9%	154568	0.321%
2016	744127	6.7%	153556	-0.0655%
2017	827122	6.9%	164706	0.72%

According to Table 2, from 2014 to 2017, the total amount of local government debt in China changed little and the rate of change was relatively stable, while GDP continued to grow, with a large growth rate, stable at around 7%. All these indicate that China's economy has ability to developed in the capacity of local government debt.
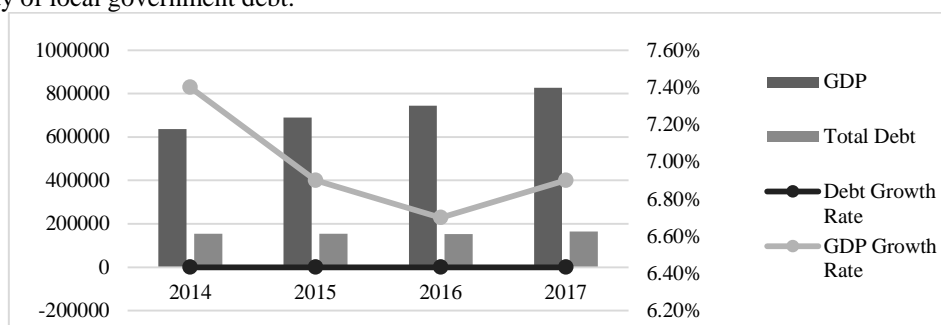
Figure 3   Comparison of Local Government Debt and GDP in 2014-2017 (In Billions of Yuan)

At the same time, growth rate of local government debt is much higher than GDP growth, this phenomenon is most evident in 2016, reflecting significant effectiveness in local government debt country limit management in 2016 (specific changes of trend is in Figure 3) .

According to the data shown in Table 3, China's local fiscal budget revenue has increased year by year from 2014 to 2017, with a stable growth rate of about 8%. Increases in local government debt were significantly reduced since that control of quota control in 2015. The growth rate of local government debt is obviously lower than the growth rate of local fiscal budget revenue. The overall scale of the debt risk is controllable, but the growth rate has a rising trend, which indicates that it is necessary to implement quota control and strengthen the supervision of local government debt.

Table 3   Comparison of Total Local Debt and Local Budget Income in 2014-2017 (In Billions of Yuan)

Year	Local Budgetary Revenue	Local Fiscal Budget Revenue Growth Rate	Total Local Government Debt	Local Government Debt Growth Rate
2014	140406	8.60%	154073	0.30%
2015	152249	8.40%	154568	0.32%
2016	146681	7.40%	153556	-0.07%
2017	156665	7.70%	164706	0.72%

(2)The structure of local government debt
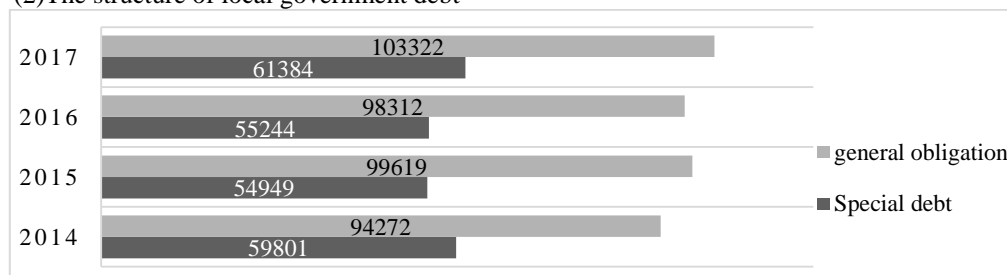
Figure 4   A Bar Chart about the Structure of Local Government Debt in China, 2014-2017
(In Billions of Yuan)

According to the analysis of Figure 4, China's local governments generally have more general debts than special debts, more than half of the total debt balance. In 2017, for example, where local government debt accounted for 37 percent of that total debt, whereas the general debt ratio of up to 63 percent, the data is shown in Figure 5. All indicates that local government general debt contributed significantly to the total debt. In general, China's local government debt structure is stable from 2014 to 2017.
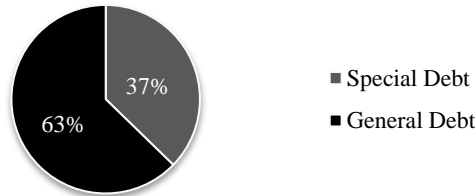
Figure 5   Pie Chart of Local Government Debt Structure in China in 2017

From 2014 to 2017, China's economy developed rapidly, but the level of inter-regional development was not balanced, leading to differences in the debt structure of regional governments. Many developed regions are mostly developed debt, with a large debt scale. And in less developed areas, more of the debt is guaranteed, such as building roads, schools and hospitals. The total debt is relatively small.

In conclusion, we have a larger and more substantial debt in our local government, but the growth is relatively stable, and the debt risk is controllable. The effect of national quota management on local government debt has been remarkable, and there is room for growth in the bear capacity of local government debt. Local government debt in China is given priority to with general obligation, regional structural differences need to be balanced.

3 Causes and Consequences of Local Government Debt

At present, the risk factors of local government debt are diverse, mainly including scale risk caused by the debt undertaken by local governments exceeding their fiscal revenue capacity, structural risk caused by unreasonable fiscal expenditure choices of local governments, efficiency risk caused by the low efficiency of local governments in the use of funds, and external risk caused by the transfer of debt from local governments to higher government institutions. In view of this, a causal diagram is used to analyze that origin and outbreak of local government debt risk.

3.1 Causes of local government debt risk

According to Figure 6, the risk of the local government's debt is mainly due to irrational growth and expansion of the debt motive, and this paper is a detailed analysis of the separation of authority, the management system, and the government.
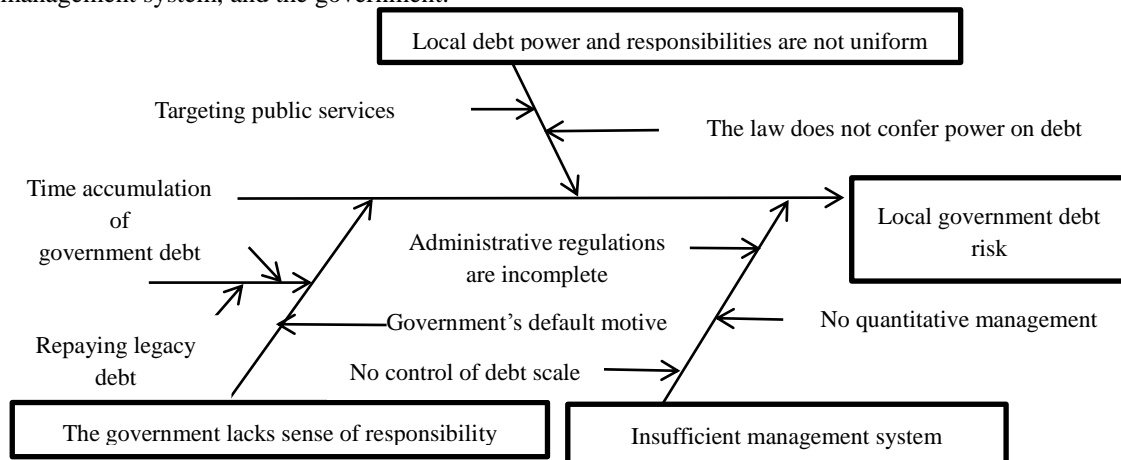
Figure 6   Local Government Debt Risk

(1) The unified ownership and responsibility of local governments' liability

At present, local government liability has become a common phenomenon, and the government's exercise of employing liability has turned into a reasonable means of economic adjustment. However, in fact, China's laws do not entail local governments the power to practice liability. Local governments exercise their creditor's rights in the absence of unified rights. The rationality of government borrowing is its aim at public interests by offering the public service, thus to realize the public interests is the counterpart to the exercise of borrowing money, which is directly related to the repayment of the governmental debts. The lack of legal constraints and clear rights and obligations makes it impossible to guarantee the relevant interests of the current and future public service rights and responsibilities and makes it difficult to repay debts. Whether the rights and responsibilities of local government liability are unified determines whether public interests can be truly maintained and realized.

Take Sichuan province as an example. From 2008 to 2011, the province borrowed a lot of money to meet its fiscal targets, adding 4 trillion yuan of investment funds, 70.0% of which came from local government debt and government budget, causing a surge in local debt. After 2012, the government invested a lot of money to accelerate the construction of transportation facilities and the construction of new urbanization in the province, resulting in high debt. In 2016, the GDP growth rate of the province was 36.9%. Meanwhile, the local debt of the province was 781.00 billion yuan, of which 32.5% were contingent liabilities. The debt growth rate was 45%, far higher than the GDP growth rate of the same period.

(2) Imperfection of management system

The blind expansion of local government liability is due to the lack of a strict and sound debt issuance and repayment system. Therefore, we should improve the system of borrowing procedures, supervision and repayment, and standardize the formation and confine the expansion of local government liability in the cage of the former system. At the end of last century, the United States put forward measures to quantitatively manager state liability. That is, all state debt activity should be under control of a special institution strictly restricting the scales of debt through compulsory administrative standards and active management system, in order to impel government to meet its debt obligations.

In Sichuan province, for example, the total amount of local government debt due in 2017 is large, while short-term debt reaches 55.2%. Five-year and seven-year bonds account for 66.6% of total local government debt. As a result, short-term debt accounts for a large proportion of local government debt, and the repayment pressure is high.

(3) Lack of administrative sense of responsibility

As the debtor, from the point of government behavior, local government itself has the motivation to break the contract, especially when information mutuality is not achieved, the government as the main economic body blindly pursues the maximization of interests, which could lead to the expansion of liability. Many international theories suggest that the risk posed by the expansion of local government liability is largely due to "irresponsible debtors".

The accumulation of local debts over time has resulted in the current government departments having to repay part of the debts left over by the previous government in addition to the debts they borrowed, thus greatly increasing the financial pressure.

When the "irresponsible" become a kind of default rules, the government due to financial pressure has to "robbing Peter to pay Paul". In order to meet the demand of daily reasonable money, they borrowed huge amount of money and thus form excessive borrowing behaviors.

China's county-level local debt repayment consciousness is poor. Most county-level industries are mainly primary industries, and the financial income is small and unstable. At the same time, the county-level economic development require a large amount of capital, which results in the county-level government financial pressure, the rapid growth of local debt, and the increase of debt risk. Take Sichuan province as an example. In 2016, the county-level government debt of the province was 491.40 billion yuan, accounting for 62.0% of the total debt. In 2016, the growth rate of county-level debt in Sichuan province was 21.0%, far higher than the growth rate of 3.8% for municipal debt.

(4) Inefficiency of local government

The risks concerning local government debt structure and scale to a great extent are from the government inefficiency. Because of uneven distribution of fiscal spending and ambiguity of local fiscal system, local government leads a snub attitude on fiscal problems, and then governmental insolvency happens.

3.2 Consequences of local government liability risk

Local government liability is an important financial means for local government to adjust the

economy. If it grows in accordance with the normal growth, it is not harmful and does not pose a debt risk. Abnormal growth, however, if the government liability increases irregularly, it is not only a threat to the financial health in one region, it will also trigger a transmission mechanism: disruption of the state finance and financial order, and even the national economic operation system, leading nationwide economic crisis.

(1) Threaten local governmental finance

According to the results of National Government Debt Audit (National Audit Office, No.32 of 2013) of the national audit office, the total debt of local governments is relatively high, among which the liabilities for repayment account for a large proportion of local fiscal revenue. Nearly half of the 36 local governments surveyed have debt ratios of more than 100 per cent, and their delinquencies have continued to rise in recent years.

The debt ratio of local governments often exceeds the national warning line, which will enlarge the financial risk, amass the obligations of government, and finally affect the credibility of the government.

(2) Initiate financial risk

At present, local governments borrow mostly through investing and financing platforms and bank loans, which are relatively large. On this basis, local governments are often invisible guarantors. Due to the capital amount and capital circulation, these two methods of debt financing have great risks -- most financing platforms also have the problem of illegal capital absorption, and the funds are mainly circulated to the direction of public welfare projects.

This means that the credit risk of the platform company is transferred to the government as its credit risk and financial system risk. Failure to repay the debt at maturity will quickly lead to the formation of bad bank loans, which will be transformed into the crisis of the national financial system.

(3) Form social crisis

Under China's existing system, once local governments have debt repayment problems, their financial pressure will be transmitted to the central government and spread rapidly to the whole country. At present, our country is in the new period of socialist construction walking in the deep waters of socialist reform and having to overcome many difficulties, once the local governments increases income and cuts expenditure, it is bound to influence the results of governmental measures to the reform because of inadequacy of financial input, and even likely to intensify social contradictions, making it even harder to build a harmonious and stable economic and social environment.

(4) Reduce the credibility of local government

Local government liability management system is an imbalance of the assessment of administrative achievements and debt liability, the latter one is to an extent ignored. The abuse of administrative power to excise excessive liability, illegal financing behaviors by guaranteeing credibility can lead to the formation of an overly complex debt chain, making the debt unable to be paid. It not only affects the healthy development of local economy, but also affects the authority of the local government, which is extremely harmful to the government's social image.

(5) Influence the social liability environment

Local government debt scale once more turns bigger than financial income scale, will lead to an increasingly complex social liability chain, forming "triangle liability" phenomenon, as a result, social capital flow speed is reduced, efficiency of capital utilization turns low, which is not conducive to the development of social productive forces and purity the social environment of liability.

4 Prevention and Measures of Local Government Debt Risk

Based on the analysis of the causes and consequences of local government debt risks, the specific measures for risk prevention and resolution proposed in this paper are as follows.

(1) Clarify the right and responsibility relationship of local government debt

In view of the inconsistency of the local government's debts and responsibilities, the government must strengthen debt management, clarify the right and responsibility relationship of local government debt, and rationalize the division of powers. We should improve the fiscal and taxation system and clarify the respective debt responsibilities of the central and local governments. We're supposed to clean up and rectify the illegal financing platform, establish a modern enterprise system, improve corporate governance structure, and introduce high-quality specialized personnel to ensure that the financing platform operates scientifically, rationally, and regularly, and legally promote economic development.

(2) Strengthen the sense of debt responsibility of government officials

With regard to the problem of unsound management system, the government should strictly control the scale of debt and adopt mandatory regulations to restrict government liability. The government

should deal with officials' reform of the assessment mechanism, strengthen publicity and education, raise officials' awareness of responsibility, and establish a clear view of performance. We should establish and improve laws and regulations, improve the system of debt-relief personnel, and avoid unlawfully borrowing due to outstanding achievements. If recurrence of adverse consequences arising from illegal local borrowings occurs, administrative responsibility should be pursued in accordance with the law, and criminal responsibilities should be severely investigated.

Improve the debt supervision mechanism

(3) With the lack of awareness of local government responsibility, local governments should improve the debt supervision mechanism and increase the transparency of government debt information. The open and transparent government affairs will help control the scale of debt and effectively curb debt expansion. Appropriate information disclosure mechanisms can strengthen government responsibilities and constrain government debt behavior.

(4) Improve the budget management of local government

The government should improve local government budget management in response to the irrational local fiscal budget. Debt is incorporated into government budget management, so that the scale of borrowing is reasonably restricted under the budget system. This move can optimize the structure of the fiscal budget and allocate social resources as a whole, so that the scale of government debt can be controlled in the budget management system.

(5) Learn from the market economy

Under the market economy environment, the government should also introduce market mechanisms, establish a market environment conducive to the management of local government debt risks, draw on market economy related practices, introduce government debt credit ratings, reduce government financing capital, and protect creditor's benefits in the aim of reduce government debt risk.

5 Conclusion

The overall trend of the development of local government debt risk in China is stable and controllable. However, due to factors such as the inconsistency of local government debt obligations and the imperfect system, there are some hidden risks in the debt structure and other aspects. It is necessary to strengthen government debt management and improve the supervision mechanism, forming a system of local government debt risk early warning mechanisms. In the new era of socialist construction, combined with the new development of the socialist market economy, China now needs to establish a market environment for controlling local government debt risk and reducing the harm of risk.

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Analysis of Influencing Factors of Reservoir Immigrants' Human Capital Accumulation: A Case of Three Gorges Reservoir Area

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Abstract: Based on the survey data of the immigrants in the Three Gorges Reservoir area, this paper used the factor analysis method to find out the influence factors in the process of accumulating the immigrant human capital, which can be summarized as economic factors, system policy factors, resource endowments factors and educational level factors. Then, this paper used the grey correlation analysis to analyze the internal effects of these four factors on the accumulation of immigrant human capital. It is found that the influence of these four factors is from large to small, followed by economic factors, system policy factors, resource endowments factors and educational level factors. This research may guide the government to help the reservoir immigrant effectively.
Key words: Reservoir immigrants; Human capital accumulation; Factors; Structural analysis

1 Introduction

China is one of countries with the most reservoir projects and immigrants. However, numerous immigrants' livelihoods are damaged during immigration because of changes to their living conditions. As a consequence, many immigrant families are at risks of secondary poverty over again. From existing domestic literature, it may be known that immigrants have been really subject to secondary poverty after their resettlement in large reservoirs. In their survey on immigrants of the South-North Water Diversion Project, Hu Jing et al (Hu Jing et al, 2010) discovered that some of original human capitals malfunctioned after immigration, because the movement induced by external-force intervention impacts immigrants' original abilities to accumulate human capitals, and pointed out that their previous abilities became ineffective for alleviating poverty.Ginsburg et al (Ginsburg et al, 2016) pointed out that the development of immigrants 'skills can help to improve their mobility. Gautam (Gautam, 2017) considered the human resources as an important factor in the resistance of immigrant livelihoods.Liu Huicong (Liu Huicong, 2018) pointed out that the reconstruction of human capital is the key factor for the resettlement of reservoir immigrants.More and more existing literature has proven that human capital accumulation promotes regional economic development. Hence, it may be concluded that human capital accumulation plays important roles in family economy and regional economy of reservoir immigrants.

Based on survey data about the Three Gorges Dam, this paper explores the factors that exist in human capital accumulation of immigrants in the Three Gorges Dam and comparatively analyses the extent of impacts, in order to provide decision-making support for immigration-related departments to formulate policies for improving human capitals of immigrants.

2 Index Construction and Data Source

2.1 Index construction

On previous evaluations of human capital accumulation, selected indexes were about formal education, health status, vocational education and training as well as labour force migration. However, these indexes are not ideal representative factors that impact immigrants' accumulation of human capitals. Large surveys on reservoir immigrants show that immigrants are unenthusiastic about re-employment training, because their original human capitals malfunction after movement and there is a lack of employment opportunities. Furthermore, immigrant families' educational investments are structural and immigrants are also impacted by government support. Therefore, it is inadvisable to discuss index construction for factors affecting human capital accumulation of immigrants simply from these four perspectives. Instead, indexes are expected to be selected from deeper perspectives such as immigrants' endowment, financial conditions, governmental institutional support and educational conditions. In view of this, 21 indexes are chosen based on economic factors (income and consumption), policy factors and basic traits of immigrants.

2.2 Data sources

Data were collected from surveys on living and production conditions of immigrants in the Three Georges Dam over 8 years from 2004 to 2011. There were five types of respondents, including rural latter settled immigrants, urban immigrants occupying land, pure residents, corporate staff and employees of industri al and mining enterprises.

Table 1   Descriptions of Basic Variables

		Mean	SD
X1	Householder's Educational Attainment Illiterate = 1, primary school diploma = 2, middle school diploma = 3, high school diploma = 4, university diploma = 5	3.24	0.81
X2	Spouse's Educational Attainment Illiterate = 1, primary school diploma = 2, middle school diploma = 3, high school diploma = 4, university diploma = 5	2.92	0.92
X3	Educational Attainment of Member 1 Illiterate = 1, primary school diploma = 2, middle school diploma = 3, high school diploma = 4, university diploma = 5	3.29	1.23
X4	Educational Attainment of Member 2 Illiterate = 1, primary school diploma = 2, middle school diploma = 3, high school diploma = 4, university diploma = 5	2.17	1.81
X5	Householder's Age	3.01	0.69
X6	Spouse's Age	2.84	0.68
X7	Age of Member 1	2.15	0.55
X8	Age of Member 2	2.11	0.64
X9	Food Expenditures (RMB)	6,274.47	3,817.27
X10	Clothing Expenditures (RMB)	698.68	711.06
X11	Living Expenditures (RMB)	915.07	1,086.40
X12	Expenditures in Household Equipment/Articles and Services (RMB)	517.4	945.79
X13	Healthcare Expenditures (RMB)	1,319.64	3,365.71
X14	Transport and Communication Expenditures (RMB)	823.01	757.9
X15	Expenditures in Cultural, Educational & Recreational Articles and Services (RMB)	2,299.44	3,017.00
X16	Living Expenditures per Capita (RMB)	3,113.73	2,043.88
X17	Engel's Coefficient	0.59	0.34
X18	Per Capita Labour Income (RMB)	7,297.87	7,160.21
X19	Per Capita Net Income (RMB)	4,192.56	2,664.43
X20	Income from Government Transfer (RMB)	920.96	937.37
X21	Government Support (RMB)	3,529.93	3,773.74

3 On Factors Impacting Human Capital Accumulation of Immigrants

In this paper, indexes impacting human capitals of immigrant families are selected by principal component analysis. Then, several aspects that affect human capital accumulation of immigrant families are classified and summarized.

3.1 KMO and bartlett spherical tests

KMO and Bartlett spherical tests were performed on all effective data to confirm feasibility of factor analysis. The results are shown in Table 2.

Table 2   KMO and Bartlett Spherical Tests of Factor Variables

Kaiser-Meyer-Olkin Measures with Large Sample Size		0.61
Bartlett's Test of Sphericity	Approximate Chi-square	1,236.19
	df	210
	Sig.	0

KMO value is taken to be 0.610. According to standards of Kaiser who is a statistician, principal component analysis may be performed on these variables. Concomitant probability of Bartlett's test of sphericity is 0.000 and below the significance level (0.05), so null hypothesis of Bartlett's test of sphericity may be rejected. Correlations of variables are considered to eliminate variables that are not

highly related, and 21 indexes are reduced to 16. Five indexes, including X4 (educational attainment), X8 (age of Member 2), X11 (living expenditures, RMB), X12 (expenditures in family equipment/articles and services, RMB) and X13 (healthcare expenditures, RMB), are eliminated. KMO and Bartlett spherical tests are performed over again. In these tests, the value of KMO is taken to be 0.673. According to the standards of Kaiser, principal component analysis may be performed on these variables.

3.2 Related Matrix Eigenvalues and Cumulative Contribution Rate

After maximum orthogonal rotation of raw data through principal component extraction, 6 principal components with an eigenvalue above 1 are extracted and items with a factor loading above 0.4 are selected. The percentage of total variance explained is 79.332%, which suggests that all factors may be explained relatively well. The construct validity of samples is acceptable. The variance of principal components is always above 0.4 whichever item is. This indicates that most variations of observed variables are explained by principal components.

Table 3   Principal Components with a Post-Rotation Eigenvalue above 1 and Variance Contribution Rate

Principal Components	Eigenvalue	Variance Contribution Rate(%)	Cumulative Variance Contribution Rate(%)
1	4.478	27.988	27.988
2	2.225	13.908	41.895
3	1.857	11.604	53.499
4	1.592	9.951	63.45
5	1.414	8.838	72.288
6	1.127	7.044	79.332

3.3 Factor loading matrix

By analysing the common factor loading matrix of factors impacting human capitals of sampled immigrant families, the first four extracted principal components were found to have evident composition, whereas the composition of the latter two was not striking. Therefore, only the former four principal components were selected in this study and their cumulative variance contribution rate was 63.45%.

3.4 Scores of common factors

The calculations suggested that the variables with relatively material impacts upon the principal component F1 included X7 (0.719), X8 (0.691), X9 (0.751), X10 (0.593), X11 (0.810), X12 (-0.479), X13 (0.582) and X14 (0.705). Above factors are associated those for evaluating income, consumption and economic conditions, so the principal component F1 is categorized as "economic factor". The variables with relatively significant impacts upon the principal component F2 include X15 (0.676) and X16 (0.705). In view that both transfer income and project support are governmental policy support for employment and livelihoods of immigrants, the principal component F2 is classified as an "institutional policy factor". The variables with relatively considerable impacts upon the principal component F3 include X4 (0.588), X5 (0.567) and X6 (0.556). Hence, this principal component may be categorized as an "endowment factor". The variables that impact the principal component F4 relatively significantly include X1 (0.444), X2 (0.509) and X3 (0.444), so this principal component may be categorized as a "factor about educational conditions".

4 Structural Analysis of Factors Impacting Immigrants' Human Capital Accumulation

4.1 Analysis of grey relations and factors impacting human capital accumulation of immigrants

Generally, economy, institutional policies, endowment and educational attainment are included in immigrant families' systems for human capital accumulation. These systems vary with the factors, thus composing a dynamic system. In these systems, the extent to which factors are interconnected with immigrant families' systems for human capital accumulation is unknown, and incompletely identified in some cases, so a grey system forms. In this study, grey relational analysis is performed as a basic approach to structural analysis of the factors. The extent of interconnections is determined by corresponding formulas to measure contributions of these factors to immigrant families' human capital accumulation and find out intrinsic relationships of the factors.

4.2 Analysis of calculations

4.2.1 Analysis of four factors and results of grey relational analysis on human capital accumulation

Among the four factors, human capital accumulation of reservoir immigrants is impacted most significantly by economy, followed by educational conditions, institutional policies and endowment successively. The results suggest that China's national strategies for economic development have exerted significant impacts upon urban and rural human capital accumulation since the nineties. They also show that after immigration, the immigrant families' human capital accumulation is impacted most immediately by the level of regional economic development at reservoirs. Immigrant families under better financial conditions may invest more in education, health preservation and skills of their family members. Furthermore, they may increase their incomes through familial business activities, where they constantly increase their special human capital accumulation.

4.2.2 Analysis results of grey relations between sub factors and human capital accumulation

In terms of economy, relations are as follows: The human capital accumulation is impacted significantly by families' income and expenditure. The impacts of expenditures in clothing, transport and communications are the most significant, whereas the degree of impacts is always not below 0.97 whichever the income and expenditure. This reflects that immigrant families' human capital accumulation may be improved by increasing human capital investments as long as income increases.

The relations of institutional policies suggest that government plays important roles in increasing human capitals of immigrant families. Since 2007, governmental work has focused on sustainable livelihoods of immigrants. While improving infrastructure, governments have made unremitting efforts to reinforce the improvement of immigrants' livelihoods by different preferential policies. According to views about sustainable development of immigrants' livelihoods, governments' transfer payment and other policy support are not only helpful for increasing net income of immigrant families, but also enhance stocks of human and social capitals with abundant material capitals.

Based on relationships of educational conditions, two conclusions may be reached as follows: On one hand, rural families are more inclined to place hope upon male labourers owing to their traditional ideas. If possible, they tend to increase their human capital investments through male labourers. On the other hand, age is a basis of reference for families to allocate human capitals to family members. Young people hope that they can cultivate skills for earning a living by receiving more training, while the aged prefer health investments.

As regards endowment, relationships suggest that human capitals of immigrant families are mainly from the investments in formal education, training and health of the young generation and families. Apart from taking care of their families, householders' spouses can also engage in business activities of families since governments offer business and employment opportunities to families in immigration projects. For instance, there are stores in residential areas after immigration. Therefore, householders' spouses ought to increase their human capitals as well.

5 Conclusion

The research suggests that economy, institutional policies, endowment and educational attainment impacts human capital accumulation of immigrants. Among these four factors, economy imposes the most significant impacts. This reveals that only if immigrant families have certain financial strengths can they accumulate more human capitals effectively. Secondly, it may be known from institutional policies that at present, government still plays important roles in economic life of reservoir immigrants. To increase income of immigrant families, great investments and support from government departments are also needed. Thirdly, research findings on educational conditions suggest that immigrant families' investments in education have relatively significant impacts upon human capital accumulation. In terms of endowment, age is found to be an important factor that impacts human capital accumulation of immigrants.

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Empirical Analysis of the Profitability of Chinese Listed Commercial Banks under the New Economic Normality

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Abstract: Based on the panel data of China's 16 listed banks from 2011 to 2017, this paper empirically investigates the relationship between the bank's income structure and profitability with the regression model. The results show that the bank profitability has the positive correlation with net interest margin, non-interest income ratio, and fee and commission income ratio; the efficient control of cost-to-income ratio and the optimization of the bank size are helpful to improve the bank profitability; the risk indices show the significantly negative correlation with the bank profitability; the decline in GDP growth to a certain extent has a negative impact on the bank profitability. The results provide references for optimizing the income structure of commercial banks under the new economic normality.

Key words: New economic normality; Bank profitability; Income structure; Non-interest income; Empirical analysis

1 Introduction

After 2011, the macroeconomic growth rate shows a continuous downward trend. Changes from the supply side and the demand side together shapes the "new normal" of China's economic development; its main characteristics can be summarized as "high-speed, superior structure, new momentum, more challenges." (Qi Jianguo, 2015)Because of interest rate liberalization and financial disintermediation, the traditional deposit and loan business of commercial banks have limited spaces. It is important for commercial banks to integrate various industry resources such as insurance, funds, securities, leasing, and trusts during the window of business transformation. Comprehensive operationsbecome the important support for commercial banks to carry out financial innovation, optimize income structure, and increase the return rate of risky assets. (Chen Siqing, 2015)

Chiorazzo et al. believe that the diversification of the income structure significantly increases the returns of large banks, and its size is more important than the source of non-interest income. (Chiorazzo, 2008) Lepetit et al. argue that relying too much on non-interest income reduces the bank's earnings and leads to the volatility of net operating income growth.(Lepetit, 2008) Li L. et al. also show that the intermediary business income has greater volatility and periodicity than the traditional business income and is vulnerable to be impacted. (Li L., 2013)An increase in the degree of bank diversification within non-traditional bank activities leads to an increase in bank liquidity creation. (Xiaohui Hou, 2018) The pre-crisis diversification discount is considerably smaller in a robust regression, which in part is driven by banks with a large share of non-interest income. (Nicolas Guerry, 2017) The short-term changes in non-interest income have important influence on the short-term fluctuations in commercial bank operating performance. (Fang Hong, 2012) Wang Shuman et al. believes that the profitability of banks is the result of the comprehensive effects of net interest margin, non-interest income, and cost-to-income ratio, in which the impact of non-interest income on differences in bank profitability is increasingly important. (Wang Shuman, 2013) The literature (Chen Yihong, 2015; Wang Siwei, 2015; Peng Mingxue, 2016) show that the increase in the proportion of non-interest income helps to improve the bank's operating performance, and the diversified profit model and income structure are the focus of future strategic transformation of commercial banks. Limei Sun et al. argue that there is a general negative correlation between the noninterest income ratio and performance of commercial banks. (Limei Sun, 2017)

Based on the panel data of 16 listed commercial banks from 2011 to 2017, this paper models the profitability of commercial banks and analyzes the influencing factors to provide reference for optimizing the income structure of commercial banks in the new economy normal.

2 Data, Variable Definitions and Descriptive Statistics

2.1 Data sample

At present, there are 26 listed commercial banks in China. Based on the Integrity and reliability of data, this paper chooses 16 of them in 3 categories as the research objects, which are state-owned

commercial banks including Bank of China, Industrial and Commercial Bank of China, China Construction Bank, Agricultural Bank of China, and Bank of Communications; joint-equity commercial banks including Ping An Bank, China Merchants Bank, China Everbright Bank, China CITIC Bank, Huaxia Bank, China Minsheng Bank, Industrial Bank, and Shanghai Pudong Development Bank; and city commercial banks including Beijing Bank, Nanjing Bank and Ningbo Bank. Data samples come from the annual panel data released by the 16 commercial banks from 2011 to 2017.

2.2 Variable definitions and descriptive statistics

(1) Dependent variables

The profitability of commercial bank is defined as the ability to use its own assets to generate revenue. Generally, the profitability of commercial bank can be measured by the indices of ROA (Return on Assets) and ROE (Return on Equity). The larger the two indices of ROA and ROE, the stronger the profitability of the commercial banks. According to the reference(De Young, 2004) and with consideration of data availability and reliability, this paper uses ROE as dependent variable to measure the bank profitability, which directly reports the bank's competitive strength and development capability.

(2) Independent variables

Commercial bank revenue consists of interest income and non-interest income, of which interest income has been the main source of revenue. With interest rate liberalization, it is inevitable for commercial banks to develop the non-interest businesses, including the intermediate businesses such as fees and commission income typically.

This paper selects the net interest margin (NIM) as the interest income, the non-interest income ratio (NIIR) as the non-interest income, and the fee and commission income ratio (COM) as the intermediate business income to measure the bank income structure and mirror the structure's influence.

(3) Control variables

To eliminate the influences of other factors on independent variables, several control variables are selected to ensure the accuracy of the investigated results.

The bank size, which can be represented with total assets logarithm (ASSET) to reduce the volatility of the original sample, has an impact on the bank profitability. The cost-to-income ratio (COST) reflects the bank's operating costs and is an important measure of bank fee control ability and profitability. Asset quality is a measure of effective use of credit assets and risk resilience, which can be explained with the non-performing loan rate (NPLR), the capital adequacy ratio (CAR), and the loan-to-deposit ratio (LDR). The speed of national economic growth will inevitably affect the development of banks, which is measured with gross domestic product(GDP).

The definitions of all the variables with the data descriptive statistics used in this paper are shown in Table 1.

Table 1   Variable Definitions and Descriptive Statistics

Variable Name	Variable	Min.	Max.	Mean	Standard Deviation
Return on Equity	ROE	.1140	.2665	.1796	.0333
Net Interest Margin	NIM	.0000	.0348	.0240	.0043
Non-Interest Income Ratio	NIIR	.0944	.4030	.2345	.0773
Fee and Commission Income Ratio	COM	.0778	.3368	.1931	.0595
Total Assets Logarithm	ASSET	.2159	.4253	.3040	.0431
Cost-to-Income Ratio	COST	10.9718	13.3141	12.3873	.5638
Non-Performing Loan Rate	NPLR	.0038	.0239	.0117	.0043
Capital Adequacy Ratio	CAR	.0988	.1565	.1254	.0140
Loan-to-Deposit Ratio	LDR	.0000	1.0516	.7045	.1326
Gross Domestic Product	GDP	.0669	.0954	.0756	.0091

3 Regression Model and Empirical Analysis

3.1 Regression model

To investigate the relationship between the income structure and profitability of commercial banks, a panel data model is used for regression. With the analysis of the correlation between the index variables based on the data samples, the results show that NIIR and COM are closely related. Therefore, NIIR and COM are considered separately to examine the impacts of the non-interest income and the

intermediate business income on the bank profitability. The two multiple linear regression models are established as follows:

$$ROE_{it}=\beta_0+\beta_1 NIM_{it}+\beta_2 NIIR_{it}+\beta_3 COST_{it}+\beta_4 ASSET_{it}+\beta_5 NPLR_{it}+\beta_6 CAR_{it}+\beta_7 LDR_{it}+\beta_8 GDP_{it}+\varepsilon_{it} \qquad (1)$$

$$ROE_{it}=\beta_0+\beta_1 NIM_{it}+\beta_2 COM_{it}+\beta_3 COST_{it}+\beta_4 ASSET_{it}+\beta_5 NPLR_{it}+\beta_6 CAR_{it}+\beta_7 LDR_{it}+\beta_8 GDP_{it}+\varepsilon_{it} \qquad (2)$$

where i denotes a commercial bank, t denotes time, β_0 denotes a constant term, $\beta_1 \sim \beta_7$ denotes a regression coefficient, ε_{it} denotes a random error term, and ROE_{it} denotes a return on equity of the tth period of the ith listed commercial bank. The others are similar.

3.2 Regression results

All data samples from 2011 to 2017 are divided into 4 groups, which are all banks' sample, state-owned banks' sample, joint-equity banks' sample, and city commercial banks' sample. And based on the 4 group samples, 8 regression models of model (1) and (2) are established by SPSS software. The regression results are shown in Table 2 and Table 3.

3.3 Regression model analysis

The regression results from Table 2 and Table 3 show that:

(1) The R^2 of all regression models exceed 0.7, indicating that the overall model fitting degree are relatively high, and the independent and control variables considered have significant influences on the dependent variables with the same directions and significances. The regression models are stable.

Table 2　Regression Results with NIIR

Independent Variables	All Banks		State-Owned Banks		Joint-Equity Banks		City Commercial Banks	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
NIM	3.269	0.000	6.279	0.000	2.611	0.005	0.838	0.088
NIIR	0.055	0.125	0.102	0.274	0.059	0.224	-0.067	0.210
COST	-0.073	0.115	0.100	0.351	-0.115	0.070	0.265	0.002
ASSET	0.016	0.000	0.017	0.170	0.058	0.003	0.000	0.977
NPLR	-3.925	0.000	-2.702	0.001	-5.597	0.000	-6.469	0.001
CAR	-0.605	0.000	0.366	0.294	-0.694	0.018	-0.469	0.033
LDR	-0.045	0.006	-0.111	0.063	0.049	0.302	-0.025	0.056
GDP	0.181	0.562	0.750	0.021	-0.667	0.192	-0.680	0.121
R^2	0.711		0.930		0.823		0.843	
Adjusted R^2	0.688		0.908		0.792		0.739	
Sig.	0.000		0.000		0.000		0.001	

Table 3　Regression Results with COM

Independent Variables	All Banks		State-Owned Banks		Joint-Equity Banks		City Commercial Banks	
	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
NIM	3.440	0.000	5.795	0.000	2.928	0.002	0.687	0.153
COM	0.158	0.000	0.301	0.004	0.098	0.109	-0.145	0.101
COST	-0.068	0.121	0.127	0.180	-0.120	0.057	0.305	0.001
ASSET	0.017	0.000	0.014	0.138	0.057	0.003	0.003	0.764
NPLR	-4.432	0.000	-2.647	0.000	-5.696	0.000	-5.609	0.003
CAR	-0.442	0.001	0.265	0.379	-0.675	0.020	-0.541	0.014
LDR	-0.054	0.000	-0.083	0.098	0.054	0.245	-0.021	0.099
GDP	0.269	0.358	0.628	0.027	-0.587	0.249	-0.895	0.058
R^2	0.741		0.947		0.827		0.858	
Adjusted R^2	0.720		0.931		0.797		0.763	
Sig.	0.000		0.000		0.000		0.000	

(2) The net interest margin, non-interest income ratio, fee and commission income ratio, and bank size are positively correlated with bank profitability. City commercial banks' non-interest income ratio and fee and commission income ratio have negative regression coefficients, which shows that the

growth rate of these two financial indicators do not make up for the decline in interest income. The non-performing loan rate, capital adequacy ratio, and loan-to-deposit ratio are negatively correlated with bank profitability. The cost-to-income ratio is significantly positively correlated with city commercial banks, which shows the better cost-control than other category banks. GDP is positively related to state-owned banks and negatively correlated with joint-stock banks and city commercial banks, indicating that GDP has negative impacts on the bank profitability as the macroeconomic growth rate drops to a certain extent.

4 Conclusion

According to the regression model, the following conclusions can be drawn:

(1) The largest regression coefficient of NIM shows that the interest income is still the main income source but is decreasing year by year. The non-interest income and fee and commission income are increasingly important to bank profitability. Therefore, commercial banks must adjust the income structure and expand the scale of non-interest business, especially the intermediate business.

(2) Commercial banks must improve management level to control costs as diversified business expanded. At the same time, the optimal size is necessary to promote the profitability.

(3) The promotion of profitability must base on the controllable risks. The non-performing loan ratio, capital adequacy ratio and loan-to-deposit ratio have negative impacts on profitability, especially the non-performing loan ratio and capital adequacy ratio. The robust operations and sustainable developments are available with the low bad loans as possible and the appropriate capital adequacy ratio and loan-to-deposit ratio.

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Research on Crowdfunding and the Mining Model for Youth Entrepreneurial Risk Indicator Based on Co-word Analysis

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Abstract: Nowadays, the integration of internet crowdfunding and youth entrepreneurship has become the trend of the times. And it brings unlimited new opportunities to the social economy. But at the same time, the risk of the organic combination of the two is still severe. Based on co-word analysis, this paper explores the integration model of internet crowdfunding and youth entrepreneurship, analyzes and summarizes the main reasons for the poor integration of internet crowdfunding and youth innovation and entrepreneurship. Meanwhile it uses cluster analysis and other research methods for inspection and evaluation. The result shows that the four risk indicators of "information richness", "amount of financing", "industry sector" and "financial condition" have a great impact on crowdfunding youth entrepreneurship, and they need to be taken seriously in project setting and development.
Key words: Internet crowdfunding; Youth; Innovation and entrepreneurship; Risk indicators; Co-word analysis

1 Introduction

Crowdfunding is an innovation of traditional financing mode based on the development of Internet technology. And it provides new financing channels and marketing tools for individual entrepreneurs and start-ups. As an important part of the popular entrepreneurship trend, youth entrepreneurship has attracted a lot of attention, but the success rate is very low.

As China's Internet crowdfunding market is still at an exploratory stage, there is no strict screening system. "Investors and financiers" in any corner of the world can participate in this platform. This leads to various risks such as uneven crowdfunding projects, financial opacity and lack of third-party supervision. In addition, there are many examples of failures in crowdfunding project. Therefore, how to evaluate and prevent the risk of crowdfunding for college entrepreneurs is particularly important and urgent.

At present, the implementation of the national development strategy of "Internet +" is rapidly expanding the boundaries of various industries. Crowdfunding is expected to become a power source to support popular innovation and entrepreneurship (Chen Yujie, 2015). At present, the classical models of entrepreneurial risk mainly include theoretical models of entrepreneurial potential (Atherton, Krueger, and Brazeal, 2004), entrepreneurial propensity assessment model, entrepreneur quotient model (Nortwestem Mutual Life Insurance, 1985), and entrepreneurial quality assessment, Grounded Model (Zhao Yuxiang, 2016), etc., also contains many scholars' qualitative indicators and theories for various fields and groups.

Based on the perspective of crowdfunding participation and operation, most scholars focus on the key factors that affects the success rate of crowdfunding models. At present, there are still blind spots in the research on the crowdfunding model of college students' independent entrepreneurship at home and abroad. Whether from the characteristics of university students' entrepreneurial team, the characteristics of university students' group or from the characteristics and scale of university students' entrepreneurial projects, the financing channels of college students' entrepreneurship are quite different from those of small and medium-sized enterprises and non-profit organizations. Therefore, in this paper, the entrepreneurial groups of college students are chosen for research. A quantitative analysis of the innovation and entrepreneurship of young people under the Internet crowdfunding from 2013 to 2018 is conducted in this research. The conclusions of the study can explain the successful laws of youth innovation and entrepreneurship and reflect the characteristics and trends of youth innovation and entrepreneurship under internet finance.

2 The Word Frequency Statistics

This paper mainly uses co-word analysis and cluster analysis methods to research the risk indicator of youth entrepreneurship that is under the crowdfunding model. Co-word analysis can count the times that a group of keywords appears in one literature, to find out the close relationship between these words.

On the basis of the statistics of co-word frequency, clustering analysis aggregates the topic words that are close together to form different groups. Each group reflects the specific focus of literature in a certain period of time. And then, we analyzed the structural changes of the disciplines and themes that represented by these words.

In this study, 3-4 key words were identified from each literature. The key words with high frequency were found through word frequency statistics, and the co-word matrix of high frequency key words in each phase was established, then, on the basis of the co-word matrix, using SPSS 21.0 for clustering analysis, and the word clusters of the co-words were displayed.

Table 1   The High-frequency Keywords of Crowdfunding and Youth Innovation and Entrepreneurship

Keywords	Word frequency	Keywords	Word frequency	Keywords	Word frequency
Project novelty	62	Equity structure	31	Credit investigation	62
Sense of leadership	27	Number of followers	47	Target amount	47
Information richness	255	Industry sector	131	Team cohesiveness	71
Transparency of financial information	43	Returning rate of project	31	consciousness of risk prevention	368
Market requirement	144	Amount of financing	176	Number of participants	88

Table 2   The High-frequency Keywords Dissimilarity Matrixes of Crowdfunding and Youth Innovation and Entrepreneurship (Partial)

	Project novelty	Sense of leadership	Information richness	Market requirement	Equity structure	Number of followers	Industry sector	Returning rate of project
Project novelty	.000	.528	.507	.422	.864	.770	.880	.228
Sense of leadership	.528	.000	.604	.556	.792	.798	.857	.769
Information richness	.507	.604	.000	.731	.935	.836	.498	.986
Market requirement	.422	.556	.731	.000	.907	.495	.286	.765
Equity structure	.864	.792	.935	.907	.000	.739	.834	.116
Number of followers	.770	.798	.836	.495	.739	.000	.781	.724
Industry sector	.880	.857	.498	.286	.834	.781	.000	.949
Returning rate of project	.228	.769	.986	.765	.116	.724	.949	.000
Team cohesiveness	.706	.665	.917	.474	.884	.576	.740	.566
consciousness of risk prevention	.811	.894	.870	.529	.979	.722	.609	.764
Number of participants	.697	.884	.846	.751	.778	.521	.519	.430

3 The Clustering Model and Analysis of High Frequency Keywords

3.1 Clustering analysis

This paper systematically analyzes high-frequency keyword dissimilarity matrixes using SPSS19.0. The ward clustering method, Phi square metrics counted, and Z score standardization was selected. The final clustering results are shown in the following figure. According to the figure, the researches about crowdfunding and youth innovation and entrepreneurship can be divided into four groups in the recent four years, namely as followed, financial information and equity structure; project attention-degree and financing needs; market conditions and team quality; project value and informatization. There are many factors involved in the project attention-degree and the market. Financial profitability as a separate category is also a very important factor.
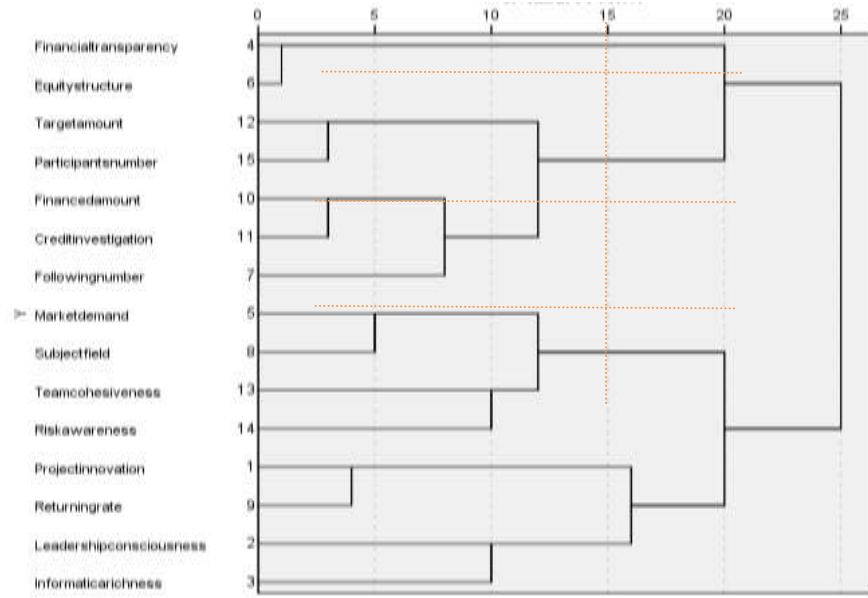
Figure 1   The Tree Diagram of Clustering Results for High-frequency Keywords

3.2 Multidimensional scaling analysis of high frequency keywords

Multi-dimensional scaling analysis attempts to find data structures by measuring or observing the distance between individuals. The purpose of the analysis is to reflect the distances between individuals as much as possible by two-dimensional or three-dimensional spatial distances. In this way, we can objectively reflect similarity relationship between individuals. Using the multi-dimensional scale analysis of SPSS, two-dimensional scale analysis of dissimilar matrices of high-frequency related words was performed to obtain visualization results, as shown in Figure 2.

Taking X=0.8 and Y=0 as the coordinate axis, we can see that the "information richness", "financing amount" and "industry sector" are relatively far away from other indicators. There are great differences, which can be used as the core indicators of risk judgment. They have an important position in project evaluation. The aggregation located in the two or three quadrants are highly similar, with the financial condition of the project value as the core individual representation. It can be seen that the external factors such as market factors and financing amount play a more prominent role under the current pattern of crowdfunding and entrepreneurship, while the role of project features seems to be relatively weak. It is only necessary to focus on information richness.
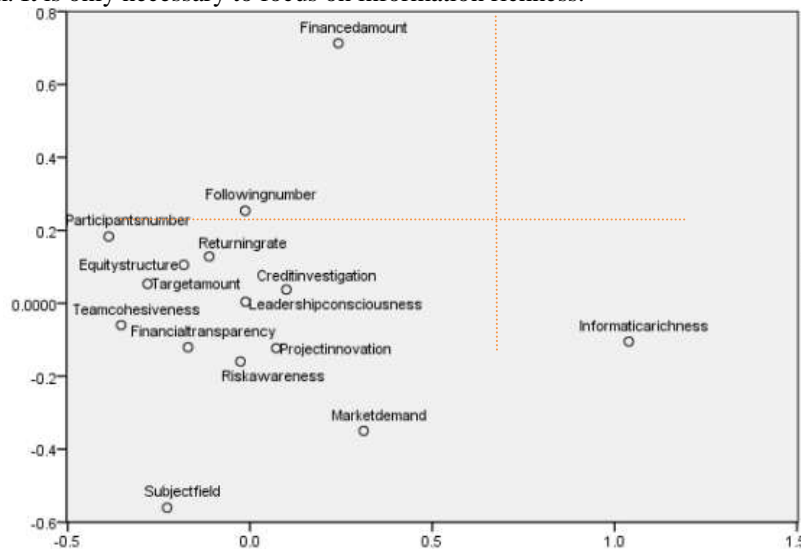
Figure 2   The Results Map of Multi-Dimensional Scaling Analysis

4 Conclusion

In this paper, by searching for related papers about crowdfunding in recent five years, high-frequency keywords co-word matrices are formed by using high-frequency keywords as analysis samples, and analysis is conducted by using algorithmic classification tests and multi-dimensional scaling analysis and strategic coordinates and other methods. This paper summarizes four research topics and analyzes them one by one, to verify the key points of innovation and entrepreneurship of young people under the current Internet crowdfunding. The study findings were as follows:

(1) Fully reflect the richness of project information. (2) The financial situation and the amount of financing are still critical. Internet crowdfunding plays the role of investment beneficiary, and it is still very concerned about the financial expectations of startup projects such as profitability. With a reasonable allocation of equity, a substantial returning rate of the project can help achieve the finance amount really expected. (3) The consciousness of risk prevention is an important foundation for the development of the entire project. Projects with high-risk consciousness and strong team cohesiveness often persist longer. (4) Industry selection and market requirement play a decisive role. In crowdfunding and entrepreneurship, market requirement guides and selects projects, and industry trends determine the project development prospect.

Therefore, relevant domestic scholars should strengthen the application of big data in risk control of young people's innovation and entrepreneurship under Internet crowd-funding, combine with actual cases, guide the benefit maximization of crowdfunding innovation and entrepreneurship, and promote the deepening of the reform of the science and technology system further.

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Capital Allocation Methods in Financial Institutions: A Review and Comparison

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Abstract: Capital allocation plays a significant role in risk measurement for many financial institutions. The major concept behind the capital allocation is to allocate an adequate amount of economic capital to internal business units or portfolio elements, where the allocated risk capital is used to prevent unexpected losses (Ita, 2017). The amount of economic capital that is used to absorb potential losses of the company is determined by different risk measures, such as Value at Risk and Expected Shortfall. Since the allocated risk capital is thought to be a "cost" of an entity, it is important for financial institutions to allocate the capital in an efficient way for competition purpose (Denault, 2001). The project mainly examines the commonly used allocation methods with two risk different measures *Value at Risk* and *Expected Shortfall*, where the real financial data are employed. In the empirical study conducted in the paper, among all the methods, the allocated risk capital determined by the CAS allocation is the most stable one, while examine the stability of the resulted daily risk capital using the realized variance. Therefore, it can be concluded that the CAS allocation could be suggested for practical applications for financial institutions.
Key words: Capital allocation; Value at Risk; Expected shortfall; Euler method; CAS allocation

1 Introduction

Capital allocation plays an important role in risk measurement and assessment for many financial institutions. The allocated capital serves as the foundation in evaluating the risk-adjusted performance of business units. The major idea behind capital allocation is to allocate an adequate amount of economic capital to internal business units or portfolio elements, where the attributed capital is used to absorb unexpected losses (Ita, 2017). After the financial crisis in 2008, financial institutions have paid additional attention to access the risk-adjusted performance of internal business units, and the capital allocation framework is applied. In addition, the regulatory framework also requires corporations to quantify their total risk. Capital allocation rules allow large financial institutions, such as banks, to monitor the use of capitals and to evaluate risk-adjusted performance. As the the economic capital needed is calculated for each sub-unit to improve the efficiency of the allocation, it becomes possible for one to evaluate different parts of the portfolio and business lines (Holden, 2008). The applications of the capital allocation also include allowing financial institutions to better understand the contribution of different business lines to the economic capital, performing performance measurement, and it is also applied in strategic decision making process (Balog, 2017). The amount of riskless investments a firm holds and uses as an insurance against the uncertainty of the portfolio's net worth is named as risk capital by Denault (Denault, 2001).It is important for financial institutions to allocate the capital in an efficient way for competition purpose (Ita, 2017). Capital allocation provides a way for businesses and companies to determine the amount of economics capital required for different processes or divisions. However, the risk capital is thought to be a cost of a company because it is actually money instruments with extremely low risk and low return (Denault, 2001); therefore, it is important for companies to allocate such burden in an efficient way.

The amount of economic capital that is used to absorb potential losses of the company is determined by different risk measures, such as Value at Risk (*VaR*) and Expected Shortfall(*ES*). *VaR* is a risk measure which expresses the amount of economical capital necessary to ensure the probability, for a default is less than a certain confidence interval. According to McNeil, Fret and Embrechts (McNeil, Fret and Embrechts, 2015), one could interpret *VaR* as the "maximum loss which is not exceeded with a given high probability". *ES* is defined as the average of *VaRs* of portfolio-wide profit/loss at confident level α and higher (McNeil, Frey and Embrechts, 2015).According to Artzner, Delbaen, Eber and Heath (Artzner, Delbaen, Eber and Heath, 1999), a coherent risk measure should satisfy the properties including sub-additivity, monotonicity, positive homogeneity and translation invariance. Value at Risk (*VaR*) is one of the most commonly used risk measure, but it is not a coherent risk measure as it violates the criterion of sub-additivity (Balog, 2017). Nowadays, the trend is to use *ES* instead of *VaR* in risk measurement, since*ES* is a coherent risk measure (Balog et al, 2017).

Similar to risk measure, an allocation principle is said to be coherent if it satisfies the requirement

of certain properties. Denault (Denault, 2001) stated in the paper *Coherent Allocation of Risk Capital* that an allocation principle is coherent if it satisfies the requirements of no undercut (core compatibility), symmetry and riskless allocation. In addition, he proved that Aumann-Sharplay value is a coherent allocation principal while a coherent risk measure (Expected Shortfall) is used (Denault, 2001). Tasche (Tasche, 2008) discussed and presented two desirable properties of an allocation principle, which include full allocation and RORAC-compatibility. According to Denault (Denault, 2001), only the Euler principle (Aumann-Shapley value) with coherent risk measure (e.g. Expected Shortfall) meets all three requirements to be a coherent allocation method and RORAC compatible.

According to Kalkbrener (Kalkbrener, 2005), capital allocation enables the application of allocation of risk measures in evaluating performance and managing portfolio. In the paper *Wang's capital allocation formula for elliptically contoured % distributions* (Valdez and Chernih, 2003), the authors state that risk allocation not only set the risk limited but also allow one to better understand the risk bearing ability of insurance companies. In addition, Homburg and Scherpereel (Homburg and Scherpereel, 2008) states that the allocation method can be used to access the performance measure of organizations with divisions. What's more, Kim and Hardy (Kim and Hardy, 2009) studied how to allocate capital among business lines, and they also discussed about the application of capital allocation in performance evaluation and product pricing.

The main goal of this paper is to study and analyze the allocation methods (including marginal method, Shapley method, Euler principle and CAS allocation) with the two risk measure Value at Risk (*VaR*) and Expected Shortfall (*ES*) using the real financial data. In fact, there is a paucity of literature in using the real financial data to study the existing methods, people tend to use the simulation data for their study instead, (Balog, et, al., 2017). Moreover, there is few study that compare the CAS allocation with other existing methods, since the CAS allocation is a relatively new allocation method. This paper tried to fill the gap in some degree, since the real financial data is used to study the behavioral of the allocation methods with the two different risk measures.

2 Data and Algorithms

2.1 Data

For the empirical analysis, a portfolio with one unit of each stock index is constructed: DAX (German stock index), Standard & Poor's 500 (America stock index), NASDAQ (America stock index for technology stocks), Hang Seng (Hong Kong stock index). Suppose the quantity of each stock index does not change (i.e. always one unit) during the period of study, which means the overall portfolio value changes every day as the price of the stock index in portfolio changes. The indices prices are imported from the Yahoo Finance and the historical foreign exchange rates for currencies versus the US dollar is from Federal Reserve.

The daily stock index prices of the four indices are converted to the US dollar. And only the dates where all four stock indices have transaction are chosen for the analysis. The data is taken from 03/01/2001 to 30/12/2016, which would allow us to study the performance of the allocation methods during the 2008 global financial crisis. The daily portfolio-wide loss/profit is calculated as the following:

$$L_{t+1}^P = (P_{t+1}^P - P_t^P)$$

where the portfolio value $P_t^P = P_t^{DAX} + P_t^{SP500} + P_t^{NASDAQ} + P_t^{HangSeng}$

2.2 Algorithms

The daily risk capital allocation of each stock in the portfolio is calculated using the moving window technique. And the window size D is set to be 250, which is the number of the trading days in a year. The daily allocation of day T is then calculated using the data ends at day T and includes 250 data points before the day T. Two risk measures *Expected Shortfall(ES)* and *Value-at-Risk(VaR)* that are both homogeneous of degree 1 are used and compared in the analysis. As was mentioned in the previous section, *VaR* of loss distribution L is the q_α of L, and the *ES* is effectively *VaR* at level α and higher. For the empirical analysis in this paper, the value of α is set to be 0.99. The following sub-sections presents the mathematical formulas used for empirical analysis the methods.

2.2.1 Marginal method

The motivation behind the marginal method is to allocate risk capital based on the marginal effect of the ith component to the total portfolio risk (El Gharib et al., 2014). The method allocates the joint risk capital to the sub-portfolio proportional to the individual's marginal risk. Different from the activity based method, the marginal method considers the risk contribution of the ith subunit to the whole

portfolio by calculating the difference between the portfolio risk with and without the ith component. The following mathematical equation is the formula that is used to calculate the daily risk allocation of the ith stock $\rho\left(L_t^i\middle|L_t^P\right)$ in the constructed portfolio on day t using the marginal method, where *VaR* is the risk measure ρ:

$$VaR_t(L_i|L_P) = \frac{quantile_\alpha(L_t^P) - quantile_\alpha(L_t^{P\setminus i})}{\sum_{j\in N}(quantile_\alpha(L_t^P) - quantile_\alpha(L_t^{P\setminus j}))} quantile_\alpha(L_t^P)$$

where $t=T\text{-}D+1,\dots,T$, L_t^P represents the loss of the overall portfolio from day $t-D+1$ to day t.

The formula that is used for daily allocation becomes the following while using *ES* as the risk measure:

$$ES_t(L_i|L_P) = \frac{quantile_\alpha(L_t^P) - quantile_\alpha(L_t^{P\setminus i})}{\sum_{j\in P}(\mathbb{E}[L_t^P|L_t^P \geq VaR_\alpha(L_t^P)] - \mathbb{E}[L_t^{P\setminus j} \geq VaR_\alpha\left(L_t^{P\setminus j}\right)])} quantile_\alpha(L_t^P)$$

where $t=T\text{-}D+1,\dots,T$, $\mathbb{E}[L_t^P|L_t^P \geq VaR_\alpha(L_t^P)]$ and $\mathbb{E}[L_t^{P\setminus j} \geq VaR_\alpha(L_t^{P\setminus j})]$ represents the *ES* for the loss of the overall portfolio L_P and the portfolio excluding the ith stock calculated using the data from day $t\text{-}D+1$ to day t, respectively.

2.2.2 Shapley Method

In game theory, Lloyd Shapley proposed the Shapley value in 1953, where he investigated and came up with a set of axioms that could uniquely determine the value of a coalition game (Shapley, 1953). The Shapley method calculates the marginal effect of the ith element within all the possible coalitions of the portfolio, and then determines the allocation of the risk capital to each subunit. For the Shapley methods with risk measure *VaR*, the risk capital allocation is calculated using the following equation below:

$$VaR_t(L_i|l_P) = \sum_{S\subseteq P, i\in S} \frac{(|S| - 1)! (n - |S|)!}{n!} (quantile_\alpha(L_t^S) - quantile_\alpha\left(L_t^{S\setminus i}\right))$$

where $t=T\text{-}D+1,\dots,T$, and $quantile_\alpha(L_t^S)$ represents the *VaR* of the coalition S at day t which is calculated using the loss of coalition S from day $t\text{-}D+1$ to day t. $|S|$ represents the number of stocks in the coalition S, and n represents the total number of stocks in the portfolio P. For the empirical study, total of 8 coalitions need to be considered for each of the stock i, and the value of $n = 4$.

For the Shapley method, the allocated risk capital is calculated as the following while using ES as the risk measure:

$$ES_t(L_i|L_P) = \sum_{S\subseteq N, i\in S} \frac{(|S| - 1)! (n - |S|)!}{n!} (\mathbb{E}[L_t^S|L_t^S \geq VaR_\alpha] - \mathbb{E}\left[L_t^{S\setminus i}\middle|L_t^{S\setminus i} \geq VaR_\alpha\left(L_t^{S\setminus i}\right)\right])$$

where $t = T\text{-}D + 1, \dots, T$, and $\mathbb{E}[L_t^S|L_t^S \geq VaR_\alpha]$ represents the ES of the coalition S at day t which is determined by the loss of S from day $t\text{-}D+1$ to day t. $|S|$ represents the number of stocks in the coalition S, and n represents the total number of stocks in the portfolio P.

2.2.3 Euler Principle

Noting that the Euler method has different versions in the literature. The paper focuses on the partial derivative definition of the Euler principle, which coincides with the Aumann- Shapley method in game theory. The Aumann-Shapley method was developed by Aumann and Shapley (1974), and it is an extension of the Shapley method as it allows one to deal with the non-atomic games / divisible portfolios. The Aumann-Shapley method reduces to the Euler principle when the risk measure is homogeneous of degree one and differentiable (e.g. *VaR* and *ES*) (Tasche, 2008; Li et al., 2016).

The following equation is used to calculated the *Euler-VaR-contribution* of the ith stock for the empirical study, where the derivative is computed manually:

$$VaR_t(L_i|L_P) = \frac{VaR_\alpha\left(L_t^P + hL_t^i\right) - VaR_\alpha(L_t^P)}{h}$$

the value of h is set to be 1 here, and $t=T\text{-}D+1,\dots,T$. $VaR_\alpha\left(L_t^P + hL_t^i\right)$ stands for the α-quantile of the loss of portfolio L_p plus h units of the ith stock over the period $t\text{-}D+1$ to t.

The Euler contributions while using the risk measure ES is quite straightforward compare to the *Euler-VaR contribution.* For the empirical analysis, the *Euler-ES-contribution* is calculated as the following according to Tasche (2008):

$$ES_t(L_i|L_P) = \mathbb{E}[L_t^i|L_t^P \geq VaR_\alpha(L_t^P)]$$

where $t=T\text{-}D+1,\dots,T$, and $\mathbb{E}[L_t^i|L_t^P \geq VaR_\alpha(L_t^P)]$ represents the *ES* of the overall portfolio at day t calculated by using the loss of the portfolio from day $t\text{-}D+1$ to day t.

2.2.4 Constrained Aumann-Shapley Allocation (CAS)

The Constrained Aumann-Shapley(CAS) allocation is a relatively new method developed by Li et al(Li et al, 2016). The paper *organising the allocation* pointed out that there exist counter intuitive results while applying the Shapley and Aumann-Shapley method to allocate capital for business units within banks in practice, and it is caused by the ignorance of the bank's organization constrains (Li et al., 2016). As a result, the CAS allocation is developed and it enables one to capture the organizational constraints of banks. The CAS allocation is the combination of the C-Shapley method and Aumann-Shapley method. Let S stands for all the possible sub-units of the portfolio proceeding stock index i. For each possible coalition S, the integration could be calculated with the value of q taking the value from 0.1 to 0.9, with the interval 0.1. Giving the coalition S, the conditional allocation of i using risk measure VaR is then calculated as the following:

$$VaR_t(l_i|l_S) = \sum_{q=0.1}^{0.9} \frac{\partial VaR_t(l_t^S + ql_t^i)}{\partial(ql_t^i)} \times 0.1$$

The unconditional allocation of index i at day t is then calculated by taking the arithmetic average of the conditional allocation of i at day t over all possible coalition S (Li et al., 2016):

$$u_t(l_i) = \mathbb{E}[VaR_t(l_i|l_S)]$$

For a given sub-unit S, the conditional allocation of i on day t with risk measure ES becomes:

$$ES_t(l_i|l_S) = \sum_{q=0.1}^{0.9} \frac{\partial ES_t(l_t^S + ql_t^i)}{\partial(ql_t^i)} \times 0.1$$

where q takes value from 0.1 to 0.9, and the interval is set to be 0.1.

The unconditional risk capital allocation of stock index i within the portfolio at day t is then calculated by taking the arithmetic average of the conditional allocation of i at day t over all possible coalition S:

$$u_t(l_i) = \mathbb{E}[ES_t(l_i|l_S)]$$

where $t = T\text{-}D + 1, \ldots, T$, P represents the constructed portfolio, and while calculating the allocation of the i^{th}index under all the possible permutations, S stands for the union of the indices within a specific coalition excluding the ith index.

3 Results

The risk capital of a portfolio that is determined by ES is always greater than the capital determined by VaR of the same portfolio($ES_\alpha \geq VaR_\alpha$). Due to the natural of the ES, which is effectively the average of VaR over all levels above the confidence level α (McNeil, Frey, and Embrechts, 2015). In order to study the daily allocation of the above methods with risk measure VaR and ES of the same scale, I choose to modify the allocation with risk measure ES in a way such that it becomes the same level as the VaR. And the following equation is used for rescaling:

$$ES_t(\widehat{L_t|L_P}) = \frac{VaR(L_t^P)}{ES(L_t^P)} \times ES_t(L_i|L_P)$$

Applying the above equation to the allocations with risk measure ES would ensure the total amount of capital used for allocation on day t is the same no matter which risk measure is used.
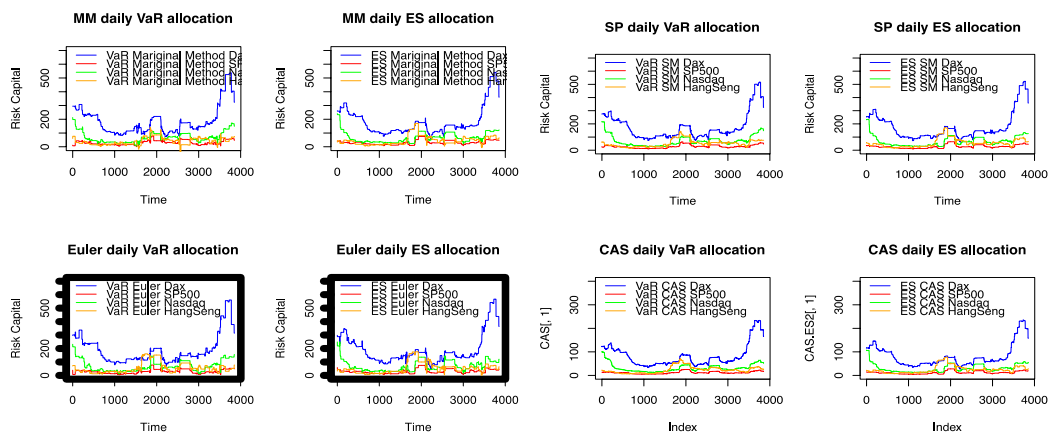
Figure 1   Time Series Plots of Daily Allocated Risk Capital of the Four Stock Indices (With *VaR* and *ES*) fROM DECEMBER 2001 to December 2016, Using Marginal Method, Shapley Method, Euler Principle, CAS Allocation

It is obvious that the allocated capital of stock index DAX fluctuates more compared to the others; and as one would expect, the required risk capital increases during the 2008 financial crisis. Another interesting observation is that the allocated risk capital of stock index Hang Seng has negative value while using the marginal method. The interpretation of the phenomenon is that the Hang Seng index has negative correlation with the rest of the portfolio, which enables it to hedge against the other indices.

The plots of the daily risk capital allocation are non-stationary because the time series, especially the allocation of the DAX index, displays an upward trend, except it drops sharply at the end. Indeed, it would not be really meaningful to use the global tools, such as variance, to test whether the allocated capital with one risk measure is more stable than the other. Instead of using variance to access the stability, realized variance is used to evaluate the stability of the allocated risk capital over the chosen period. The realized variance is defined as the sum of the squared differences of the risk capitals on day t and on day t_1, which could be expressed using the following equation (Hansen and Lunde, 2004):

$$IV_i = \sum (\rho(l_t^i) - \rho(l_{t-1}^i))^2$$

where $\rho(l_t^i)$ and $\rho(l_{t-1}^i)$ stands for the allocated risk capital to the ith stock index on day t and on day t-1.

Table 1   Realized Variance

	DAX	SP500	Nasdaq	Hang Seng
Marginal VaR	87978	13572	28176	40857
Marginal ES	59090	5078	19326	28704
Shapley VaR	53277	2239	9913	9167
Shapley ES	45799	2048	11590	14137
Euler VaR	116549	12236	42259	33298
Euler ES	94135	8925	44232	47017
CAS VaR	6209	108	718	610
CAS ES	8015	407	2504	2923

Based on the integrated variance, while looking at the stability of allocation on individual indices, the allocation determined by the CAS allocation performs better than all the other allocation methods. And the CAS allocation with the risk measure *VaR* performs better than *ES* if accessing the stability based on the realized variance. In addition, it can be observed that the performance of the Shapley method and Euler method are not constant across all the divisions: the methods with risk measure *VaR* would result in more volatile capital than *ES* on subunits DAX and SP500, and less volatile capital on Nasdaq and Hang Seng. This phenomenon can be explained by the fact that the allocation process happens within the whole portfolio, the less stable allocation situation on the index Nasdaq and Hang Seng could be interpreted as a cost for a more stable allocation of a more volatile element (DAX and SP500) in the portfolio.

4 Conclusion

In this paper, a portfolio with four subunits is constructed in order to study the performance of allocation methods with the two different risk measures in practice. Understanding that the financial institutions would prefer allocation method with risk measure that provides less volatile risk capitals, the CAS allocation is suggested for application in the real world. Because the CAS allocation captures the organizational constraints of banks, and it outperformances all other allocation methods in allocating risk capitals since it results in the least volatile risk capital of all the elements in the constructed portfolio based on realized variance. It is observed that during the 2008 financial crisis, the allocated risk capitals would experience an obvious increase during the crisis and drop back to the normal level afterwards, regardless of the method used, this result is not surprising because the allocation is calculated according to the losses of the whole portfolio as well as the subunits, and the losses would definitely grow during the period of a crisis.

For future study, other assessments in additional to realized variance could be considered, which would make the comparison becomes more convincing. Furthermore, in this paper, there is no need to apply the Monte Carlo simulation while studying the Shapley method and the CAS allocation, as it is possible to calculate the allocation over all the possible coalitions because of the small portfolio size.

Therefore, for further study, the number of the portfolio and the divisions within the portfolio could be increased, so that the Monte Carlo simulation could be applied while studying the allocation methods.

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Application of HSE Risk Management in Shipbuilding

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Abstract: Shipbuilding projects are characterized by long time spans, various work types, long risk cycles, great difficulties in risk management, and social and ecological effects. This paper combines the application of HSE risk management in different industries, based on the research on mode of thinking, process and techniques of HSE risk management, applies HSE risk management in shipbuilding industry with a case study of jig frame fabrication activity. By identification, assessment and control of jig frame fabrication HSE risk, effectively improve abilities of risk management and reduce the likelihood of accidents in shipbuilding.

Key words: Shipbuilding; HSE risk management; Risk identification; Risk assessment; Risk control

1 Introduction

Shipbuilding industry is the epitome of modern big industry, it is not only providing equipment for water transportation, energy transportation and marine exploitation, but also offers naval vessels equipment, so it is one of the strategical industry for national economy and defense construction. However, as a labor-intensive, technology-intensive, capital-intensive industry of high risks, if accident occurred, it would cause enormous damage to people, assets and environment.So there are a lot of strict requirements of health, security and environment management in shipbuilding industry. Currently, HSE management system which is widely applied in oil and gas industry is a guideline for company's standardized management and sustainable development (Akalezi C.O., 2005). HSE risk management as the core element of the HSE management system is the basis to implement HSE management (Sun Xianchang, Wang Xiaomin, Xiao Zonglin, et al., 2010). When applying the HSE risk management model and techniques into shipbuilding, we can effectively control the occurrence of accident and guarantee the production objective of company or organizations.

HSE is a trinity system of Health, Safety, and Environment, which is an advanced internationally recognized management system. The International Maritime Report based on the Waltz liner oil spill and reef accident established the core position of risk assessment and accident prevention in HSE management system (Sun Weiqun, 1999). Five oil upstream companies including BP Amoco, Conoco Philips, Shell, Statoil ASA, Atlantic Richfield Company summarizes the better HSE risk management model and method through the comparison of HSE risk management performance (Gomm C., Brosnan C., Grundt H.J., et al., 2000). With the continuous development and improvement of safety sciences, environmental sciences, and systems theory, HSE risk management has been gradually applied to construction projects (Jafarnia E., Soltanzadeh A., Ghiyasi S., 2018), electric power industry (McLeanI., 1998; Bransby M.L., Jenkinson J., 1998), shipbuilding, as well as to medical industry (Li Hongbo, Zhong Liwei, Chang Jian, et al., 2017) and agrochemical industry (Fan Dongsheng, 2016). Shipbuilding industry as a high-risk industry is next only to the mining industry and construction industry, there already have been some HSE risk management researches on it, which include the establishment and implementation of the HSE management system in LNG shipbuilding projects (Li Yang, 2011), some extend to oceaneering projects about HSE risk management for JU200E jack-up drilling rig construction projects (Cao Yunfei, 2014).All these studies have proved the positive influence and role of HSE risk management in occupational health, safety, and environmental risk management of the industry or in related organization.

2 Framework of the HSE Risk Management

2.1 The mode of thinking of HSE risk management

The core of HSE risk management is to eliminate hazards, by this way which the accidents can be prevented. Figure 1 (Zheng Shejiao, 2017) reveals the mode of thinking of HSE risk management, including the procedures of risk identification, risk assessment and risk control. And it also reflects the sources of systemic hazards (materials, machinery and facilities, working environment, ability and consciousness, methods and procedure) and main risk control measurement (engineering technology, education and training, enforcement management).
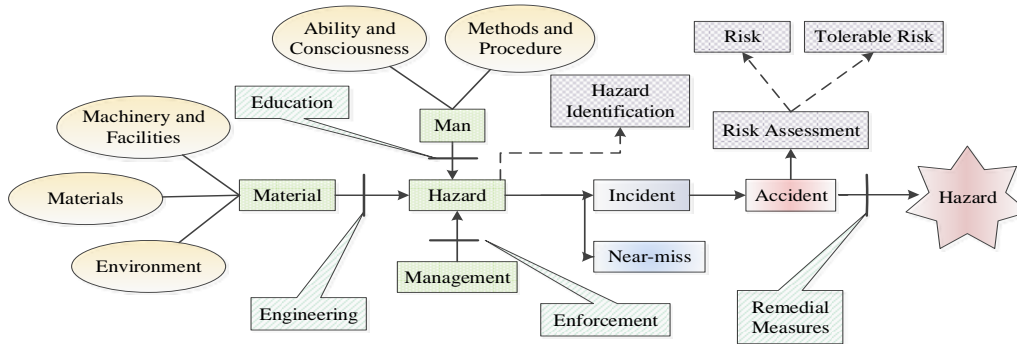
Figure 1   The Mode of Thinking of HSE Risk Management

2.2 The process of HSE risk management

In terms of the whole HSE management system, HSE risk management is a dynamic process of leaders' support and decision-making, total involvement and continual improvement. In order to point out the responsibility, objective and policy of risk management, the principle step for HSE risk management is to set up risk management group based on company's scale, nature and personnel quality. As the object of HSE risk management generally is complicated, complex system should be divided into unit or section, so the object of management is risk units or sections. On this basis, the early stage of risk management is to identify and analyze hazard factors, then assess the risk by the incidence probability and severity of consequences of each hazard factor according to the risk criterion. The later stage is to bring up measures to weaken, control hazard or meet emergencies based on the degree of hazard factors, ultimately form the plan and relative procedures for HSE risk management.

2.3 Techniques of HSE risk management

2.3.1 Risk identification techniques

The hazards in a complex system are multiple and difficult to recognize all-inclusively. Therefore, the method of risk identification should be scientific, systematic, comprehensive, targeted and operable. At present, combined with existing domestic and foreign research, common hazard identification methods include: information collection, inquiring survey, job hazard analysis (JHA), safety check list (SCL), event tree analysis (ETA), failure mode and effects analysis (FMEA), Hazard and Operability (HAZOP), etc. (Zheng Shejiao, 2017).

2.3.2 Risk assessment techniques

Risk assessment is based on the existing professional experience, statistical data, and evaluation criteria through a quantitative or qualitative means of scientific evaluation of the risk classification to determine the extent of its hazard and possible impact after the hazard factors are identified. Current risk assessment methods include: LEC (likelihood, exposure, and consequence), matrix method, pre-hazard analysis (PHA), failure mode and effects analysis (FMEA), brainstorming, etc.

2.3.3 Risk control techniques

Risk control is the fundamental purpose of risk management and the conduct of implementing risk management decisions. According to Heinrich's "3E countermeasures", risk control measures mainly include engineering, education and enforcement. By adopting appropriate measures, reduce and prevent the frequency of occurrence of accidents or damage caused by the accident. In the long-term safety management practice, seven types of more specific risk control measures are proposed. The effect of those measures from high to low are: elimination, substitution, reduction, isolation, procedures, reduction of employee contact time, and personal protective equipment.

3 Application of HSE Risk Management in Shipbuilding

Before the implementation of the shipbuilding project, the shipyard initiated HSE risk management with the goal of establishing and improving comprehensive risk management system and optimizing internal control. In response to the HSE risk of shipbuilding, the risk management team proceed from the project HSE goals, combine the actual conditions of shipbuilding, internal and external environments, and analyze various activities involving in HSE in the entire life cycle of shipbuilding from multiple dimensions by means of interviews, investigations, inspections, looking up the records. Ultimately shipbuilding system is divided into ten major production segments: preparatory technical work, lay off, blocks fabrication, slipway blocks assembly, outfitting, painting, ship launching, mooring

test, sea trail, and completion delivery. Further dividing production segments and taking blocks fabrication as an example, blocks fabrication can be divided into ten production units: site preparation, jig frame fabrication, batching, hoisting and assembling, block scaffolds lifting and installing, electro welding of construction, hot working\correcting\grinding, block structure\integrity\pressure inspection, block bearing pad disengaged, block transferring, as is shown in Figure 3.
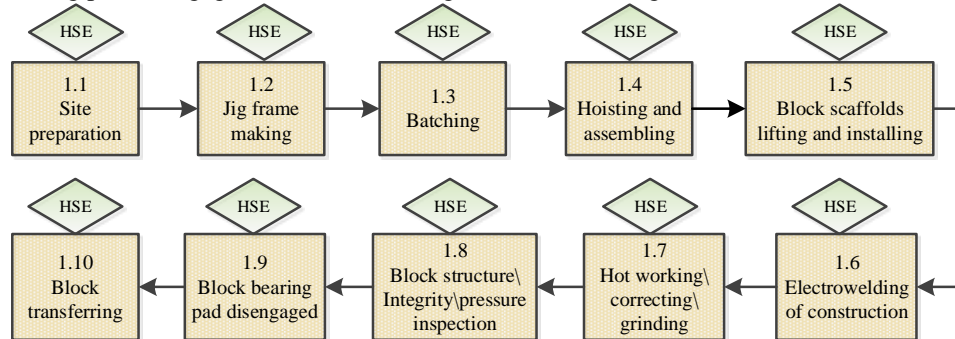
Figure 3   Risk Units Analysis of Blocks Fabrication

Carry out risk identification of the jig frame fabrication unit in the blocks fabrication segment in shipbuilding adopting JHA method. Combining the basic operation activities, actual production status and past accident data of the jig frame production unit, obtain the main HSE hazards. Analyze the hazards identified, using incidence probability (L) and severity of consequences (S) to quantify magnitude of the risk, and formulate risk grading standards to determine the risk level: <20, class 1; 20-70, class II; 70-160, class III; 160-320, class IV; >320, class V. Propound targeted control recommendations with risk control techniques for management and control of the jig frame fabrication unit. The identified hazards, assessment results and control measures are shown in Table 1.

Table 1   HSE Risk Identification, Assessment, Control of Jig Frame Fabrication

No	Production Segment	Main Hazards	Main Results	L	E	C	D	Risk Level	Control Measures
1		Operators without security education, no certificates	Lifting injury	1	6	7	42	II	Certification and training
2		Overweight crane lifting capacity	Falling object hit	3	6	6	108	III	Strict accordance with the operating procedures
3	Jig materials lifting and moving	Slings lack of maintenance and rust damage	Lifting injury	6	3	3	54	II	Strengthen daily equipment maintenance
4		Inadequate binding of hanging loads	Lifting injury	3	6	6	108	III	Strengthen inspection prior to operation
5		Piles or people inside the lifting cordon	Casualties	1	6	6	36	II	Strengthen inspection prior to operation
6		Insufficient lighting	Lifting injury	3	6	3	54	II	Strengthen inspection of work environment
7	Jig installing	…	…	…	…	…	…	…	…
8		Welding staff without security education, no certificates	Fire, electric shock, hot burn, explosion	1	6	7	42	II	Certification and training
9	Jig electro welding	Without hot work permit	Fire, electric shock, hot burn, explosion	3	3	15	135	III	Strict enforcement of hot work permit
10		Improper or absent protective equipment	Electric shock, hot burn, industrial disease	3	6	3	54	II	Strict enforcement of dress code and protective equipment

Continual Table 1

No	Production Segment	Main Hazards	Main Results	L	E	C	D	Risk Level	Control Measures
11		Welder grounding failure	Electric shock	3	6	7	126	III	Strengthen inspection prior to operation
12	Jig electro welding	Combustibles in affect region	Fire, explosion	1	6	7	42	II	Strengthen inspection prior to operation
13		Poor ventilation	Fire, explosion	3	6	3	54	II	Strengthen inspection of work environment

4 Conclusion

This paper focuses on the practical application of HSE risk management in shipbuilding. Based on the actual status of shipbuilding, identify, assess and control the risk of jig frame fabrication unit in shipbuilding, and put forward proposals and research outlook as follows:

The great investment and high risk of shipbuilding determines the necessity of HSE risk management. HSE risk management group should set reasonable HSE risk management objectives, select appropriate risk identification methods for risks at different stages and with different operational characteristics, encourage full participation in the confirm of hazard and degree of impact, and balance the relationship between risk control cost and risk levels.

The implementation of the HSE risk management process should be accompanied by strict documentation procedures, supervision and auditing, follow-up and training, follow-up study will be about the implementation and operation of these elements.

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Game Analysis of Interests Between Government and the Listed Company in Financial Information Disclosing Management

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Abstract: Whether the relationship between the government and listed companies is clearly regulated has a great impact on the efficiency and quality of financial information disclosure management. This paper, therefore, conducts an in-depth analysis of the interests of the government and listed companies in the financial information disclosure management. It analyzes the actions and motivations of governments at all levels and listed companies through constructing the static and dynamic game models of governments at all levels and listed companies in financial information disclosure management, and puts forward corresponding suggestions in a targeted manner based on the analyses.
Key words: Finance; Information management; Government; Listed companies; Game analysis

1 Introduction

Nowadays, with the continuous improvement of China's government supervision system, the disclosure system of corporate related financial information has basically taken shape. The disclosure of related financial information, however, is still far from perfect. Financial irregularities such as incompleteness and delay in disclosure, non-disclosure is not uncommon. Therefore, there is an urgent need to strengthen the supervision of corporate financial information disclosure. This paper employs the game model to conduct an in-depth analysis of the interests of the government and listed companies in the financial information disclosure management, and strives to build a benign interactive relationship between the two sides, and thus promoting the efficient management of financial information disclosure.

2 Research Review

For a long time, it is natural for academia, industry, or government management agencies to assume that government is completely independent, has a fair and unselfish attitude, rich governance experience, moreover, it is able to make scientific decision and harbors good wishes. Therefore, since the information disclosure system is established to protect the interests of the investing public, it will be able to achieve its intended goal (Reesse, 2002). However, American economist Geogre.JitSgler first proposed different opinions as early as 1964, supporting "the uselessness of regulation.Professor (Shen Yifeng, 1998) used Stigler's empirical test method to compare the purpose and actual effect of the "Provisional Regulations on the Administration of Stock Issuance and Transaction" promulgated by the CSRC, and concluded that the efficiency of government supervision is limited and conditional. (Cui Xuegang, 2004) analyzed information disclosure problems in listed companies to explore government's role and function in the process of financial information disclosure of listed companies. (Wu Weirong, 2018), taking the A-share listed companies in Shenzhen and Shanghai from 2003 to 2015 as a sample, focusing on the issue of voluntary rotation, investigated the problems of auditing quality affected by CPA and term transitional CPA under tenure management and explored the regulatory role of government regulation in these two effects.

3 Game Model Construction

The process of financial information disclosure management is actually a gaming process between governments at all levels and listed companies. On the one hand, on the government side, they hope to conduct financial information disclosure management rapidly with minimal social costs (including economic costs) to maximize social stability and development. On the other hand, listed companies, based on the role of rational economic agents, make great effort to maximize their own interests, including both economic interests and social interests, and adopt information dissemination and other means to obtain more benefits. Disclosure of a listed company's own financial information allows its potential investors to fully understand its business situation, and encourages them to invest in the company. Investors will consider the cost of investing and endeavor to gain greater benefits (including both economic and social benefits) from it.

Based on the above analysis, the article puts forward the following assumptions for the construction of the two-side game model.

Hypothesis 1: The main body of financial information disclosure management is governments at all levels and listed companies, both of which are rational economic actors. That is to say, the pursuit of maximizing their own interests is their respective goal, so that conflicts of interest between them in their respective actions are inevitable.

Hypothesis 2: Listed enterprises faced by governments at all levels are collectives with consistent actions and objectives. In the actual process, however, these collectives often break apart under the influence of government while pursuing their own interests.

Hypothesis 3: Information is asymmetric. Governments at all levels have absolute advantages in management of financial information disclosure, whereas resistance actions and targets of listed companies put them at an information disadvantage.

Hypothesis 4: Once a listed company succeeds in a corporate resistance, the government and officials at the same level will face penalty imposed by the higher level government.

4 Analysis of Static Game Models of Governments at Different Levels and Listed Companies

Based on the above assumptions, in the process of financial information disclosure management, governments at all levels take legal or irregular action strategies to obtain their own social interests. The strategy of listed enterprises is to resist or cooperate with government. Therefore, the static game model for building government and listed companies is shown in Table 1.

Table 1　Static Game Models of Government and Listed Companies

		Listed Companies	
		Cooperation	Resistance
Government	Legal Means	A，B	A-C，$B+b_1$-C
	Irregular Means	A+b，$B-b_2$	A+b-F，$B+b_1$-F

In the static game model of the two sides, "A" represents the profits government gain in financial information disclosure management in a legal manner. "B" is the legitimate profits obtained by listed companies in their financial information disclosure activities (including economic benefits and social benefits). "C" stands for the economic and social costs required for the government to conduct financial information disclosure management in a legal manner and the listed companies to execute it. "F" represents the conflicting costs borne by government due to its irregular disclosure management of financial information and the resistance of listed enterprises. At the same time, it is assumed that the conflicting cost is zero if government conduct financial information disclosure management in a legal manner and listed companies conduct financial information disclosure in a cooperative manner (including execution costs and conflict costs). "b" represents the expected additional benefits government gain in the irregular management of financial information disclosure. "b_1" stands for the expected additional benefit gained by a listed enterprise taking the strategy of resistance. "b_2" is the expected revenue loss borne by listed companies due to the government's irregular management of financial information disclosure. It is obvious that F is greater than C (F>C).

The relationship between governments at all levels and listed companies is a single-stage static game. Based on this, this article draws some conclusions after analyzing the choices made by governments at all levels and listed companies.

(1) In the case of $A+b-F>A$, where the profits obtained by governments at all levels in the irregular management of financial information disclosure is greater than that gained in legal management of financial information disclosure, governments at all levels will prioritize irregular means.

At the same time, what the listed companies need to consider in strategy choice is the value size of "$B-b_2$" and "$B-b_1-F$". If "$B-b_2$" is smaller than "$B+b_1-F$" ($B-b_2 < B+b_1-F$), listed companies adopt resistance strategy. Listed companies believe that the resistance strategy will increase government's management cost of financial information disclosure, and may trigger higher-level government to impose penalties on the government at this level, which will urge the government at this level to make concessions; thereby they can obtain more benefits from it. If "B-b_2" is greater than

" $B + b_1 - F$ " ($B - b_2 < B + b_1 - F$), listed companies will adopt a cooperation strategy.

(2) In the case of $A > A - C > A + b - F$, government's strategy choice depends on the listed companies'. When listed companies choose resistance, governments at all levels will conduct financial information disclosure management in a legal manner. If listed companies adopt a cooperation strategy, the best strategy for local government is to conduct irregular management of financial information disclosure.

(3) In the case of $B + b_1 - F > B$, resistance strategy is preferable to listed companies. Whether government conduct financial information disclosure management in an irregular manner is determined by the value size of $A - C$ and $A + b - F$.

(4) In the case of $B - b_2 < B + b_1 - F < B$, listed companies' behavior choice relies on that of government. If government conduct financial information disclosure management in an irregular way, the best strategy for listed companies is to take resistance actions, then Nash equilibrium is " $A + b - F , B + b_1 - F$ ". If government conduct financial information disclosure management in a legal manner, the best strategy for listed companies is to cooperate with government, then Nash equilibrium is "A, B".

(5) In the case of $B + b_1 - F < B - b_2$, cooperation strategy is preferable to listed companies. Government conduct financial information disclosure management in an irregular way, and Nash equilibrium is " $A + b, B - b$ ".

5 Analysis of Dynamic Game Models of Governments at Different Levels and Listed Enterprises

In actual work, the gaming ability of governments at all levels and listed companies is asymmetric in the process of financial information disclosure management. As listed companies are in a passive state, government at all levels take absolute advantage in information management. However, actions taken by government at this level are subject to supervision by higher levels of government. If a listed company succeeds in resisting the government's irregular management of financial information disclosure, local government may face penalty imposed by the higher level government. In view of the above analysis, the focus of government and listed companies when they decide what strategy should be adopted is listed companies' willingness to take resistance actions，the probability of successful resistance (p), and the cost (F) listed companies have to bear if government conduct financial information disclosure management in an irregular way. The cost (F) here includes not only the increased comprehensive cost (F_1) due to the resistance of listed companies, but also the penalty imposed by the higher level government (F_2). It is assumed that if government and officials at this level found to be conducting financial information disclosure management in an irregular way would incur severe penalty, the government would take the risks and costs into account while conducting irregular management. Therefore, the gaming playing between the two sides is a mixed strategy game behavior. The game model is as follows:
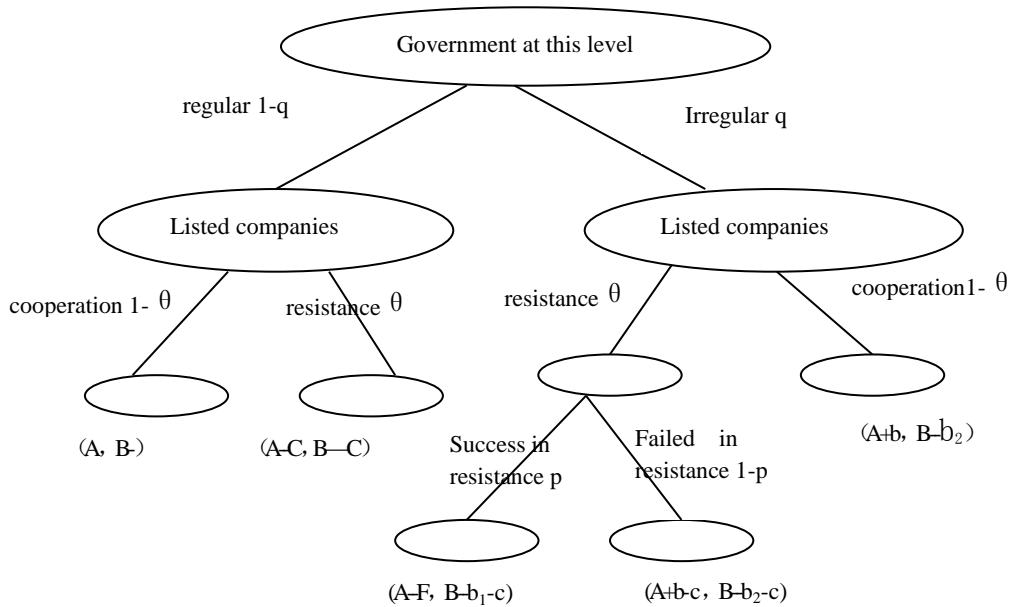
Figure 1   Dynamic Game Model of Government and News Media

Taking risks and costs into account, governments at all levels will decide whether to conduct financial information disclosure management in an irregular way. In figure 1, "q" represents the probability of government taking irregular measure. The pursuit of an optimal strategic combination for the two sides is a process of seeking a mixed strategy Nash equilibrium.

Assume that the government's hybrid strategy is $h_1 = (q, 1-q)$. The probability of government conducting financial information disclosure management in an irregular manner is "q", and the probability of government conducting financial information disclosure management in a legal manner is "$1-q$". Assume that the mixed strategy of a listed company is $h_2 = (\theta, 1-\theta)$. The probability of the listed company taking resistance action is "θ", and the probability of the company adopting cooperation means is "$1-\theta$". "p" represents the probability of the company's successful resistance when government conduct irregular management, and "$1-p$" stands for the probability of the company' failure in these actions. One more assumption is made that the probability of the company's successful resistance under the government's legal management is zero. Then the expectation function of governments at all can be shown in Figure 1.

According to the above analysis, the game model has no Nash equilibrium. This paper can deeply analyze the optimal behavior choices made by two sides, and choose the optimal one from the hybrid strategy through comparing two parties' expectations.

(1) Optimal behavior choices made by governments at all levels.

The expectation of government at all levels conducting financial information disclosure management in an irregular way is:

$$U_1 = \theta P(A - F) + \theta(1 - P)(A + b - C) + (1 - \theta)(A + b)$$

The expectation of government at all levels conducting financial information disclosure management in a legal way is:

$$U_2 = (1 - \theta)A + \theta(A - C)$$

Whether the government chooses to conduct financial information disclosure management in an irregular manner depends on the value size of U_1 and U_2. The greater the value size of $\Delta V = V_1 - V_2$ is, the greater driving force and motivation the governments at all levels own while conducting financial information disclosure management in an irregular way.

$$\Delta U = U_1 - U_2 = b(1 - \theta P) - \theta P(F - C)$$

As can be seen from the above formula, whether governments at all levels choose to conduct financial information disclosure management in an irregular way is mainly determined by the specific

situation when listed companies take resistance actions, as well as the profits governments at this level have gained through irregular management and the penalties for their violation of regulations. Smaller probability (θ) of a listed company choosing resistance action would lead to smaller probability (P) of its success in resistance. More benefits (b) obtained through financial information disclosure management in an irregular way would lead to greater probability of governments at all levels conducting management in this way. In addition, governments at all levels are more inclined to conduct financial information disclosure management in irregular ways, when the penalties (F) for irregular management of financial information disclosure and the costs of conflict (C) are closer. Therefore, if the higher-level governments intensify the investigation and punishment of irregular management of financial information disclosure, even if the value size of θ, P, and F increases, irregular behaviors of government at the same level will decrease in the process of financial information disclosure management.

(2)Optimal behavior choices made by listed companies.

The expectation of a listed company taking resistance action is:

$$V_1 = (1-q)(B-C) + qp(B + b_1 - C) + q(1-p)(B - b_1 - C)$$

The expectation of a listed company adopting cooperation strategy is:

$$V_2 = (1-q)B + q(B - b_2)$$

The expected difference   ($\Delta V = V_1 - V_2$)   of the above two expectations.

$$\Delta V = V_1 - V_2 = qp(b_1 + b_2) - C$$

The above formula reveals that whether a listed company adopts resistance strategy or not depends on the probability （ q ） of government conducting irregular management of financial information disclosure, the probability (p) of the company's successful resistance, the comparison of the benefits gained from successful resistance（ b_1 、 b_2 ）, and the costs of resistance. In the process of financial information disclosure management, as listed companies are at a disadvantageous position, the chance of successful resistance is slim.

According to the analysis (1) and (2), it is obvious that due to their unbalanced status, the government being in a advantageous position and listed companies being in a disadvantageous position, what concerns governments at all levels is not listed companies' resistance action, but the penalties imposed by higher level government due to their violation of regulations. Therefore, in the process of financial information disclosure management, governments at all levels usually focus on dealing with various adverse problems caused by irregular management, such as preventing listed companies from publishing real financial information, deceiving or bribing superior supervisory authorities, rather than aiding increasing interests of listed companies. What's more, in practice, the ability of government bearing the risks and costs is far greater than that of listed companies at the same level. However, if higher-level government clarify individual responsibilities and conduct tougher punishment for the officials violating regulations in the process of management, it will form a powerful deterrent to governments at all levels and officials, which is helpful in reducing violations of regulations. The main driving force for local government to violate regulations and listed companies to take resistance actions is to obtain more benefits from financial information disclosure management. Therefore, clear and reasonable distribution of the benefits from it will help to prevent government and listed companies from falling into a game dilemma (violation & resistance).

6 Suggestions on Game Analysis
6.1 Making strict regulations on government's powers and obligations in listed companies' financial information disclosure management

Nowadays, under the guidance of the ideological concept of guaranteeing market economy stability, governments at all levels are given great power to manage financial information disclosure of listed companies, so that powers and obligations are not equal. The great discretion of government enables them and their officials to gain more benefits in the process of management. Therefore, great efforts must be made in the following aspects: improving relevant laws and policies, making strict regulations on the powers and obligations of governments at all levels in the process of listed companies' financial information disclosure management, ensuring equality in powers and obligations, establishing scientific, standardized and transparent management system, effectively protecting the vital interests and social

interests of listed companies and investors. All of these will increase the costs of violating regulations, thus reducing the chance of government gaining illegal benefits from it.

6.2 Creating a loose business environment, so that listed companies are more autonomous in crises

It is necessary to improve the laws and regulations on listed companies' financial information disclosure management, clarify the financial information disclosed by listed companies, disseminate the rights and responsibilities of financial information, give listed companies maximum right of freedom to disclose information, regulate both the content and the form of the financial information disclosed by listed companies in terms of social needs and public demand. Furthermore, it is desirable to establish and improve the supervision mechanism and correction mechanism of financial information disclosure, and create a loose business environment, so that listed companies are more autonomous and free in the crises.

6.3 Strengthening the supervision and management of financial information disclosure to protect the vital interests of government and listed enterprises

There are two main reasons accounting for why governments at all levels conduct financial information disclosure management in irregular ways. First, the benefits from irregularities are greater than those from compliance with regulations. Second, the penalty for irregularities is less than the opportunity cost of irregularities. Therefore, it is needed to strengthen the supervision and management of financial information disclosure, take effective measures to reduce the profits from irregularities and increase the penalty once irregularities found. Specific measures can be as follows. Firstly, information technology can be used to conduct dynamic supervision. A dynamic monitoring system for financial information disclosure management can be established to improve the probability of government conducting financial information disclosure management in irregular ways. Secondly, a smooth external supervision channel can be established to give full play to the supervision role of social groups, network forces and public forces, and make sure that listed companies learn the truth, participate in and supervise the management of financial information disclosure.

6.4 Intensifying the enforcement of financial information disclosure management for listed companies

It is necessary to give full play to the strength of the social and legal community to support listed companies conducting financial information disclosure. Social legal communities should provide listed companies with legal advice on issues related to financial information disclosure management. When government violates laws on financial information disclosure management, listed companies can make legal appeals. Relevant law enforcement agencies should intensify the management of financial information disclosure. When governments at all levels violate these regulations, it is necessary to strengthen investigation and punishment, clarify leadership responsibilities and severely punish officials who violate regularities.

7 Conclusion

The relationship between government and listed companies in accounting information disclosure is complicated. It is not only a static game between listed companies and regulatory agencies, but also a multi-party dynamic game. It involves other participants including outsiders who are trying to know internal information, such as other listed companies, creditors of listed companies, accounting firms and so on. In reality, the violation of listed companies is often conducted by supervisors who instruct or force accountants to do so, which will have a major impact on the game process. Due to the complexity of model representation and the inconvenience of data acquisition, the model used in this paper cannot test the reality very well. Therefore, further research and analysis will be carried out in the future.

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Research on Immune-based Internal Audit of University Research Funds

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Abstract: With the increase of research funds in colleges and universities, more and more attention has been paid to improve the proper usage and efficiency of research funds. The paper introduces the immune system into the internal audit and studies the specific immune functions, such as defense function, recognition function, reveal function and repair function. This paper puts forward the basic idea of the internal audit procedure of research funds based on immune functions, and concludes that the immune-based internal audit can identify, reveal, repair and prevent the problems existing in the whole process of the research activities, so as to improve the efficiency of research funds.
Key words: Immune system; Immune functions; Internal auditing; Efficiency of research funds

1 Introduction

With the rapid development of China's economy, the intensity and scale of investment in scientific research have increased rapidly. According to the science and technology funds statistics of Ministry of Finance, the research and develop investment intensity of GDP accounted for more than 2.05%, which outnumbered the average 1.94% investment intensity of EU 28 countries. However, with the increasing of research funds, there is more and more misusage of research funds. According to the survey report of 2014 the Audit Commission: only 40% of research funds were used for research projects. One key reason for the improper usage of research funds lies in the leader-in-charge system. The research project leader has the entire right to control the whole expenditure of the fund, which is prone to misusage and waste.

An effective supervision system should be established to prevent and reduce such problems, without which the usage efficiency of research funds will be affected and the stability of research team will be endangered [1-2]. The current supervision situation of research funds in our country can be seen as "zero prior-management, ambiguous process management, rough post-management", which is difficult to be changed by the post-supervision based external audit.

Internal audit as an important means of supervision of research activities is different from external audit. It has the immune function with the main goal of prevention and process control [3-5]. In the internal audit, the audit department can supervise the audit object at any time, and play the role of warning and preventing in time. A good internal audit operation mechanism can regulate the use of research funds, improve the efficiency of research funds use, and help to promote the achievement of input performance objectives in science and technology research work.

There are lots of achievements on the research of the immune function in internal audit in the management of research funds. (Meng & Zhang, 2010) introduced the research of immune function into the field of internal audit, and highlighted the preventive effect of internal audit. (Xiong et al. 2017) analyzed that the internal audit had the immune effects of defense, surveillance and repair, which formed the immune system composed of "early risk warning, internal control mechanism, continuous supervision".

2 Analysis on the Immune Function of Internal Audit of Research Funds in Colleges and Universities

In order to change the situation of "zero prior-management, ambiguous process management, and rough post-management", it is necessary to carry out the four kinds of immune function "defense, recognition, reveal and repair" in internal audit [3-5], that will be beneficial to find the potential risk early, and avoid more serious problems.

2.1 Immune function

The immune function of organism is mainly manifested in three aspects: immune defense, immune stability and immune surveillance. (1) Immune defense refers to the function of the body to remove

pathogenic micro-organisms or other foreign matter, (2) Immune stability refers to the function of the body to remove damaged or senescent cells and maintain its physiological balance, (3) Immune surveillance means that the body recognizes and clears the mutant cells in the body to prevent the occurrence of tumors.

Similar to the immune function of organism, there are independent immune functions in the internal audit, which cooperate with each other and play the role of "immune system". The functions of the immune system in the audit process are recognition function, reveal function, repair function and defense function. Figure 1 illustrates the relationship of internal audit process and four immune functions.
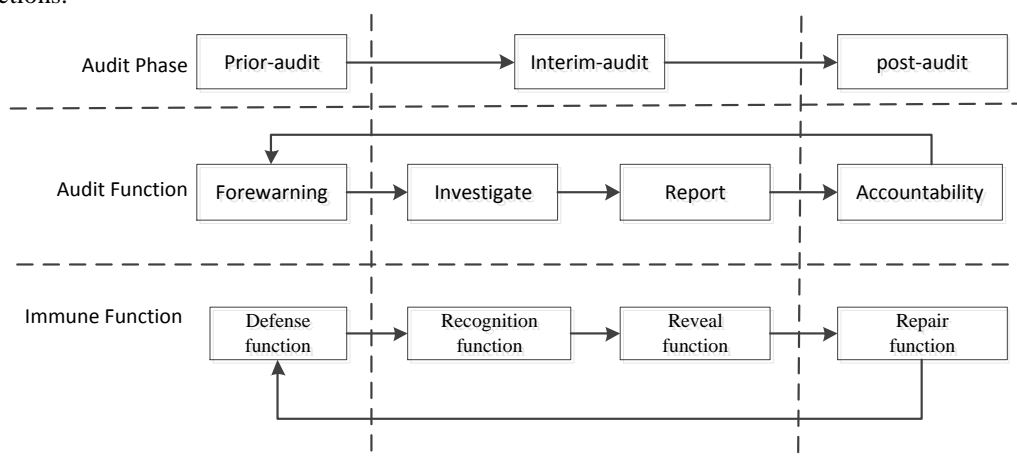
Figure 1　Immune-Based Internal Audit Process and Functions

(1) **Recognition function**: Internal audits with immune function can identify potential damages and risks. If there is abnormal information or risks, the immune system will automatically warn early, and provide sufficient information for the system to develop preventive measures and to avoid loss, using various funds safely and effectively.

(2) **Reveal function**: When the immune system is unable to resist the risk, the system will automatically open the reveal function, and warn the improper behavior, indicating the existence of risk. At the same time, the immune system can quickly and effectively deal with the found risk, and produce a considerable deterrent to potential risks to reduce losses, ensuring the safety and integrity of funds.

(3) **Repair function**:　Immune system can adopt the constructive views of all sides, sort out and summarize the collected information. Besides, it can analyze and dispose the feedback of all sides, rectify the problems revealed by the internal audit immune system, to repair the system and finally to promote the internal audit department to clarify their responsibilities. At last, it can strengthen the management of the audited project, and improve efficiency.

(4) **Defense function**: After the repair of the internal immune system, the system can identify the unfavorable factors or risks, and exclude identifiable risk from the system, to curb the risk in the budding stage, thus to strengthen the whole immune system's defense, reducing the loss of project funds as far as possible.

2.2 Recognition function of internal audit --- identify problems

Considering the internal audit information system in colleges and universities, we need to find out the weaknesses of the system, and to equip the "automatic monitoring device" with the establishment of the real-time audit monitoring if we want to identify the problems and risks in the system [5]. The main problems and risks in the use of university research funds are: expenditure on outsourcing, lack of coordination and supervision of research equipment purchase, no list of office supplies, optional and casual travel reimbursement and so on. Therefore, in the process of research project, we need to introduce immune-based internal audit, which can identify the high risk issues timely and put the audit checkpoint ahead.

2.2.1 Expenditure on outsourcing

With the development of society, "professional people to do professional things" has become the general trend in research work. So the professional works, such as testing, commissioned processing, are generally entrusted to the specialized agencies. Research work outsourcing has become an important part of research. From the practice of internal audit, there are complex types of outsourcing. But the

focus of outsourcing contracts and the expenditure audit includes: Is the expenditure budget of the project reasonable? Is the use of expenditure standardized? Is the expenditure real? Is there related party extracted for the project funds? Etc.

2.2.2 Lack of coordination and supervision of equipment purchase

The equipment spending of research funds is one of the main concerns of the internal audit. Because the devices are managed as fixed assets, which should be purchased by procedures of public bidding of school or government procurement, and the related materials should be confirmed by the school and then to handle the receiving note of fixed assets. Fixed assets accounting can only be done after the equipment invoice. Purchase contracts and receiving notes should be audited by the school financial department. And the management of the process and the reimbursement procedures should be standardized. At the same time, whether the equipment purchase in the research funds is reasonable, whether the school can adjust or share in order to avoid the waste of research funds cannot be determined.

Due to the lack of coordination and supervision, the phenomenon of using the research funds to take the repeated purchase of equipment occurs frequently, which seriously affects the usage efficiency in the research funds. In addition, it is possible to use personal equipment (computers, air conditioning) as the research funds, resulting in the vain cost of research. Therefore, the internal audit department should be involved in the budget of research projects in advance, to reasonably estimate the correlation and necessity of research equipment and projects.

2.2.3 No detailed list of office supplies

From the audit practice, there are large amounts of expenditure reimbursed as "office supplies" in the research project funds, without specific name, number and price on the invoice. Seen only from the invoice, it's difficult to determine whether the items are reimbursed for research office supplies. Besides, the invoice management is not standardized. No matter what the customers buy, maybe personal consumption necessities, businesses will generally meet the customer's demand as long as the customer demand for "office supplies" invoices. Frequently personal costs are included in the research cost, which virtually increases the cost of research. So it's hard to make the accurate accounting of the actual benefit by research funds.

2.2.4 Casualness of travel expense

Due to the need of field research activities, or participation in seminars, etc., the cost of research funds includes a large number of travel expenses. Internal auditors can see numbers of the people, time, place, and the costs of travel from the reimbursed transport costs and accommodation bills, but it's difficult to determine whether the travel expenses are associated with research projects, and whether it is reasonable. Financial data may include travel expenses that should be assumed by an individual or other travel expenses in the cost of research, so the internal audit department should remove the inflated travel expenses from the cost of research, to ensure the reasonable and real expenditure of research project funds.

2.3 Reveal function of internal audit --- revealing problems

How to effectively solve the problems after identifying, that is the second important responsibility of immune audit. After identifying a series of problems through the management of research funds, we need to expose the problems, to deter potential risks and establish the authority of audit [3].

2.3.1 Disclosing the found problems and potential risks

All the problems are reflected and identified from the procedures, and these problems bring great obstacles to the future audit. Therefore, we should put the immune-based audit into management practice in research funds, using the information system to collect expenditure information of research funds, then establishing the dynamic monitoring and auditing system to prevent possible risks, and timely disclosing the found problems and potential risks, so as to avoid the waste of research funds. At the same time, the internal audit department should assess the risks and define the degree of risks, to warn in the process of revealing problems timely. Also, it is necessary to standardize the consequent use of research funds, to avoid serious problems in the research team and improve the use efficiency of the research funds.

2.3.2 Publicizing the project audit results

Publicizing the audit results of university research funds timely and periodically by the audit department is conducive to the real objective evaluation of research projects from the perspective of the third party. This is also an important way to use the audit results, with the power of the publicity to promote non-standard use of funds to be rectified which can also play a warning role for other research projects funds.

2.4 Repair function of internal audit - repairing problems

Repairing problem is the main procedure in immune-based audit, which will effectively integrate the audit resources, clean the reveled problems outside the system, and effectively repair the immune system audit [8].

2.4.1 Establishing accountability system

The accountability system of research activities is an important part of the immune system audit. Therefore, we should strengthen the construction of accountability system and the supervision of research funds as soon as possible and to improve the immune audit. Accountability system is essential in the management of research funds in colleges and universities. Colleges and universities should formulate relevant regulations timely, and take the strict accountability of the violation of discipline. Only by the clear authority of the internal audit department can we deter potential risks, and better fulfill the internal audit supervisory functions.

2.4.2 Improve financial processes and standards

At present, many of the provisions on the use of research funds are still in the general restrictions, without specific implementation of standards. Besides, some standards have not been modified for so long time, which falling behind the current situation. At the same time, all kinds of information system in colleges and universities are also in the process of construction. When there are new problems in immune function, the relevant standards and procedures should be improved timely according to current situation and the existing kinds of information.

2.5 Defense function of internal audit -- preventing problems

It is the defense process of immune system to effectively discover the "old problem" and produce effective "immune" function of the audit. Through the immune audit, the system can effectively identify and reveal problems, control risks, and solve problems through the establishment of a series of measures, such as perfect the management system of research funds in colleges and universities, establish appropriate accountability mechanisms, formulate specific rules for using research funds, regulate the use of university research funds, and strengthen "immunity" of internal audit gradually.

In the audit process, as long as the audit staff carries out the audit theory of "immune system", it will be able to reveal new problems timely and accurately, solve the problems, and ultimately prevent new problems. Therefore, it will prove that the introduction of the "immune system" theory in the audit of research funds is an important way to strengthen the immune system and improve the efficiency of the use of research funds.

3 Immune-Based Internal Audit Process of University Research Funds

Most of the internal audit process of research funds in colleges and universities has the closing audit only after the accomplishment of the project, lacking in the prior audit and interim audit. In order to achieve the immune function of internal audit, we put forward the following audit process:
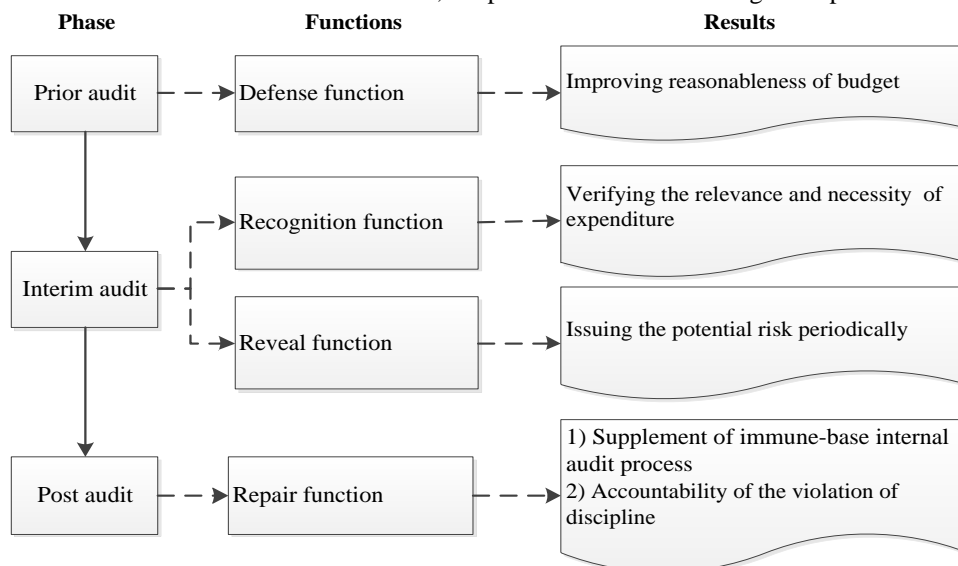
Figure 2   Process of Internal Audit Based on Immune System

In prior audit phase, by using defense function, internal immune audit check the budget of contract to find the unreasonable budget, such as repetitive purchase of equipment. It is helpful to improve the efficiency of research funds, avoid misusage of research at the beginning of project.

In interim phase, using recognition and reveal function, internal immune audit expenditure of project on authenticity, relevance and standardization periodically, to find the misuse of the research fund, such as outsourcing fee, equipment fee, labor service and travel expense, and so on. That will identify, reveal early risk warning and supervise the use of project funds continuously.

In post audit phase, internal audit should sum up the experience, supplement and improve the immune-based internal audit process, start the accountability mechanism if there is illegal use of the research fund.

The introductions of audit immune system in the audit of research funds in universities not only explore the immune function of internal audit, but also effectively promote the internal audit level of research funds to advance to prior audit and interim audit and run through the entire process of funds audit. At the same time, it strengthens the supervision of research funds, reduces the audit risks, and forms a cycling "firewall", which can detect, prevent, eliminate "disease" and repair the immune system timely, to ensure the safe operation of the system and to achieve an effective monitoring of research funds, and finally improve the efficiency of research funds.

4 Case Study

Take project numbered No.61178093 of W university funded by the National Natural Science Foundation of China as an example. The project funding is 580, 000 RMB. Immune-based internal audit supervise research activities in the whole process. By defense, recognition, reveal and repair functions, the immune-based internal audit identify some potential risks, reduce some improper use of research funds, and propose some rectify measurement. Table 1 illustrates the results of immune-based audit on this project in whole process.

Table 1　Case study for Immune-Based Internal Audit of a Research Project of Wuniversity

Phase	Functions	Efforts	Results
Prior audit	Defense function	Budget compliance securing	repetitive equipment fee 82,300 RMB reduced labor service fee 20,000 RMB increased
Interim audit	Recognition function	unnecessary expense identifying	unnecessary travel expense 24,560 RMB identified unreasonable equipment fee by 28,650 RMB identified unrelated part outsource fee 40,000 RMB identified unrelated office supplies fee 16,786 RMB identified
	Reveal function	Common misusage summarizing and reporting	Issue semi-annual report 8 times
Post audit	Repair function	Rectifying suggestions	Propose rectification measures Sum up experience, supplement internal audit process, strengthen immune function.

In this case study, the 102,300 RMB in contract budget was adjusted for use, 10,996 RMB improper use of research fund was rectified by immune-based internal audit.

After analyzing the use of the case project funds, the comparative results of each part effectiveness of the research funds before and after the immune audit are showed in Figure 3.

As can be seen from the above figure, the effective research expenditure before the immune audit is only 45.6%, and about 40% of the budget is unreasonable or non-compliant. By immune-audit methods, the use of unreasonable budgets and non-compliant funds has been effectively reduced, and the effective use rate of funds has been raised to about 80%. The effect is remarkable.
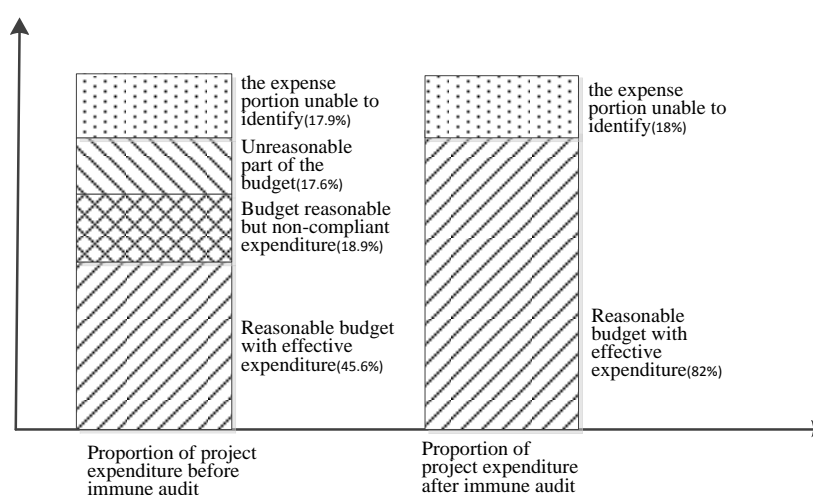
Figure 3　Effects of Rational Use of Research Funds on Immune Audit

5 Conclusion

From the current situation of the internal audit of colleges and universities, the realization of its functions is more passive defense, less active surveillance, and far from elastic stability. As the supervisor of the use of research funds in colleges and universities, the internal audit department can supervise the expenditure in the process of research projects and reduce the waste of resources. Also, it will supervise research management department and project leader to effectively regulate the use of research funds. Therefore, the paper introduces the immune function of internal audit into research funds audit of colleges and universities, to identify, reveal, repair and prevent the problems existing in process of the research activities, so as to improve the efficiency of research funds.

Acknowledgement

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Research on the 3-dimensional Prevention and Control Strategies of Risk Conduction of Corporate Finance System

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Abstract: This paper expounds that the risk conduction of corporate finance system follows the principles of direction, time and intensity. It proposes to plan the risk management prevention and control strategies of corporate financial system from the direction dimension, time dimension and intensity dimension according to those principles. In the aspect of direction dimension, the strategies of preventing and controlling risk conduction through business process chain, interest chain, value chain and capital supply chain was put forward. In terms of time dimension, prevention and control strategies for slowing the release time and speeding from the conduction path are proposed. In terms of intensity dimension, a prevention and control strategies are proposed to reduce the risk of the main body by reducing the degree of strong coupling and transferring risks. This paper has important theoretical research value and practical application value for the prevention and control of risk conduction in corporate finance system.
Key words: Direction dimension; Time dimension; Intensity dimension; 3Dimension prevention and control strategies

1 Introduction

The risks of corporate finance systems are ubiquitous, and they are conducted along business process chains or interest chains or value chains or capital supply chains, leading to varying degrees of damage to stakeholders such as investors, creditors, debtors, tax bureau, and employees. With regard to this, from the perspective of directiondimension, timedimension, and intensitydimension of risk conduction in corporate finance systems,effective prevention and control strategies can be used to quickly, accurately identify financial risks, and control financial risks, and prevent financial risks from so as to protect the interests of enterprises and stakeholders from being infringed andto maintain a stable and sustainable development. However, so far, researches on the prevention and control of risk conduction in corporate finance systems from three-dimensional space are rare. With respect to corporate financial risk conduction, Benston (Benston, 1986) believed that when a certain number of enterprises in a system failed at the same time, systemic risks would occur. Jarrow et al. (Jarrow et al., 2001) conducted a study of corporate financial risk conduction from the perspective of vulnerability. They believed that because one company's failure would lead to failure of other companies, ordinary financial vulnerabilities would arise then. Shen Jun (Shen Jun, 2011), a domestic scholar, studied the direction dimension, time dimension, and intensity dimension of corporate financial risk conduction, and established a prediction model about direction dimension, time dimension, and intensity dimension of corporate financial risk conduction. Based on this, she proposedthe corporate financial risk conduction control model of direction dimension, time dimension, and intensity dimension which had important theoretical research value and practical application value for effective prevention and control of corporate financial system risk conduction.

2 The Structureof 3-dimension Prevention and Control Strategies of Risk Conduction of Corporate Finance System

The 3-dimensional prevention and control strategies of corporate finance system risk conduction refers to the direction principle, time principle, and intensity principle of risk communication according to the corporate financial management system. Its prevention and control strategies are planned from the three-dimensional space of direction dimension, time dimension, and intensity dimension, so as to realize the effective prevention and control of risk conduction in financial system. Its concrete structure is shown as in Figure. 1:
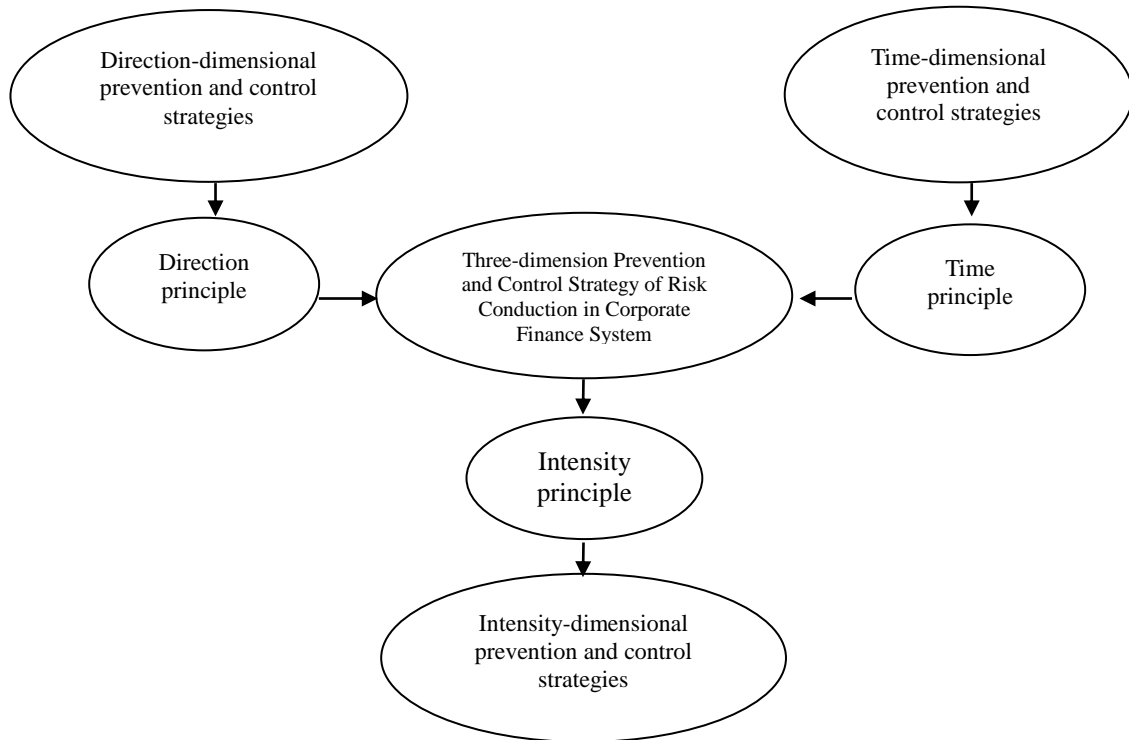
Figure 1   Diagram of 3-D prevention and Control Strategies of Risk Conduction in Enterprise Finance Management System

3 Prevention and Control Strategies for Direction-dimensional Risk Conduction of Corporate Finance System

The direction dimension of corporate finance system risk conduction refers to the risk of corporate finance management system is conducted along the business process chain or interest chain, value chain, and capital supply chain of the enterprise financial management system, and presents the features of directionality and path- dependence. Its connotation is shown in Fig2.
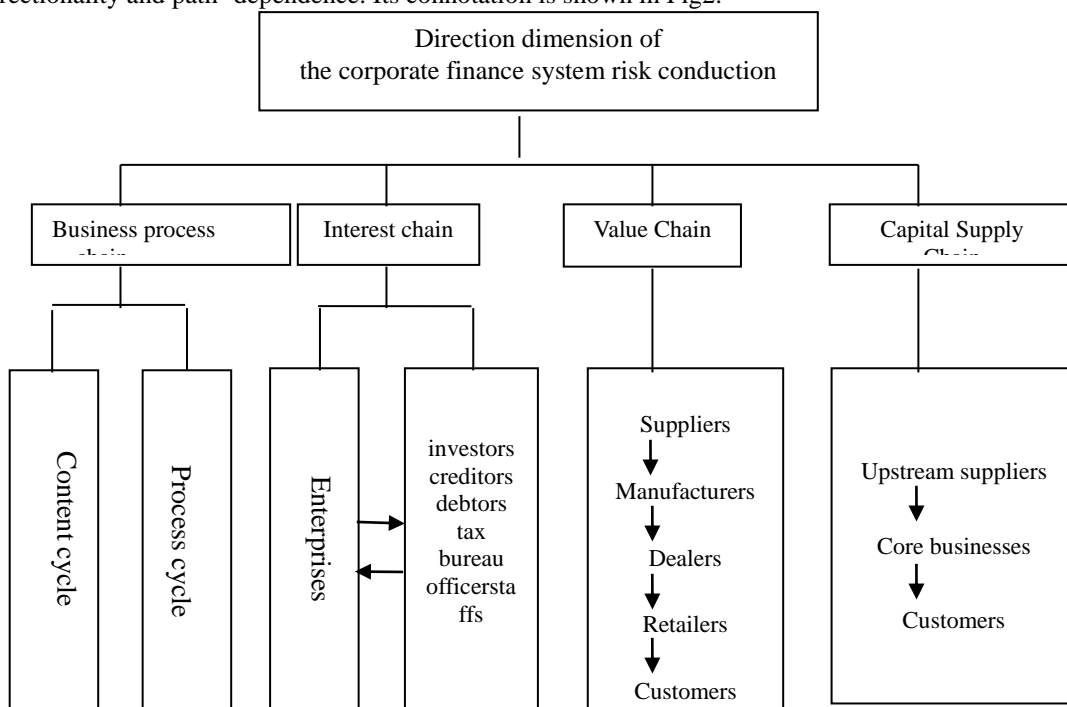
Figure 2   Direction Dimensionof Risk Conduction in Corporate Finance System

3.1 Prevention and control strategies for corporate finance system Direction-dimensional risk conductionthrough Business Process Chain

The direction dimension of Corporate Finance System Risk Conduction through business process chain means that risk is transmitted in accordance with the enterprise financial content cycle and process cycle. Its prevention and control strategies mainly include: Firstly,from the government's point of view, to improve accounting laws and regulations, and continuously to strengthen the construction of the financial system. Secondly,from the corporate perspective, to strengthen the control of risk sources such as corporate financing, capital injection, working capital and profit distribution, thus eliminating the risk on the early stage. Thirdly, to promote scientific nature of the operation methods such as enterprise financial forecasting, financial decision-making, financial planning, financial control, financial accounting, and financial analysis, the effectiveness of the execution intensity, and the usefulness of achieving the effect.

3.2 Prevention and control strategies for corporate finance system Direction-dimensional risk conduction through Interest Chain

The direction dimension of Corporate Finance System Risk Conduction through interest chain mainly refers to risk conduction according to the respective economic links between the company and investors, creditors, debtors, tax authorities, and employees. Its prevention and control strategies mainly include: 1 Under the common rules and systems, enterprises and investors clearly define the rights and responsibilities of all parties and balance the interests of all parties; 2 Enterprises and creditors make full use of contract contracts to ensure timely and adequate supply of funds by creditors and the reasonable use of credit terms; 3 In the face of debtors, tax authorities, employees, etc., companies should establish a good corporate image and establish a corporate reputation.

3.3 Prevention and control strategies for corporate finance system Direction-dimensional risk conductionthrough Value Chain

The direction dimension of Corporate Finance System Risk Conduction through value chain mainly refers to the risk that the risk is guided from suppliers to manufacturers, then to retailers, and finally to customers. Its prevention and control strategies mainly include: to prevent control, in-event dynamic control, post-event feedback control among value subjects on the value chain to prevent breaks in the value chain, maintaining healthy operations, and sustainable development.

3.4 Prevention and control strategies for corporate finance system Direction-dimensional risk conduction through Supply Chain

The direction dimension of Corporate Finance System Risk conduction through supply chain mainly refers to the conduction of risk based on capital flows from upstream suppliers to core companies to downstream user. Its prevention and control strategies mainly include: (1) reasonably determining the scale of funds; (2) storing funds in time; (3) ensuring the use of funds; (4) establishing and improving legal supervision.

4 Prevention and Control Strategies for Time-dimensional Risk Conduction of Corporate Finance System

The time dimension of corporate finance system risk conduction refers to the occurrence of intermittent or time-delay or periodic or continuous conduction of corporate finance system risk on the conduction path due to interference, spread and oscillation of related factors. Enterprises can make full use of good time dimension to implement prevention and control of corporate financial system risk conduction. Its prevention and control strategies mainly include:

4.1 Extending the burst time of risks released from the source of risk

The process of risk conduction in corporate finance systems is the process by which risks change from small to large and from quantitative to qualitative. According to the time-based principle of risk accumulation in corporate finance management systems, adopting risk management measures and improving the risk management measures such as risk tolerance of enterprise systems can suppress or reduce the possibility and time that the risk shift from static to dynamic and finally burst out. This strategy enables corporate financial system risk to be resolved before it has impacted the business, and it will provide time for the company to cope with the risk conduction of financial systems.

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4.3 Reducing the speed of risk conduction of corporate financial system

The faster the corporate financial system's risk conduction speed is, the shorter the time it takes for the risk to be on the conduction path, and the greater the loss to the relevant parties in the chain. By increasing the damping of risk conduction in corporate finance systems or mitigating the intensity of risk drivers and extending the distance of risk conduction paths, companies can delay the conduction of risk management in corporate finance systems The risk management and early warning system of corporate wealth management system can be used to take effective measures to resist or prevent the intrusion of risks, mitigate the speed of risk conduction and make early plans for risk prevention and control when the risks corporate wealth management systems real or potential the company is facing have not yet emerged or have just been exposed.

4.4 Establishing Information Conduction Mechanism on the Benefit Chain

In the interest-based financial relationship network, accurate, real, timely information communication is critical to block corporate finance system risk conduction. Enterprises can control the occurrence of corporate financial system risks by adopting parallel management of risk conduction carriers such as information flow, capital flow, and logistics, and establishing a sound financial mechanism for each member unit of the interest chain. Through this method, enterprises can track and control in real time and get feedback in time, thus ensuring the safe and efficient operation of the entire interest chain.

5 Prevention and Control Strategiesfor Intensity-dimensional Risk Conduction of Corporate Finance System

The intensity dimension of Corporate Finance System Risk Conduction mainly refers to the phenomenon that various single-factor risks of the corporate financial system encounter each other in the risk conduction path, and they may be weakly coupled or strongly coupled, resulting in exhausted risk conduction or enhanced risk conduction. Its prevention and control strategies mainly include:

5.1 Reduce the degree of strong risk coupling in corporate finance system and avoid enhanced risk conduction

In the process of production and business activities of the company, various single-factor financial risks occur at the same time, and the interplay of these different attribute risks will inevitably produce strong coupling effects. At this time, the company should strengthen the independent operational capabilities of various functional nodes, regulate the conduction of various risks and effectively control the key elements of risk conduction, try to control the convergence or intertwining of the risk factors of each single factor so as to minimize the risk-strong coupling phenomenon. To prevent enhanced risk conduction.

5.2 Leading the risk management of corporate finance system to other conduction entities, spreading risks and creating exhausted risk conduction

There is objectivity in the risk conduction of corporate finance systems, and there is also subjectivity. Objectivity refers to the risk conduction of corporate financial system is not based on the will of the people, which inevitably has an adverse impact on the corporate financial management system; subjectivity refers to that the enterprise managers can actively guide the risk to the other risk-taking subjects through human intervention and conduction to achieve the purpose of spreading risk and reducing the intensity of risk coupling. The main ways are:

(1) Insurance

Insurance means that by paying premiums, the insured party has the right to indemnify the insured party against the insured's economic losses within the scope specified by the contract and the law. According to the insurance contract, the damaged enterprise has the right to obtain corresponding economic compensation from the insurance company, thereby helping the enterprise to restore normal production and business activities in time and improve the financial stability of the enterprise.

(2) Outsourcing

Outsourcing means that the company outsources its non-core business to other companies and seeks resources from the outside, thereby conduction quality risks, capital occupation risks, and technical risks to outsource, thereby reducing their own risks and enhancing the ability to resist risks.

(3) Selling

Selling refers to the conduction of ownership from the seller to the buyer through the sale of the company, so that the buyer company bears all risks to the entity. In this way, the seller's company can eliminate operational problems, quickly recover funds, and rationally allocate resources to open up new business areas so as to achieve the purpose of conduction risks.

6 Conclusion

The risk conduction of corporate financial system follows the principles of direction, time and intensity. Based on these basic principles, three-dimensional prevention and control strategies for direction dimension, time dimension, and intensity dimension can be formulated which have their pertinence, operation, and scientity, so as to achieve the effectiveness of prevention and control of risk conduction in corporate financial systems.

(1) Direction-dimensional risk prevention and control strategies of corporate finance system mainly include developingoperation strategies from the three directions of business process chain direction, interest chain direction, value chain direction and capital supply chain direction. so as to achieve the goal of risk prevention and control.

(2) Time-dimensional risk conduction prevention and control strategies of corporate finance system mainly includes measures to delay the time of risk release and the speed of conduction and establish Information conduction mechanism by following the time law that corporate financial system risk is transmitted from the risk source to the risk acceptor so as to cope with financial system risk conduction and prevent and control risk conduction effectively.

(3) Intensity-dimensional prevention and control strategies of risk conduction in corporate finance system mainly includes: (1) Take effective measures against all kinds of single-factor financial risks that may occur during the production and business activities of the enterprise, avoiding the aggregation or intertwining of various risks, and thus reducing the coupling effect to minimum degree; (2) Through the business methods of insurance, business outsourcing, and sales, guide the risk management of the corporate finance system to other conduction entities, diversify risk, and thus achieve prevention and control of risk conduction.

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Assessment of Emergency Logistics Risk Based on Structural Equation Model

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Abstract: Natural disasters and other emergencies have caused serious economic and social losses. Emergency management can control losseseffectively. Emergency logistics is an important part of emergency management. On the basis of understanding the characteristics and application scenarios of emergency logistics, this paper constructs a risk assessment system for emergency logistics through literature learning. The structural equation model was used to evaluate the impact of various risk factors on the overall risk and the correlation between risk factors. The results of the study show that, purchaserisk of emergency materials, reserve risk of emergency materials, transportation of emergency materials, political and organizational risk, informational and social risk have significantly positive impacts on the overall risk of emergency logistics.
Key words: Emergency logistics; Risk assessment; Structural equation model; Literature review

1 Introduction

Natural disasters and emergencies are often difficult to predict and forecast. Even if some disasters can be forecasted, due to the short interval between the forecasting time and the time of occurrence, emergency materials for disaster relief are difficult to achieve their time and space effects, making it difficult to implement their logistics process. Therefore, the study of emergency logistics management has become an important issue in social security (Zhou Yu, 2009).

In recent years, many scholars have achieved innovative and effective results in this field.Song Yinghua (Song Yinghua, 2018) constructed a two-layer dynamic LAP model in view of the severe shortage of emergency materials in the disaster area in the aftermath of earthquake so as to meet the different emergency needs of multiple subjects. Emre Kirac, Ashlea Bennett Milburn(Emre Kirac, Ashlea Bennett Milburn, 2018) presented a general framework for investigating whether it is worthwhile to act on user-generated data prior to its absolute verification in the context of disaster response logistics planning. Alfredo Moreno (Alfredo Moreno, 2016) developed two stochastic mixedinteger programming models to integrate and coordinate facility location, transportation and fleet sizing decisions. Min Peng (Min Peng, 2014) proposed a system dynamics model to analyze the behaviors of disrupted disaster relief supply chain by simulating the uncertainties associated with predicting post-seismic road network and delayed information.Wang Haijun, Ma Shihua, Du Lijing (Wang Haijun, Ma Shihua, Du Lijing, 2014) studied the dynamic scheduling of emergency materials for multi-modal joint transportation under fuzzy supply and demand conditions, focusing on the characteristics of large-scale emergency response. Under the efforts of many scholars, emergency logistics has formed a complete theoretical system.

Emergency logistics, as a system engineering, involves the external constraintsof policy environmentand natural environment, and the internal limitations of institutional mechanisms and emergency resources. At the same time, it involves the game between different subjects such as government, demand side, supply side, transporters, and volunteers. When the rules of the exchange of material, energy, and information between the emergency logistics system and the outside world are broken, the risk energy originally contained in the operation process will be released and followed by a certain chain of risk evolution, and eventually evolved into a risk loss. From the perspective of logistics operations in the handling of various emergencies in recent years, effective implementation of risk management in the process has become one of the keys to the success of emergency logistics. Strengthening emergency logistics risk analysis and evaluation is an urgent need for the change of the situation, and it is also an important issue to China's current development of emergency logistics. In recent years, some scholars have begun to study the uncertainty of emergency logistics and sought to minimize its risk.

Table 1   Results of Emergency Logistics Risk Research

Scholars	Reseach
Mei-siang	Meisiang proposed that government logistics should be used to deal with emergency logistics problems caused by floods in the uncertain situation.
Li Jingyi	Pointed out that GIS plays an important role in emergency logistics management; at the same time, it puts forward application of GIS in the four stages of emergency logistics management: risk assessment and planning phase, preparation phase, response phase and recovery phase.
Zhao Yong	Systematically analyzed the features of emergency logistics and the characteristics of emergency logistics risks, and proposed a framework model for emergency logistics risk analysis, namely the three processes of emergency logistics risk identification, risk assessment and risk rating.
Li Jianguo	Applied the Analytic Hierarchy Process (AHP) to evaluate the support capabilities of emergency logistics and tried to establish a method to evaluate it.
Xia Caiyun	Used the theory of interval number to study the problem of minimizing the risk of selecting transportation route after the occurrence of an emergency event, providing a strong basis for risk control and route selection.

Previous researches in this field have provided us with important theoretical references and practical experiences. However, at present, there are still two deficiencies in the study of emergency logistics. First, quantitative research basically adopts the methods in optimization method and simulation method in operations research, and does not apply the statistical method to analyze the relationships among the elements of the emergency logistics system. Second, it pays too much attention to the logistics optimization under emergencies, and less attention to the uncertainties faced by the emergency logistics as a system engineering. This article will comprehensively identify and evaluate risks of emergency logistics based on extensive literature retrieval and theoretical learning.

2 Risk Evaluation Index System of Emergency Logistics

The design of the risk evaluation index system of emergency logistics needs to identify the source of risk first. According to the foregoing analysis, the source of emergency logistics risks is contained in the internal and external environmental changes brought about by unexpected events. The risk indicators can be designed based on the operational flow of emergency logistics and divided into direct and indirect process risk. The direct operation process is a collection of internal factors that cause emergency logistics risk, including the three major risk sources. They are purchase risk of emergency materials, reserve risk of emergency materials, and transport risk of emergency materials. The indirect operation process is the collection of external factors that cause emergency logistics risks, including political and organizational risk, informational and social risk. They are two major source of indirect risk. According to the characteristics of the emergency logistics risk, the risk source can be further subdivided, and the indicator system can be set up as the following first-level indicators: purchase risk of emergency materials, reserve risk of emergency materials, transport risk emergency materials, political and organizational risk, informational and social risk. Each first-level indicator can be further subdivided into a number of secondary and tertiary indicators. Based on this, we propose the hypotheses of this paper:

H_1: Purchase risk of emergency materials, reserve risk ofemergency materials, transport risk of emergency materials, political and organizational risk, informational and social risk have a significantly positive impact on the overall risk of emergency logistics. H_2: Supplier production capacity,suppliers' ethics, quality of emergency supplies, the complexity of sources of emergency materials, timeliness of delivery of emergency materials have a significantly positive impact on the purchase risk of emergency logistics. H_3: Rationality of the layout of reserve centers, reserve of emergency materials, reserve of emergency fund have a significantly positive impact on the reserve riskof emergency materials. H_4: Degree of damage to transport channels, accessibility of disaster areas, rationality of the layout of the traffic network, rationality of layout of emergency logistics center, rationality of transportation vehicleshas a significantly positive impact on the transport risk of emergency materials. H_5: Coordination between administrations, completeness of strategic emergency warning mechanism, correctness of emergency management decisions, professional quality of emergency logistics personnel, number of emergency logistics personnel have a significantly positive impact on political and organizational risk. H_6: Government's cohesion, stability of communication system, social sentiment, completeness of DSS of emergency logistics have a significantly positive impact on informational and social risks. H_7: There are correlations between the five latent variables of purchase risk of emergency

materials, reserve risk of emergency materials, transport risk of emergency materials, political and organizational risk, and informational and social risk that affect the overall risk of emergency logistics.

Table 2　Emergency Logistics Risk Assessment Index System

Source of risk	Risk factors	Coding
Purchase risk of emergency materials (R_1)	Suppliers' production capacity	R_{11}
	Suppliers' ethics	R_{12}
	Quality of emergency supplies	R_{13}
	The complexity of sources of emergency materials	R_{14}
	Timeliness of delivery of emergency materials	R_{15}
Reserve risk of emergency materials (R_2)	Rationality of the layout of reserve centers	R_{21}
	Reserve of emergency materials	R_{22}
	Reserve of emergency fund	R_{23}
Transportation risk of emergency materials (R_3)	Degree of damage to transport channels	R_{31}
	Accessibility of disaster areas	R_{32}
	Rationality of the layout of the traffic network	R_{33}
	Rationality of layout of emergency logistics center	R_{34}
	Rationality of transportation vehicles	R_{35}
Political and organizational risk (R_4)	Coordination between administrations	R_{41}
	Completeness of strategic emergency warning mechanism	R_{42}
	Correctness of emergency management decisions	R_{43}
	Professional quality of emergency logistics personnel	R_{44}
	Number of emergency logistics personnel	R_{45}
Informational and social risk (R_5)	Government's cohesion	R_{51}
	Stability of communication system	R_{52}
	Social sentiment	R_{53}
	Completeness of DSS of emergency logistics	R_{54}

3 Risk Assessment Based on Structural Equation Model

3.1 Selection of models and methods

The SEM establishes a causal model to observe causal relationships between variables. SEM is divided into measurement model and structural model: (1) Measurement equation describes the relationship between latent variables and observed variables. Observation variables obtain the intuitive data through the scale or other measurement tools. (2) Structural equations describe the relationship between latent variables. Exogenous latent variables refer to latent variables as causal factors, and endogenous latent variables are latent variables that can act as outcomes.

The measurement equation is expressed as:

$$Y = \Lambda y n + \varepsilon \tag{1}$$

In the above model, X is the observed variable of ξ, Y is the observed variable of η, ξ and η are exogenous latent variables and endogenous latent variables. Λx and Λy are the relationships between latent variables and observed variables respectively, which is factor load matrix. δ and ε are the errors of the X and Y variables respectively.

The structural equation is expressed as:

$$\eta = B\eta + \Gamma \xi + \varepsilon \tag{2}$$

In the above model, η indicates endogenous latent variables, ξ indicates endogenous latent variables, B is the relationship between endogenous latent variables.

3.2 Data collection and empirical test

This paper adopts 5-point Likert scale to measure the attitudes of theoretical experts in universities,

practice experts on emergency management and other relevant personnel. The degree of each risk indicator'simpact is scored, and the overall risk is scored. Finally, the acquired data is substituted into the structural equation model for hypothesis testing. This paper selects the staff of the logistics company in Z city of H province, logistics management and emergency management researchers and the students of major universities as samples, and distributes a total of 281 questionnaires.

This paper uses statistical software SPSS 23.0 to analyze the reliability and validity of the emergency logistics risk scale. (1) Reliability test. Cronbach's α reliability coefficient is used to check the internal consistency and stability of the scale, which is between 0-1. The larger the α value, the higher the data reliability. The overall reliability of the scale was 0.964, and the Cronbach's α values of the measured variables met the critical conditions of greater than 0.7 and were all above 0.9. The correlation coefficient between the revised item and the total is above 0.5. Only the CITC value of the variable R_{51} does not reach 0.5, and the overall reliability is improved after the deletion, so the indicator is removed. (2) Validity test. The load values of various factors and the KMO sample measure and the Bartlett sphericity were used to test the validity of the data. The KMO value was 0.953, which was above 0.9. The Bartlett's spherical test Sig. was 0.000<0.005. The questionnaire had good validity and was very suitable for factor analysis.
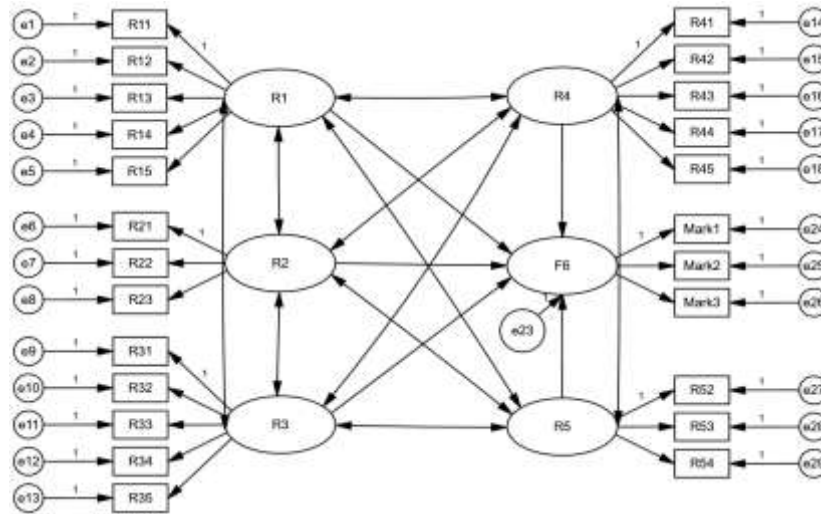
Figure 1   Structural equation model path diagram

Table 3   Model Fit Test Results

Index classification	Index name	Model fitting value	Critical value	Fit evaluation
Absolute fit indicator	X^2/DF	2.783	<5	Ideal
	RMSEA	0.076	<0.08	Ideal
	GFI	0.923	>0.9	Ideal
	AGFI	0.897	>0.9	Acceptable
Value-added adaptation indicator	NFI	0.951	>0.9	Ideal
	RFI	0.931	>0.9	Ideal
	IFI	0.944	>0.9	Ideal
	CFI	0.899	>0.9	Acceptable
Simplified fitting index	PGFI	0.491	>0.5	Acceptable
	PNFI	0.706	>0.5	Ideal
	PCFI	0.716	>0.5	Ideal

Table 4   Hypothesis Test

Latent variable	Path	Observation Variable	Influence direction	Path coefficient	S.E.	T	P	Test result
Risk	←	R1	+	0.401	0.025	4.091	***	Pass
Risk	←	R2	+	0.440	0.014	2.827	***	Pass
Risk	←	R3	+	0.571	0.019	3.670	***	Pass
Risk	←	R4	+	0.330	0.025	2.847	***	Pass
Risk	←	R5	+	0.549	0.021	2.314	***	Pass

As is shown in the above table, the test of hypotheses about the impact of each risk source on the overall risk of emergency logistics have passed. This result provides an important reference for macro-management and decision-making of emergency logistics from the government level. At the same time, H_7 also passed the test, indicatingthat the five major risk sources act on the overall risk of emergency logistics in the impact of collaborative interaction. When establishing a risk prevention and control mechanism, we should stand in the perspective of a dynamic, open, and balanced system, considering the adaptation between macro and micro environments and the coordination of interests between multi-agent. Due to space limitations, the testing results of correlation of each risk source are not shown in the main text, and can be requested from the author.

4 Conclusion

Although based on extensive research, this paper has carried out a more systematic identification and evaluation of emergency logistics risks, but there are still some limitations and deficiencies: (1) There are limitations in sample selection and sample size. The number of entities that are directly related to emergency logistics is limited, and due to some objective factors, it is not possible to select samples for investigation in a wider range. (2) The composition of evaluation indicators has limitations. Although this article systematically builds a risk assessment system from different dimensions, it has a large number of subjective indicators and the objectivity in risk assessment is insufficient. (3) The empirical analysis has limitations. This paper evaluates the attitude measurement data of the Likert scale so that the subjectivity is strong.

In the future research, amendments to evaluation indicators should be incorporated into local economic statistics and past cases of emergency logistics to increase the objectivity of evaluation results. As far as funding is allowed, relevant entities in all areas where the incident occurred should be investigated to increase the accuracy of sample selection. We can build dynamic risk assessment indicators, using grounded theory to identify risks, combining emergency logistics processes, stakeholders, internal and external environments, so as to judge critical risk points, analyze risk evolution mechanisms, and dynamically monitor risk evolution.We can also use big data technology to build early warning and risk prevention platform, effectively prevent and control the risk of emergency logistics.

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Evaluation and Innovation Strategy for the Key Points of Coping Mechanismon the "NIMBY" Event in Garbage Incineration Power Generation

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Abstract: As a waste disposal method of "reducing, harmlessness, and resource recovery", the garbage incineration power generation has aroused great attention of the state. But in the course of advancing the project, it is facing the difficulty of landing caused by the "NIMBY" event. This paper uses web crawler technology, natural language processing technology and entropy value method evaluation model, obtains the important factors which affects the landing of the city garbage incineration project, proposes the effective methods and provides the decision-making basis for the emergency management of garbage incineration power generation.

Key words: Garbage incineration; NIMBY; Entropy; Erases management

1 Introduction

According to the 2016 China Rule of law Development Report statistics, in recent years, mass incidents involving more than one hundred people in China, about 32% are closely related with the garbage incineration such as "NIMBY" project, particularly serious such as Hubei Xiantao, Zhejiang Yuhang, Beijing six-Li Tun, Gao An Tun, Asu Wei, Shanghai Jiang Qiao, Songjiang, Guangzhou Panyu and other social security incidents. However, with the continuous development of our society and the increasing level of urbanization, the rapid growth of urban population has led to the increasing of urban waste production and the volume of clearing. At present, more than two-thirds of the cities in China are beset by rubbish siege, and the garbage incineration power generation, as a waste disposal method of "reducing, harmlessness and resource recovery", has aroused great attention of the state. However, in the process of the garbage incineration power generation project, it has been plagued by the "NIMBY" incident.

The foreign scholars had an earlier study of "NIMBY". In 2016, E. Pol, A. Dimasso and others used the case statistics method to investigate the construction of the "NIMBY" facility which was found in the European region for 15 years since 1999, found that the "NIMBY " phenomenon is related to the regional population ideology (E. Pol, etc., 2006). In 2010, with the survey methods of in-depth interview, group discussion and questionnaire, Patrick Devine-Wright and Yuko Howes found that the main cause of the conflict between the construction of wind power plants is "The public lack of contact and understanding of the project " (Patrick Devine-Wright,YukoHowes, 2010).

Chinese scholars' study on the "NIMBY" incident was relatively late. In 2013 Yang Yi and Zhu Hong used literature analysis, field observation and semi-structured interview methods to study the INMBY attitude of the common people lived nearby the garbage incineration power plant in Guangzhou panyu. It was found that "spatial distance and social economic characteristics have great influence on the attitude of NIMBY of people" (Yang Jin, Zhu Hong, 2013). In 2016, Song Jinbo, Song Danrong and Sun Yan used a case study to analyze the key risks of a garbage incineration project and find that "government decisions, technology, operations, and garbage supply are key risks in the advancement of wasting incineration projects (Song Jinbo, Song Danrong, Sun Yan, 2012)".

To sum up, the domestic and foreign scholars on the "NIMBY" event research generally using questionnaires and case analysis methods.Most of them only researched for one or several cases and they were lack of a more macroscopic quantitative analysis.What's more, they rarely mentioned the more comprehensive system mechanism innovation either. In view of the above problems, this paper adopts the method of quantifying the case key words, through the quantitative analysis of the typical cases, obtains the important factor that causes the conflict of the garbage incineration power generation project "NIMBY", and puts forward the innovative mechanism to resolve the conflict of "NIMBY" of refuse incineration.

2 NIMBY Event Keyword Analysis

2.1 NIMBY event innovation processing technology

In the past, the basic means of dealing with "NIMBY" event include literature analysis, case reasoning and specific model analysis, compared with the previous qualitative research methods in China, this research is based on the framework of "theoretical research + semantic analysis + case Inference", and comprehensively utilizes web crawler technology. , natural language processing, word segmentation method, theory literature, probability analysis and so on, formed the "NIMBY" event innovation mechanism.

2.2 Keyword capture process

Processing process as shown in the Figure 1, to aim at the more decentralized distribution features of the garbage incineration power generation "NIMBY" event on the Internet, I designed through the link tag on the Internet to crawl the content of the general crawler. According to the crawling and grasping contents of the crawler, the paper makes a double screening and finally obtains the webpage file of the key page with high relevance to the study by the filtering algorithm of HTML structure designed for the text structure. At the same time, using the machine learning of natural language processing (NLP) Technology of Chinese word segmentation, lexical similarity analysis and calculation of the two main analytical methods, combined with artificial assistance analysis, obtained the keywords table of the " NIMBY" event(Zong Huiling, etc.,2017) (table 1).
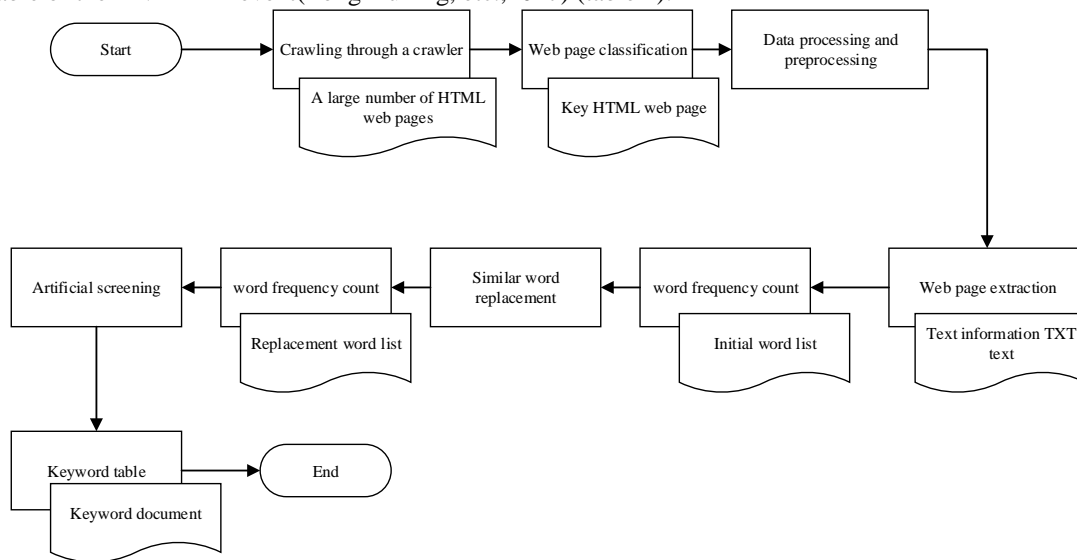
Figure 1   Keyword Processing Process

Table 1   "NIMBY" Event Keywords Table

Keywords table				
Living Garbage	Residents	site selection	Government	Emission standards
Participation	Information disclosure	Supervision	Dioxin	Risk
Pollution	environmental quality assessment	Landfill	Conflict	Opinion
Protest	Compensation	Consultation	Solicit comments	Trust

2.3 Keyword processing results

The key cases were obtained by vectorization of the key words and the corresponding weights, and the table 2is obtained.

Table 2   "NIMBY" Event Case to Quantification

	Living Garbage	Residents	site selection	Government	…	Compensation	Consultation	Solicit comments	Trust
1	0.7455	0.2485	0.0497	0.5964	…	0.0248	0	0	0
2	0.1751	0.0729	0.0145	0.9778	…	0	0	0	0
3	0.4668	0.5189	0.0781	0.6752	…	0.0200	0.0080	0.0060	0.0360
4	0.4319	0.4297	0.3284	0.6637	…	0.0427	0.0045	0.0067	0.0045
5	0.8222	0.2740	0	0.1796	…	0	0.0685	0	0

Continual Table 2

	Living Garbage	Residents	site selection	Government	…	Compensation	Consultation	Solicit comments	Trust
…	…	…	…	…	…	…	…	…	…
24	0.3642	0.2649	0.1986	0.8609	…	0	0	0	0
25	0.6173	0.0809	0.0708	0.7489	…	0	0	0	0
26	0.7287	0.3729	0.0573	0.4992	…	0.0172	0	0	0.0057
27	0.2797	0.2272	0.2272	0.8041	…	0.0174	0	0.5244	0
28	0.6829	0.2897	0	0.6001	…	0	0.0620	0	0

The horizontal expression in the table is the key word of the "NIMBY" event, and the longitudinal word is the proportion of the key word in the corresponding case.

3 Research Methods and Results Analysis

3.1 Entropy value method evaluation model

The entropy method is a method of determining weights according to the difference degree of the index data between each scheme (sample) (Wang Yuan, etc., 2013). If the data of each scheme (sample) is very different, the index's weight is heavy. The projection process is divided into three steps:

The first step is to convert the standard data y_{ij} to a specific gravity P_{ij}.

$$P_{ij} = \frac{y_{ij}}{\sum\limits_{j=1}^{n} y_{ij}}, (i = 1, 2...m; j = 1, 2....n)$$

The second step is to calculate the entropy value of each indicator e_i.

$$e_i = -K \sum\limits_{j=1}^{n} P_{ij} \ln(P_{ij}), (i = 1, 2...m) \text{ (where k=1/lnn)}$$

The third step is to calculate the weight w_i

From the above, the smaller the data difference for indicator i, the greater the e_i is, and the greater the data difference, the smaller the e_i is. On the other hand, if the data of indicator i is large, it indicates that the action of the Scheme (sample) is large and its weight should be larger; on the contrary, the weight should be smaller. Therefore, the weight and the entropy value should be complementary relations, namely

$w_i' = H - e_i$, the full score of the scheme (sample) is the product of the H and the sample size.

Normalized treatment, obtained:

$$w_i = \frac{w_i'}{\sum\limits_{i=1}^{m} w_i'}, (i = 1, 2...m)$$

3.2 Evaluation results analysis

The transverse of the table is the key word of "nimby" event, and the longitudinal is the entropy value of the keyword in the typical case and the weight that is converted according to the entropy value.

Table 3   "NIMBY" Event Keyword Weight Table

Keywords	Trust	Dioxin	Conflict	Solicit comments	Consultation	Compensation	environmental quality assessment	Opinion	Landfill	Supervision
Entropy value	0.1149	0.2155	0.2608	0.2742	0.3363	0.4037	0.6005	0.6624	0.8732	0.8904
Weight	0.0739	0.0714	0.0702	0.0698	0.0683	0.0665	0.0615	0.0599	0.0545	0.0540

Keywords	Protest	Risk	Information disclosure	Participation	Emission standards	site selection	Pollution	Government	Living Garbage	Residents
Entropy value	0.9281	1.1697	1.3131	1.3902	1.3914	1.4102	1.5187	2.0398	2.3639	2.8457
Weight	0.0531	0.0469	0.0432	0.0412	0.0412	0.0407	0.0379	0.0246	0.0163	0.0039

It can be concluded from the data analysis in the table that the key words such as trust, negotiation and compensation(HeYi, Zhao Zhijie,2013, Zhu Yangguang,Yang Jie,Zou Liping,2014, Guan Zai-gao,2010) have a large weight and influence in the "NIMBY" event. However, the key words such as emission standard, site selection and pollution have less weight in the "NIMBY" event and therefore less influence. The two key words, trust and compensation, can be analyzed by natural language technology, which is the key factor of "NIMBY" conflict. In addition, the government, residents of the two representatives of the "NIMBY" event main body of the key word entropy value is larger. It can be inferred that the two are the core of the conflict between "NIMBY"(Gao Jun-bo, etc.,2016). Combined with the above analysis, through the comprehensive inference can be drawn, leading to the "NIMBY" incident, the main reason for the difficult landing of garbage incineration projects is the poor information communication and imbalance of interest distribution caused a public crisis of confidence in the government.

This paper puts forward two mechanism innovations by considering the causes of "NIMBY" and taking full account of the two core subjects of the "NIMBY" incident, in order to avoid the "NIMBY" conflict, to maintain social stability and harmony, and to "NIMBY" as "neighbor benefit".

1) Strengthen the information communication, improve the benefit coordination and consultation democratic mechanism of project argumentation

The government should do a good job in selecting a scientific site, listen to people's opinions in time, do more communication, cooperate more, negotiate more, coordinate the interests of many parties and achieve a win-win situation.

2) Careful planning, improve the multiple compensation guarantee mechanism

The government should adhere to the "who benefits, who compensation" principle, the establishment of a loss quantification system, to achieve accurate compensation, while the establishment of entertainment, capital, medical, ecological compensation mechanism, to make up for the psychological deviation of the people.

4 Conclusion

As a great project of the benefit of the nation, the garbage incineration power generation project has always been plagued by the "NIMBY" incident. To solve the problem of "NIMBY", we should take a new angle to analyze the problem of "NIMBY", and make the "NIMBY"to benefit between neighbors.In this paper, we use the entropy method to analyze the characteristics of the typical cases of Internet crawl, to explore the factors affecting the "NIMBY" problem of the garbage incineration power generation, and propose the innovation mechanism to provide the theoretical basis for the effective decision.

Acknowledgement

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Research on Evaluation Index System for Local Government Debt Risk in China

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Abstract: Local government debt risk is a severe issue in China. By learning and referring from the predecessors in the relevant research, this paper selects first-level indexes and second-level indexes.They can reflect local government debt risk. Then we build the evaluation index system for local government debt risk in China based on analytic hierarchy process (AHP). Adopting the evaluation system, we make an empirical study on the local government debt risk of 15 provinces in China in 2016. Finally, we put forward countermeasures and suggestions.
Key words: Analytic Hierarchy Process (AHP); Local government debt risk; Evaluation index; Region analysis

1 Introduction

In March 2018, the report on the Work of the Government in two sessions of the NPC and CPPCC puts forward preventing and resolving major risk. And the local government debt risk is about preventing and resolving major risks. But China government lacks a comprehensive, systematic and concise evaluation index system for local government debt risk. It needs detailed suggestions and countermeasures forlocal government debt risk.

In the evaluation of local government debt risk, the domestic and foreign academia's dominant practice is to extract the indexes which affects the local debt risk firstly. Some scholars are according to the classification of debt types (XieHong, 2007) or the types of risks (XuLei, LiuXiaochuan, 2018) and so on. In addition, they are likely to adopt objective weighting method to make the conclusions, such as Entropy Valueto. Because it's with strong mathematical theory (Diao Weitao, 2017). But to some extent, that doesn't reflect the importance of the judges on different indexes. In consideration of the disadvantages of the predecessors' methods, the paper eliminates the repetitions or unrepresentative factors, chooses from the causes of local government debt, the source of local government debt repayment and the classification of local government debt risk to establish the evaluation index system.From three dimensions(local economic development, financial situation and debt situation), the system adopts subjective weighting method, analytic hierarchy process(AHP). After that, the paper makes an empirical analysis of 15 provinces in China in 2016 according to the economic regions. Then this paper put forward regional countermeasures and suggestions for the prevention and resolution of local government debt risk. We expect it can provide reference for local governments to carry out local government risk evaluation and prevention.

2 Extraction of the Evaluation Indexes for Local Government Debt Risk in China

2.1 Selection of the factors affecting the local government debt risk

2.1.1 Causes of local government debt

One of the main reasons leadingtodebt is that the local economy needs the support of the local finance, but the financial resources can't support it. So, the local government must raise money, which creates the debt. In other words, the local economy, the government finance and the debt correlate to each other.

2.1.2 Source of repayment of local government debt

The repayment is vital to local government debt. Local finance is a direct source of local government debt payment, so local financial situation has a direct impact on local government debt risk. Besides, the economic development decides the government finance. So, the local economy has an indirect but fundamental effect on the local government debt.

2.1.3 Classification of local government debt risk

Local government debt risk includes scale risk and structural risk. Scale risk refers that local debt is too large to be repaid. Structural risk isn't considered due to the closed statistics. So, local government debt situation has an impact on local government debt risk.

2.1.4 Summary of the Factors Affecting the Local Government Debt Risk

Local economic development and local financial situation negatively affects local government debt risk, while local government debt situation positively affects the debt risk. Therefore, local economic development and local financial situationis extracted as the first level negative indexes, and local government debt situation as the first level positive index.

2.2 Selection of the second level index

2.2.1 Second level indexes to indicate local economic development

When evaluating the current economic development in a regionandcomparing the situation of different religions, real GDP per capita is usually selected as the secondary index to reflect the local economic development, and GDP growth is selected to assess its long-term economic development.

2.2.2 Second level indexes to indicate local financial situation

The paper selects the ratio of financial revenue and expenditure and theelastic coefficient ofgovernment receipts as the second level indexes to indicate local financial situation.The former indicates the current financial situation. The latter reflects the prospect of local financial situation.

2.2.3 Second level indexes to indicate local government debt situation

Debt balance is the direct reflection of the scale of local government debt, so debt per capita is selected as the secondary index. Besides, too much debt is due to the current debt beyond the current government debt paying ability. Therefore, debt-to-GDP and debt-to-government receipts are selected as the second level indexes.

Table 1 Evaluation Index System for Local Government Debt Risk

First-Level index	Second-Level index	Index meaning	Index attribute
Local economic development	Real GDP per capita	Real GDP / Population	Negative
	GDP growth	(Current GDP-Previous GDP) / Previous GDP	Negative
Local financial situation	Ratio of financial revenue and expenditure	Financial revenue / Financial expenditure	Negative
	Elastic coefficient of government receipts	Government receipts growth / GDP growth	Negative
Local government debt situation	Debt-to-GDP	Debt balance / Real GDP	Positive
	Debt per capita	Debt balance / Population	Positive
	Debt-to- government receipts	Debt balance / Government receipts	Positive

3 Construction of the Evaluation Indexes for local government debt risk in China

3.1 Determination of index weight by AHP

In the help of ten professors and government clerks, we assess the index by the following 1-9 scale.

Table 2 T.L. Saaty The Fundamental Scale of Absolute Numbers

Intensity of importance	Definition
1	Equal importance
2	Weak or slight
3	Moderate importance
4	Moderate plus
5	Strong importance
6	Strong plus
7	Very strong or demonstrated importance
8	Very, very strong
9	Extreme importance

3.1.1 Number the index

Number the local economic development as a_1, the local financial situation as a_2, and local the government debt situation as a_3.

3.1.2 Build the judgment matrix

By the evaluation of the indexes from ten professors and government clerks, we build the matrix.

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 1/2 & 1 & 4 \\ 1/3 & 1/4 & 1 \end{bmatrix} \tag{1}$$

3.1.3 Consistency check

It has been calculated that its largest eigenvalue is 3.1078 (i.e. λmax=3.1078).

$$CI = \frac{\lambda max - n}{n-1} = \frac{3.1078 - 3}{3-1} = 0.0593, \ RI = 0.5 \tag{2}$$

$$CR = \frac{CI}{RI} = \frac{0.0593}{0.58} = 0.093 < 0.1 \tag{3}$$

Therefore, the judgment matrix has passed the consistency test.

3.1.4 Calculate the weight by combination weight vector

Finally, by calculation we can know the combination weight vector: ω=(0.622，0.213，0.165)^T. It means that the weight of local economic development is 0.622, the weight of local financial situation is 0.213, and the weight of Local government debt situation is 0.165.

In the same way, we can get the weight of the second level index based on the first level index:

Table 3　Weight of the Evaluation Index

First level index	Weight	Second level index	Weight
Local economic development	0.622	Real GDP per capita	0.87
		GDP growth	0.13
Local financial situation	0.213	Ratio of financial revenue and expenditure	0.657
		Elastic coefficient of government receipts	0.343
Local government debt situation	0.165	Debt-to-GDP	0.21
		Debt per capita	0.66
		Debt-to- government receipts	0.13

3.2 Model synthesis

3.2.1 Model synthesis for first level index

$$A_i = \sum(\omega ij Rij) \tag{4}$$

A_i represents the evaluation result of the i-th first level index, and ω_{ij} represents the weight of the j-th second-level index based on the i-th first-level index, and R_{ij} represents the evaluation result of the j-th second-level index based on the i-th first level index.

3.2.1 Model synthesis for evaluation index system

$$L = \sum(Ai \ \omega i) \tag{5}$$

L represents the evaluation result of local government debt risk, A_i represents the evaluation result of the i-th first-level index, and the ω_i represents the weight of the i-th first-level index.

4 An Empirical Study on the Local Government Debt Risk in China

On the basis of the evaluation index system, 15 provinces in China were selected to access and the initial dates are from *2016 National Fiscal Settlement*.

Since the criteria of each index are different, the evaluation results of the index should be non-dimensionalized. In order to make the data intuitive and easy to read, and to reflect the difference of positive and negative index, the evaluation result of the non-dimensionalized positive index is multiplied by 100, and the negative index is multiplied by -100. The final evaluation results are as shown in the table 4. The result has been ordered from highest risk to lowest and the local government debt risk presents a regional difference, so the paper classifies them into economic divisions to make an empirical study.

Table 4　Evaluation Results of Local Government Debt Risk of 31 Provinces and Cities in China

Provinces or cities	Local economic development	Local financial situation	Local government debt situation	Local government debt risk
Qinghai	-2.45528	2.532237	6.382784	0.065344
Yunnan	-1.90053	-1.65747	4.144268	-0.85136
Heilongjiang	-2.12397	-0.74421	2.486178	-1.0694
Guangxi	-2.29783	-2.35615	2.867291	-1.45801
Sichuan	-2.41543	-2.15988	2.718082	-1.51397

Continual Table 4

Provinces or cities	Local economic development	Local financial situation	Local government debt situation	Local government debt risk
Jiangxi	-2.49158	-1.85085	2.421323	-1.54448
Shanxi	-1.868	-3.7537	1.820106	-1.66111
Jilin	-2.92619	-2.39137	2.795407	-1.86821
Anhui	-2.46078	-4.8036	2.455596	-2.1486
Hubei	-3.24694	-3.08899	2.232846	-2.30913
Liaoning	-4.57914	-3.14657	4.898226	-2.71024
Zhejiang	-4.67694	-6.41738	3.36632	-3.72052
Guangdong	-4.16731	-6.68222	1.778748	-3.72189
Beijing	-5.24151	-5.76139	2.911071	-4.00707
Shanghai	-6.35793	-8.89922	3.753102	-5.23091

The four economic divisions are Eastern China (Beijing, Shanghai, Zhejiang, Guangdong,), Central China (Shanxi, Anhui, Jiangxi, Hubei), Western China (Guangxi, Sichuan, Yunnan, Qinghai), Northeastern China (Liaoning, Jilin, Heilongjiang).The paper takes the average of the evaluation result of provinces to assess the local government debt risk of the economic divisions and calculates their variances. The result is as shown in the table 5.

Table 5   Evaluation Result of Economic Divisions and The Variance

Economic division	Local economic development	Rank	Local financial situation	Rank	Local government debt situation	Rank	Local government debt risk	Rank	Variance	Rank
Eastern China	-4.49	1	-5.12	1	3.06	3	-3.38	4	1.02	4
Central China	-2.55	3	-3.46	2	2.24	4	-1.96	3	0.07	1
Northeastern China	-3.21	2	-2.09	3	3.39	2	-1.88	2	0.45	2
Western China	-2.51	4	-1.81	4	3.81	1	-1.32	1	0.46	3

4.1 Impact of local economic development on local government debt risk

Local economic development is the most vital to the debt risk. We learned that the weight of economic development is the mostwhen calculating it. Additionally, regional rank of local economic development is almost the same as the regional rank of debt risk. So, the impact of economic development is higher.

4.2 Impact of local financial situation on local government debt risk

The weight of local financial situation is far below the economic development and the effect is smaller. It also presents in the comparisons of economic divisions. If a province is well-developed in economy but ignores finance, the debt risk will get higher than others with lower economic development.

4.3 Impact of local government debt situation on local government debt risk

Local government debt has the smallest impact on the local government debt risk. And the debt balance is not related to the debt scale. The weight of local government debt situation is the least, so it has minimal impact on local government debt risk. But it cannot be ignored when it is extreme. Besides, all second-level indexes of local government debt situation adapt debt balance as statistic. But debt balance has nothing to do with the local government debt situation. The debt risk scale refers to the matching degree between the debt and finance or economy. So, borrowing more debt can't be worse.

5 Conclusion

Based on AHP, the paper builds the evaluation system, accesses the risk of 15 provinces in 2016 in China, makes an empirical analysis and draws conclusions and gives suggestions as follows.

5.1 Eastern China

Eastern China has a greatest economy and the lowest debt risk, but the variance is large, indicating that the risk varies greatly in the division, and the development in the region is not balanced.

The eastern region, relying on its great debt-payment base, can continue to expand its debt scale.

But it should care the imbalanced debt risk. It is suggested that the well-developed provinces should help the backward provinces to reduce the debt risk by improving the local economic development.

5.2 Western China

The local government in the west has the least debt (the least debt balance), but the development is backward dueto the inactive economic activityand it can't offer a hunk repayment base for the debt, leading to the relatively-large debt balance. So, local government debt situation and debt risk isterrible.

It is suggested that the western region should focus on economy, attract external population and increase business activities. Besides, if expanding the debt scale to obtain funds is good for economic development, it can increase local government debt with orderly debt management.

5.3 Central China

Local government debt risk and the variance of Central China is both not large. Besides, the local government debt situation is in good condition. Those show that the debt management is reasonable, and debt risk is mainly caused by low level of economic development.

It is recommended that the Central China keep the good debt management and focus on economy. Without improvement in economy, it shouldn't increase the debt balance, otherwise the economic and financial resources will not support the expanded debt scale, leading to increasing the debt risk.

5.4 Northeast China

The debt risk in Northeast China is between Eastern and Central, and the economy is second only to Eastern. But debt situation and financial situation are behind so the finance and debt management need improving. Besides, the variance is big, showing the debt risk and economy are imbalanced.

The local government in Northeast China should focus on debt and financial management, take administrative norms seriously and compile the budget of government debt strictly. Besides, provinces need to help each other, strengthen economic connections, develop together and avoid the debt risk.

Acknowledgement

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Study on the Risk Assessment of Mental Health of Civil Aviation Crew

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Abstract：In flight accident statistics, we find that flight accidents or incidents have been increasing year by year because of aircrew errors. To further improve the current level of aviation safety, the issue of how to overcome and avoid the occurrence of human error of aircrews has become important for all countries in the world. Based on the grounded theory, influencing factors of psychological health risks have been identified. AHP was used to construct the evaluation index system and fuzzy comprehensive evaluation model. Through empirical analysis, the model's scientific and applicability were verified. The results laid the foundation for further research on mental health risk of civil aviation crew, and provided a basis for civil aviation organization to control crew's mental health risk. At the same time, it also helps to improve the quality of work and life of aircrews.
Key words: Civil aviation crew; Mental health risk; Evaluation index; Fuzzy comprehensive evaluation

1 Introduction

According to the flight data statistics, the main cause of the aviation accident has changed from the initial aircraft itself to the factor of adult, and the analysis of the flight accidents in recent years found that the main cause of the accident is closely related to the mental health problems of the crew. For example, the incident in 2015, the main cause of the accident was the suicidal tendencies of the deputy captain, Rupez, who was found to have serious depression and had a strong dependence on the drug. Due to the nature of the work, civil aviation crew faces greater psychological pressure, safety responsibility and mental health risk, which is likely to cause flight safety risk. How to identify and control the psychological health of the crew is attracting more attention from scholars and airlines. Therefore, the construction of the mental health risk assessment model of the civil aviation crew can effectively prevent the risk of mental health of the crew and have certain guiding significance for the effective treatment of mental health problems, thus improving the level of flight safety.

The existing literature shows that many scholars at home and abroad have studied the crew's mental health risk. In the early study of foreign scholars, the factors that could cause mental health risk of pilots were explored: Lazarus (Lazarus, 1976) believed that flight would cause fear of spontaneous combustion, and that pilots were prone to psychological problems if they were not able to respond properly.Strongin (Strongin, 1987) research the phobia of pilots on the basis of the former study and find that it was mainly due to a mental disorder caused by the pilots' failure to adapt well to the environment; the factors affecting the mental health of the pilots were found byRobert Bor (Robert Bor, 2010)， including personality, lifestyle, psychological quality, adaptability, irritable response, and drug dependence. Compared to foreign scholars, domestic scholars started late, and the research in recent years, the results are more prominent, mainly from the personal factors, family factors, organizational factors, social factors and other factors that affect the psychological health of pilots: (Wang Ling , 1998)through the analysis of 115 flight attendants find that there were existed obvious psychological symptoms, and the factors affecting their mental health were: Flying age, working pressure, negative coping style, personality characteristics, physical condition, etc. Ma Wenjie (Ma Wenjie, 2002) analyzed 123 air crew using SCL-90 and 16PF scale to study the general personality characteristics and mental health of the power flight. It was found that age and working age had an impact on the mental health of flight attendants; SuHeng (SuHeng, 2006) found a positive relationship between the mental health of pilots and marriage, and the improvement of the quality of marriage was helpful to improve the mental health of pilots; Lou Zhenshan (Lou Zhenshan, 2009) adopted a self-rating scale to analyzed 428 air crew, the survey was conducted to study the role of life events, self-consistency and congruence and mental health. The research of scholars at home and abroad has great inspiration for this subject, but it can be found that the scholars are mainly studying several specific factors in the dimensions of individual, organization, society and family, but the mental health problem of the crew is a complex problem, and it is the result of the joint action of multidimensional strength. In order to make a comprehensive and in-depth study on the factors that affect the mental health of the crew from the perspective of the whole, it have a great significance to design a set of risk assessment model for the mental health of the crew. This study uses analytic hierarchy process (AHP) combined with fuzzy

comprehensive evaluation, and uses scientific standards and objective data to improve the ability of aviation organization to cope with the mental health risk of aircrew.

2 Factors Affecting Mental Health Risk of Civil Aviation Crew

In recent years, the civil aviation crew has received extensive attention from the society. Many media have carried out extensive reports on it, leaving a rich and traceable information on the Internet. Based on the root theory, the research using open coding, spindle coding, selective coding and saturation test to analyzed the original data on the network. The source of the data is mainly the information network, the civil aviation network, the Chinese civil aviation network and other media. Through the search of "pilot mental health", "air crew mental health", "pilot + risk", "flight attendants + risk" and other key words, a total of 108 data matching this research, total 125842 words.

2.1 Open coding

In order to ensure the objectivity and accuracy of the coding, we should try to summarize the original sentences in the process of labeling and conceptualization. After preliminary integration, 182 related concepts are obtained. After comparative analysis, there are more related words in the concept. In order to make the theory clearer, through the comparison and analysis of the 182 concepts, 53 categories of psychological control tendency, trait anxiety and disguise psychology are obtained according to their relevance.

2.2 Spindle coding

Spindle coding mainly focuses on discovering the relationship between categories, and establishing data association. According to the logic of "phenomenon and its cause, background, intermediary conditions, action and interaction strategies and results", the depth analysis of 53 categories has been carried out and found that there have certain causation, semantic relations, situation relations and process relations among these categories. We categorize these categories according to their relevance and get 19 main categories: work events, industry events, social events and so on.

2.3 Selective coding

Selective coding is to find a core category between categories, and integrate the whole category in a story line way, and form a theory based on this. The core category must be representative, appears repeatedly in the text, and can play an important role to the whole paper. It is found that the occurrence process of mental health risk of civil aviation crew is more consistent with the paradigm of "stress quality interaction model". On this basis, 5 core categories are found, namely stress and emotional events, psychological quality, recognition evaluation, coping style and support system.

Through the saturation test, it is found that, due to the sufficiency and comprehensiveness of the data, there are several new concepts in the saturation test process, but there is no new category and new structural relationship, so the theory is saturated. Finally, we get the mental health risk factors of civil aviation crew as shown in Table 1.

Table 1   Factors Influencing the Mental Health Risk of Civil Aviation Crew

the first level	the second level	the third level
Stress and emotional events	Work events	the nature of work, working environment, job burnout, job characteristics, work behavior, job stress, work intensity, job requirements, job expectations,job satisfaction, working atmosphere
	Industry events	Industry events, trauma events, market environment atmosphere
	Social events	Social events
	Organizational events	Organization management, management mode, organizational justice, management system, punishment system, organization concern and salary system
	Life events	Lifestyle, diet, sleep disorders, family events, life events, physical health and emotional health
Cognitive evaluation	Personality traits	Personality traits
	Personal cognition	Personal cognition
	Emotionalperception	Emotional perception
Coping style	Coping tendency	Coping tendency, social avoidance, social distress and trait coping
	Coping behavior	Coping behavior

Continual Table 1

the first level	the second level	the third level
Psychological quality	Personalbasic situation	Personal skills, age, working experience, education level and position.
	Psychological control tendency	Psychological control tendency, trait anxiety, disguised psychology and risk tolerance.
	Psychological feature	Psychological feature
	Psychological needs	Psychological needs
	Mental disorder	Mental disorder
Support system	Personal support	Interpersonal relationship, self-harmony, self-regulation
	Organizational support	Organizational support, sense of belonging and psychological intervention
	Social support	Passenger feedback, passenger quality, passenger support, cultural support and social cognition
	Family support	Family support, family responsibilities, family emotions, family events and family characteristics

3 Fuzzy Comprehensive Evaluation Method

3.1 Civil aviation crew mental health risk assessment index system

The psychological health risk factors of the civil aviation crew identified by this study are clear, and the evolutionary process of the mental health risk of the civil aviation crew is clearly demonstrated, and the psychological health risk of the civil aviation crew can be effectively judged according to the various influencing factors. Based on the analytic hierarchy process, the index of Table 1 is weighted. At the same time, combined with the expert scoring method, the factors of the mental health risk of civil aviation crew were reported to 10 experts in the field of aviation and risk management. On the basis of consulting the factors affecting the mental health risk of the civil aviation crew, the opinions of the civil aviation crew members' psychological health risk assessment index system are constructed, and then the influence factors are presented according to the expert opinion. The evaluation index is presented in the form of "working environment status", and the "salary system" is presented as "satisfaction of salary system", and "passenger feedback" is presented as "negative feedback rate of passengers". Finally, the evaluation index system of mental health risk of civil aviation crew is constructed, which are divided into three index levels. The first level index number is 5, the two level index number is 19, and the three level index number is 53. Therefore, we get the mental health risk evaluation index system of civil aviation crew shown in Table 2.

Table 2　MentalHealth Risk Assessment Index System for Civil Aviation Crew

Target index	First grade index A	Secondary index C	Tri-grade index D
All Health Risk of Civil Aviation Crew	Stress and emotional events A_1	Work events C_1	Job environment D1, job burnout D2, occupational disease D3, work stress intensity $_{D4}$, job satisfaction D5
		Industry events C_2	The incidence rate of negative industry events $_{D_6}$ trauma events encounter D7, pilots are short of $_{D_8}$, job hopping atmosphere $_{D_9}$
		Social events C_3	Incidence of negative social events $_{D_{10}}$
		Organizational events C_4	Communication barrier $_{D_{11}}$, Sense of organizational justice $_{D_{12}}$, The rationality of the punishment system $_{D_{13}}$, Degree oforganizational care $_{D_{14}}$, Satisfaction of salary system $_{D_{15}}$
		Life events C_5	Law of life $_{D_{16}}$, Sleep disorder $_{D_{17}}$, Incidence of negative family events $_{D_{18}}$, Incidence of negative life events $_{D_{19}}$, Health $_{D_{20}}$
	Cognitive evaluation A_2	Personality traits C_6	Anxiety personality matching degree $_{D_{21}}$
		Personal cognition C_7	Personal cognitive bias $_{D_{22}}$
		Emotional perception C_8	Emotional sensitivity $^{D_{23}}$ Negative tendencies $^{D_{24}}$,

Continual Table 2

Target index	First grade index A	Secondary index C	Tri-grade index D
All Health Risk of Civil Aviation Crew	Coping style A_3	Coping tendency C_9	Social avoidance D_{25}, social distress D_{26}
		Coping behavior C_{10}	Negative coping intensity D_{27}
		Personal basic situation C_{11}	age D_{28}, Working life D_{29}, Degree of Education D_{30}, post D_{31}
	Psychological quality A_4 Continual Table 2	Psychologicalcontrol tendency C_{12}	Negative psychological control tendency D_{31}, Trait anxiety intensity D_{33}, Camouflage psychological intensity D_{34}, Risk toughness D_{35}
		Psychological feature C_{13}	High trait anxiety intensity D_{36}
		Psychological needs C_{14}	Satisfaction degree of psychological demand D_{37}
		Mental disorder C_{15}	Intensity of mental disorder D_{38}
		Personal support C_{16}	Relationship D_{39}, Self-harmony intensity D_{40}
		Organization support C_{17}	Organizational support D_{42}, Sense of belonging D_{43}, Rationality of psychological intervention D_{44}, Passenger negative feedback rate D_{45}, The degree of difficulty of passengers D_{46},
		Social support C_{18}	Cultural binding force D_{47}, Symmetry of information D_{48}
		Family support C_{19}	Family contradiction D_{49}, Stress intensity of family responsibility D_{50}, Family emotional debt intensity D_{51}, Marital satisfaction D_{52}

It can be seen from table 2 that there are more qualitative indicators for the evaluation index system of mental health risk of civil aviation crew, which have obvious fuzzy nature, and the general risk assessment method is difficult to be measured accurately. The fuzzy comprehensive evaluation method can effectively deal with the evaluation problem with the fuzzy property, and can effectively deal with the subjective problems in the evaluation process. Therefore, the fuzzy comprehensive evaluation method is adopted to evaluate the mental health risk of the civil aviation crew.

3.2 Determine the set of evaluation factors

There are 3 levels of mental health risk assessment index system for civil aviation crew, so set up the evaluation factors set: $U = [U_i \quad U_{ii} \quad U_{iii}]$, U_i=[three level indicators,53 factors], U_{ii}=[two level indicators, 19 factors], U_{iii}= [level one index, 5 factors, namely: stress and emotional events, cognitive evaluation, coping style, psychological quality, support system].According to the "high risk", "moderate risk", "mild risk" and "safety", the assessment level of the mental health risk of civil aviation crew is divided into 4 categories, so set the evaluation V={high risk, moderate risk, mild risk, safety}. Qualitative evaluation is used to determine the set of reviews.

3.3 Determine the evaluation set and evaluation criteria

According to the "high risk", "moderate risk", "mild risk" and "safety", the assessment level of the mental health risk of civil aviation crew is divided into 4 categories, so the evaluation set V= {high risk, moderate risk, mild risk, safety}. The method of qualitative evaluation is used to determine the set of comments.

3.4 Determination of weight set and evaluation matrix

According to the index system, we set up the weight set W. A weight vector W_i representing the importance of the factor in the two level index. An expert scoring method is used to determine the set of comments R for each index. 10 experts were asked to evaluate their risk indicators according to their evaluation criteria. After the index is compared in the column that matches the crew's situation, the

number of votes for each evaluation object is summed up by M_{ij}, and the M_{ij} is divided by 10, and M_{ij} is the evaluation membership value of the evaluation object. And i=1, 2, 3... 19, j=1, 2, 3, 4.

Statistics of expert scoring results are made to determine the membership degree of each evaluation factor, and the fuzzy relation matrix of each indicator is constructed with two levels of indicators. That is the fuzzy relation matrix of the I index of the two level index, i=1, 2, 3,... 19.

3.5 Multilevel comprehensive evaluation

Using $B = A \cdot R$ to calculate the membership degree of each index, the mental health risk assessment results of civil aviation crew are determined according to the maximum membership degree principle. Because the mental health risk index system of civil aviation crew contains three levels of indicators, multilevel fuzzy comprehensive evaluation is needed.

(1) First level comprehensive evaluation

The membership degree of the two level evaluation index is expressed by the weight vector of the factors. It represents the lower level index contained in the I index of the two level index relative to its comprehensive operation result. It represents the I index contained in the two level index relative to its weight vector.

$$C_i = W_i \cdot R_i \tag{1}$$

(2) Two level comprehensive evaluation

The result of the comprehensive evaluation of the I element in the expression and index is calculated.

$$A = W_a [C_1 \quad C_2 \quad \cdots\cdots \quad C_k]^T \tag{2}$$

W_a represents the weight vector of the subordinate indicators of a level index relative to its importance.

(3) Three level comprehensive evaluation

The result of fuzzy comprehensive evaluation of target layer is constructed

$$P = W [A_1 \quad A_2 \quad A_3 \quad A_4 \quad A_5]^T \tag{3}$$

According to the principle of maximum membership, the risk state corresponding to the maximum value is the mental health state of the crew.

4 Case Analysis of Mental Health Risk Assessment forCivil Aviation Crew

4.1 Introduction of the basic situation of risk assessment object

SF is a private air freight company, which is a joint venture by a number of companies. It serves the air express transportation industry of a domestic express company, and has a lot of experienced crew. Taking 3 crew members of a unit of SF aviation limited as an example, the mental health risk status of the crew was evaluated. The basic situation of 3 crew members was shown in Table 3, as shown in Table 3.

Table 3   Evaluation of the Basic Situation of the Object

Evaluation Object Number	Post	Age	Working Life	Degreeof Education
1	captain	38	15	graduate
2	copilot	29	3	Junior college
3	trainee	26	2	Undergraduate

4.2 SF airline crew psychological health risk assessment

10 experts in the field of aviation and risk management are invited to evaluate the risk index evaluation criteria for 3 crew members of SF airlines and determine their degree of membership according to the votes of each index. Because of the limit of space, one of them was selected randomly, and the score of his mental health risk assessment index was illustrated in detail, and the final object of the evaluation was taken as an example. For example, 10 experts evaluated "2" "work environment status" indicators, a total of 0 experts selected "high risk", so the score was 0; 3 experts chose "moderate risk", so the score was 0.3; 6 experts chose "mild risk", so the score was 0.6; there were 1 experts choosing "safety". The score was 0.1. The evaluation matrix of "object 2" and "working environment condition" is obtained, and the membership degree of other indicators can be obtained similarly.

4.2.1 Determination evaluation matrix

Based on table 1, a fuzzy relation matrix R is constructed. For example, the fuzzy relation matrix R_1 representing work events contains factors, D_1、D_2、D_3、D_4、D_5, and, according to table 2:

$$R_1 = \begin{bmatrix} 0 & 0.3 & 0.6 & 0.1 \\ 0 & 0.3 & 0.5 & 0.2 \\ 0 & 0.1 & 0.6 & 0.3 \\ 0.1 & 0.7 & 0.2 & 0 \\ 0 & 0.3 & 0.6 & 0.1 \end{bmatrix}$$

Similarly, the fuzzy relational matrix of two indicators and other indicators is constructed. R_2, R_3, R_4,……R_{19}.

4.3 Multilevel comprehensive evaluation

The psychological health risk of crew members of SF airline is evaluated.

According to formula (1-3), we made three level comprehensive evaluation of the psychological health risk of SF company crew.

The final comprehensive evaluation results are as follows:

$$P = W \begin{bmatrix} A_1 & A_2 & A_3 & A_4 & A_5 \end{bmatrix}^T = \begin{bmatrix} 0.02970 & 0.20622 & 0.55583 & 0.21450 \end{bmatrix}$$

That is to say, the psychological health risk assessment results of a SF aircrew "2" are:

Table 5   PsychologicalHealth Risk Assessment Results of SF Airline Crew

Results of mental health risk assessment for civil aviation crew	Evaluation Criterion			
	High risk	Middle risk	Mild risk	Safety
	0.02970	0.20622	0.55583	0.21450

According to the principle of maximum membership, the psychological health risk of crew members is 0.55583, so the risk level is "mild risk".

Similarly, the risk assessment results of the other 2 crew members of a SF airline are obtained respectively, as shown in Table 6:

Table 6   PsychologicalHealth Risk Assessment Results of SF Airline Crew

Evaluation object number	Evaluation Criterion			
	High risk	Middle risk	Mild risk	Safety
①	0.00872	0.31255	0.32229	0.35644
③	0.01288	0.16448	0.35684	0.46580

According to the principle of maximum subordinate degree, the mental health level of the evaluation subjects is "safety" and "safety". SF airlines need to take risk management measures to prevent risks from deteriorating.

5 Conclusion

According to the weight of the mental health risk assessment index of the civil aviation crew and the psychological health risk assessment results of the 3 aircrew of SF airlines, it is found that the most important factors affecting the mental health risk of the crew are mainly focused on the psychological quality, personal support, organizational support, personality traits, coping behavior ， work and family support. Therefore, the center of control of the mental health risk of the civil aviation crew should be placed on the promotion of personal psychological quality, the ability to adapt to the individual's ability to adapt to work and the ability of self-support, to take active intervention measures from the point of organization, to make a reasonable work plan and to reduce the pressure of work.

The main innovation of this study is to analyze the data related to the mental health risk of the crew by using the grounded theory. Based on the stress quality interaction model, the factors affecting the mental health risk of the civil aviation crew are identified. In addition, on the basis of the factors affecting the mental health risk of the civil aviation crew, based on the comprehensive risk management theory, the evaluation index system of the mental health risk of the civil aviation crew is constructed.

This paper uses analytic hierarchy process (AHP) and fuzzy comprehensive evaluation method to evaluate the mental health risk of the civil aviation crew, and makes a comprehensive analysis on the factors that affect the mental health of the crew, and has a comprehensive and thorough research on the factors that affect the mental health of the crew from the overall point of view. At the same time, we explore a more suitable method to study the factors influencing the mental health of crew, and have

more practical significance. Overcoming the drawbacks of subjective assumptions. However, the weight of the mental health risk assessment index of civil aviation crew has not been verified in the study, which can be further studied later.

Acknowledgement

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Financial Market Environment, Enterprise Lifecycle and Inefficiency Investment

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Abstract: Taking the data of small and medium-sized listed companies in China from 2010 to 2014 as the sample, this paper uses the Richardson's model to test how financial market environment affects inefficiency investment of enterprises in different lifecycle phases. The result indicates that: for the whole sample, completing financial market environment has no significant impact on overinvestment and underinvestment; for samples in different lifecycle phases, completing financial market environment will inhibit overinvestment in the introduction, exacerbate overinvestment in growth, exacerbate the underinvestment of growth and decline; with the completing of financial market environment, inefficiency investment will be more serious.
Key words: Financial market environment; Enterprise lifecycle; Inefficiency investment; Overinvestment; Underinvestment

1 Introduction

China has implemented the policy of supply-side structural reform since 2015. This policy focuses on accelerating the reform of the financial system and lifting financial repression, improves the external environment of the enterprise effectively, facilitates the optimal allocation of factors, suppresses inefficient investments, and improves the overall economic level of China. Financial market environment, as an important part of enterprises' external environment, has been confirmed to have a significant impact on investment activities. The financial market environment in China are different among regions (Cai Wenhao et al., 2017). Besides, the survival and development statement of financing subjects vary with financial market environment (Liu Yanhong, 2014). Therefore, the research about how financial market environment influence inefficiency investment is of theoretical and practical significance.

Investment efficiency means that the ratio of the enterprise's achievements to the occupied and consumed resources in investment. It is one of the most important criteria for measuring the rationalization of resource allocation in the enterprise. When the enterprise's the input of resources does not match the output of outcomes, it means inefficient investment—specifically, it could be overinvestment or underinvestment (Garcá Lara, J.M. et al., 2016). As far as the listed companies in our country is concerned, overinvestment and underinvestment are widespread (Huang Xianhuan and Wu Qiusheng, 2017). Enterprises in different lifecycle phases will be different when they are making decisions on management, investment, and financing (Wang Bingcheng, 2011). Besides, investment activities will always coincide with the phase of the enterprise's lifecycle (Yuan Rong, 2016). Xie Peihong and Wang Chunxia (Xie Peihong and Wang Chunxia, 2017) indicated that enterprises' condition of inefficient investment will also vary with the lifecycle phases. Therefore, when researching on inefficient investment, enterprise life cycle must be concerned.

Researches show that the financial market environment could have a significant impact on investment activities in many aspect, and enterprises in different lifecycle phases will be different when it comes to inefficient investment. However, there still lack research about how financial market environment influence inefficient investment, and there is even rare research had lifecycle phases into account. In terms of theoretical significance, the research on how could financial environment influence inefficiency investment from the perspective of the lifecycle could makes up the research gaps about financial environment and inefficient investment, and at the same time enrich the enterprise lifecycle theory. In terms of realistic significance, how could financial environment influence inefficient investment, and what are the differences of its influence in different lifecycle phases? The answers to these questions are of vital importance to policy making, investment decisions, and enterprise management.

2 Literature Review, and Hypotheses

Financial market environment includes the credit institutions, the investment institutions, the

intermediary agencies, the domestic securities market and foreign securities markets.Completing the financial market environment can affect inefficient investment by expanding market capacity and alleviating information asymmetry (Irani M and Oesch D, 2015). As far as expanding market capacity is concerned, for example, the exploration of new modes of investment and financing expands the capacity of financial market. Wang Xiao and Lai Yanyun (Wang Xiao and Lai Yanyun, 2014) got the conclusion that when small and medium-sized enterprises can obtain sufficient funds from the outside, their internal financing motivation will be more weakened. So, multi-dimensional funding could help enterprises to disperse risks. Sheng Shijie (2016) found that with the development of guarantee agencies, the financing difficulties of small and medium-sized enterprises can be effectively alleviated. Wang Yixin (Wang Yixin, 2017) stated that in the background of online finance, the cooperation between online finance and commercial banks could ease the financing difficulties of small and medium-sized enterprises. Besides, according to the effective market theory, we could know that the completing of financial market environment could relieve the information asymmetry between enterprises and investors (Zhang Tiezhu and King Howe, 2017). Xiao Min (Xiao Min, 2014) pointed out that information asymmetry will lead to investors' adverse selection behavior, which makes the enterprise cash flow redundant or insufficient and causes inefficiency investment. Wang Chaoen (Wang Chaoen, 2016) found that there are significant regional differences in investment and financing activities in China, and the completing of financial market is an important factor in the investment and financing activities of enterprises. Based on this, the following assumptions are put forward:

H1: Completing financial market environment can correct inefficient investment.

H1a: Completing financial market environment can inhibit overinvestment.

H2b: Completing financial market environment can alleviate underinvestment.

Scholars began the study on lifecycle from the theory of Haire (Haire, 1959). They studied the enterprise from the perspective of bionics, and came to the conclusion that the process of enterprise development is similar to biological growth. The later researches enriched the concept of the enterprise lifecycle, gradually began to explore the way of dividing the enterprises lifecycle phase, then formed some mainstream theories, like 'three phases', 'four phases' and 'five phases'. Although there is no consensus among scholars about the division of enterprise lifecycle, the methods of division are mainly based on the way how enterprises operate, invest and finance. And it is generally believed that enterprises in different lifecycle phases have differential characteristics (Chen Chen, Li Zhe, Wang Lei, 2016). Domestic scholars usually use the theory of Anthony and Ramesh (Anthony and Ramesh, 1992) or Dickinson (Dickinson, 2011) when they are considering the division of enterprise lifecycle. In order to avoid endogenous problems, we use Dickinson's theory to define the lifecycle phases, divide the whole lifecycle into four phases, as shown in Table 1.

Table 1   the Division of Enterprise Lifecycle

	The sign of cash flow	The sign of investment cash flow	The sign of financing cash flow
Introduction	-	-	+
Growth	+	-	+
Maturity	+	-	-
Decline		others	

Zhu Konglai (Zhu Konglai, 2012) pointed out that the phases of institutional investors' action are often accordant with the phases of enterprise lifecycle. So, the inefficient investment states of enterprises also vary with enterprise lifecycle phases. The causes for this phenomenon are from a number of aspects, current studies tend to focus on the internal factors of the enterprise. For example, Luo Qi and Li Hui (Luo Qi and Li Hui, 2015) proposed that distinct dividend policies may cause diverse inefficient investment states in different enterprise lifecycle phases. Chen Yuan (Chen Yuan, 2015) did a research from the perspective of behavioral economics, and found it that the self-interest of management may also lead to periodic differences on inefficient investment in different lifecycle phases. Financial market environment is one of the most important factors when it comes to external environment of enterprise. However, it is not clear how it influences inefficiency investment in different phases of lifecycle. So, we made the following assumptions.

H2: With the change of lifecycle, financial market environment has different correcting effect on inefficient investment.

H2a: With the change of lifecycle, financial market environment has different inhibiting effect on overinvestment.

H3b: With the change of lifecycle, financial market environment has different exacerbating effect on underinvestment.

3 Experimental Method
3.1 Variable definition
3.1.1 Inefficient investment

This paper quantifies inefficient investment in the basis of Richardson's theory. In this theory, the total investment expenditure of the enterprise is the sum of the investment expenditure of the current project and the investment expenditure of the new projects. And the investment expenditure of the new projects is divided into two parts: the reasonable investment expenditure and the inefficiency investment. Besides, considering that the samples are small and medium size listed companies, their listing conditions are special compared with companies in main board. In order to ensure the robustness of the results of this study, we remove one variable which means companies' listed years. The new model for inefficiency investment is following:

$$Inew_t = \beta_0 + \beta_1 Inew_{t-1} + \beta_2 Growth_{t-1} + \beta_3 Lve_{t-1} + \beta_4 Cash_{t-1} \\ + \beta_5 Size_{t-1} + \beta_6 Ret_{t-1} + \Sigma Year + \Sigma Ind + \varepsilon \tag{1}$$

In this model, investment expenditure（$Inew_t$）is the interpreted variable, and its forecast value is determined by the company's growth, its size and so on. The residual(ε) of this model means inefficient investment. If the residual is positive, it means overinvestment. If the residual is negative, it means underinvestment. In addition, the higher the absolute value of the residual, the more inefficient investment the enterprise is. And the lower the absolute value of residual, the less inefficient investment the enterprise is. Inv_t minus Im_t is $Inew_t$, and it means new investment in the given year. Inv_t is equal to the sum of 'cash payments for the construction of fixed assets, intangible assets and other long-term assets', 'cash paid for purchase and disposal of subsidiaries and other business units', 'cash paid by equity investment' and 'cash paid by bond investment' minus 'net cash recovered from disposal of fixed assets, intangible assets and other long-term assets' in cash flow statement, then divided by total assets at the beginning of the year. Im_t is the ratio of depreciation plus amortization of long-term assets to total assets at the beginning of the year?

3.1.2 Financial market environment

Scholars have different definitions in financial market environment. Zhou Bing (Zhou Bing, 2014) used financial depth to represent financial market environment. Wang Lei (Wang Lei, 2015) defined the financial market environment from three dimensions: financial scale, financial structure and financial efficiency. Wei Chengcheng (Wei Chengcheng, 2017) also defined the financial market environment from three dimensions. It is obvious that the definition dimension of financial market environment is changing from single to pluralistic. Considering the realistic significance of this research, we use China's Provinces Marketization Index Report's way (2016) to define financial market environment. The index defines the financial market environment from five dimensions: the relationship between the government and the market, the development of the non-state economy, the development of the product market, the score of the development degree of the factor market, the development of the market intermediaries and the scoring of the legal system environment. The higher the index, the more perfect the financial market environment.

3.2 Empirical model

According to the hypotheses, the model is following:

$$OverInv_{i,t} = \beta_0 + \beta_1 Financial_t + \beta_2 Growth_{t-1} + \beta_3 Lev_{t-1} \\ + \beta_4 Cash_{t-1} + \beta_5 Size_{t-1} + \beta_6 Ret_{t-1} + \Sigma Year \\ + \Sigma Ind + \varepsilon \tag{2}$$

$$UnderInv_{i,t} = \beta_0 + \beta_1 Financial_t + \beta_2 Growth_{t-1} + \beta_3 Lev_{t-1} \\ + \beta_4 Cash_{t-1} + \beta_5 Size_{t-1} + \beta_6 Ret_{t-1} + \Sigma Year \\ + \Sigma Ind + \varepsilon \tag{3}$$

The definition of the variables in models is shown in Table 2. The formula (2) is used to test hypotheses H1a, H2a, H3a and H4a, and the formula (3) is used to test hypotheses H1b, H2b, H3b and H4b.

Table 2   the Definition of Variables

The types of the variates	Variables	Symbol	Definition
Interpreted variable	Overinvestment	OverInv	The residuals of samples whose residuals are positive in model (1).
	Underinvestment	UnderInv	The residuals' absolute value of samples whose residual are negative in model (1).
Explanatory variable	Financial market environment	Financial	The appropriate index in China's Provinces Marketization Index Report's way (2016).
	Enterprise growth	Growth	Growth rate of main business income.
	Enterprise debt ratios	Lev	Balance sheet.
Control variable	Cash holdings	Cash	The amount of cash at the end of the year /total assets.
	Enterprise scale	Size	Natural logarithm of total assets.
	Stock returns	Ret	Stock return.

3.3 Data source and sample selection

We use the financial data of small and medium enterprise board listed company from 2010 to 2014 as the initial sample, totally including 3349 samples. To ensure the effectiveness of the research, we filtered data in the following ways:(1) rejecting 45 samples which are financial companies;(2) rejecting 35 samples which are marked as ST, *ST and PT companies;(3) rejecting 695 samples which are lack of financial data. And we got 2594 final samples which are shown in table 3.

Table 3   Sample Distribution in Different Lifecycle Phases

Lifecycle phases	Overinvestment		Underinvestment		Total	
	number	ratio	number	ratio	number	ratio
Introduction	173	6.67%	243	9.37%	416	16.04%
Growth	379	14.61%	414	15.96%	793	30.57%
Maturity	321	12.37%	656	25.29%	977	37.66%
Decline	117	4.51%	291	11.22%	408	15.73%
Total sample	990	38.16%	1604	61.84%	2594	100.00%

It can be seen from the table, small and medium size board listed companies at all phases of the lifecycle and the whole sample, underinvestment is more common than overinvestment.

4 Analysis of Empirical Results

4.1 Descriptive statistics

Descriptive statistics of variables in the empirical model are shown in Table 4. The average, standard deviation and extreme difference of the overinvestment group are greater than those of the underinvestment group, and it indicates that the overinvestment situation is more serious than the underinvestment in the sample. The average of the financial market environment group is less than its median, and the standard deviation and the gradation are both large. On the one hand, the financial market environment in China has developed rapidly in recent years. On the other hand, the financial environment in China has a relatively obvious regional imbalance, and most of the small and medium-sized enterprises are in the areas where the financial environment is not superior. Other control variables, which are not the focus of this paper, will not go into details.

Table 4   Descriptive Statistics

Variable	Quantity	Average	Standard deviation	Median	Maximum	Minimum	Extreme difference
OverInv	990	0.17	0.50	0.07	0.00	13.92	13.92
UnderInv	1604	0.08	0.11	0.06	0.00	2.94	2.94
Financial	2594	8.06	1.42	8.31	9.95	-0.30	10.25
Growth	2594	0.36	7.02	0.15	355.60	-0.98	356.58
Lev	2594	0.37	0.20	0.35	2.86	0.01	2.85
Cash	2594	0.24	0.16	0.20	0.93	0.00	0.93
Size	2594	15.72	9.29	20.83	26.65	0.19	26.46
Ret	2594	0.05	0.50	-0.02	3.89	-0.87	4.76

4.2 Regression analysis

In this paper, we went through the regression test to know how financial market environment influences overinvestment and underinvestment in the whole sample and each phases of lifecycle.

Here are the results on regression analysis of overinvestment in table 5. It is obvious that: to introduction, the more complete the financial market environment, the less the degree of overinvestment; to growth period, the more complete the financial market environment, the more serious the degree of overinvestment.

Table 5　Regression Analysis: Overinvestment

Variable	Total Sample	Introduction	Growth	Maturity	Decline
Financial	-0.015	-0.140	0.096	0.051	0.119
	（-0.455）	（-1.702）	(1.791)	(0.969）	（1.199）
Growth	0.006	0.015	-0.018	0.011	0.014
	-0.187	（0.193）	(-0.352)	（0.215）	（0.143）
Lev	-0.027	0.011	0.021	-0.150	-0.087
	（-0.702）	（0.130）	(0.350)	(-2.216)	（-0.790）
Cash	0.05	0.006	-0.02	0.12	0.102
	（1.314）	（0.073）	(-0.041)	（1.870）	（0.947）
Size	-0.099	-0.172	-0.044	-0.113	-0.013
	（-2.778）	（-0.1930）	(-0.782)	（-1.848）	（-0.113）
Ret	0.103	0.156	0.084	0.183	0.069
	（2.995）	（1.776）	(1.552)	（3.316）	（0.651）
Adj-R^2	0.326	0.412	0.258	0.321	-0.201

Here are the results on regression analysis of underinvestment in table 6. It can be seen that the more complete the financial market environment, the more serious the underinvestment in growth and decline. But the completing of financial market environment has no significant influence on other phases.

Table 6　Regression Analysis: Underinvestment

Variable	Total Sample	Introduction	Growth	Maturity	Decline
Financial	-0.015	-0.029	0.086	0.026	0.097
	（-0.455）	（-0.417）	（1.687）	（0.650）	（1.726）
Growth	0.006	-0.047	0.017	-0.011	-0.022
	（0.187）	（-0.730）	（0.347）	（-0.274）	（-0.387）
Lev	-0.027	-0.080	0.171	-0.140	-0.170
	（-0.702）	（-1.217）	（3.374）	（-3.071）	（-2.697）
Cash	0.050	-0.054	0.145	-0.023	-0.015
	（1.314）	（-0.808）	（2.791）	（-0.470）	（-0.230）
Size	-0.099	-0.033	0.050	-0.080	-0.167
	（-2.778）	（-0.477）	（0.905）	（-1.813）	（-2.628）
Ret	0.103	0.085	0.088	0.127	0.193
	（2.995）	（1.280）	（1.640）	（3.071）	（3.133）
Adj-R^2	0.226	-0.306	0.463	0.241	0.329

Generally, in the whole sample and all phases of lifecycle sample, the completing of financial market environment has different influence on overinvestment and underinvestment. Therefore, it is necessary to distinguish the lifecycle phases of the sample and to distinguish whether the sample is overinvestment or underinvestment.

4.3 Robustness check

We used China's Provinces Marketization Index Report's way to define financial market environment in this paper, and there are some other ways to define financial market environment in existing literature. Therefore, we will use the index of China's urban financial ecological environment

evaluation (2013~2014) to measure the financial market environment in 2012 and 2013. And the regression results are basically consistent with the previous ones.

5 Conclusion

Based on the financial data of the CSMAR database of 2010-2014 years' small and medium board listed enterprise, this paper studies the impact of the financial market environment on the inefficiency investment from the perspective of lifecycle. The results show that: (1) to the whole sample, completing the financial market environment has no significant influence on inefficient investment;(2) completing the financial market environment has different influence on overinvestment and underinvestment;(3) completing the financial market environment has significant worsening effect on inefficient investment to small and medium sized enterprises in growth;(4) completing the financial market environment can effectively restrain overinvestment in introduction;(5) completing the financial market environment has significant worsening effect on underinvestment to small and medium sized enterprises in decline.
Based on the conclusion, the following recommendations are made:

(1) Strengthening the governance of the financial market environment. The financial market environment in China is becoming more and more completed, but inefficient investment has not been restrained, there is a significant problem of the mismatch between the supply and demand of financial resources. Therefore, we need to strengthening the governance of the financial market environment, promote the rational allocation of resources, and improve the efficiency of investment.

(2) Pay attention to the economically underdeveloped areas. At present, there is an obvious imbalance on the development of the regional financial market environment in our country, and a considerable number of small and medium-sized board enterprises are in the area where the financial market environment is not superior. The optimization of the financial market environment in these areas can effectively promote the growth of local enterprises and the local economic development.

The limitation of this paper is that there is no agreement has been reached about the methods of dividing the lifecycle of enterprises, the quantitative methods of financial market environment and the inefficiency investment, and this paper fails to exhaust all the means of definition. In addition, limited by data collection, the samples in this paper are only financial data of small and medium size enterprises from 2010 to 2014, which may affect the results of the research.

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Research on the Internal Control Process of Chinese Colleges and Universities under the New Situation: Based on Accounting Practice

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Abstract: Internal control is the administration foundation of administrative institutions. This paper studied five subsystems of college budget, material procurement, monetary control, fixed assets and engineering projects in specific financial control links of colleges and universities. The internal control process of colleges and universities was constructed, and the key control points were summarized. The colleges and universities in the United States, the United Kingdom and China were compared to study the corresponding criteria and performance of internal control construction. The measures for internal control process improvement were proposed in the two dimensions of information disclosure and supervision management.This research aims to provide a feasible scheme for the construction of internal control system in colleges and universities and to provide guidance for effective financial risk avoidance.
Key words: Colleges and universities; Internal control; Control process; Financial risks

1 Introduction

Due to the expansion of autonomy and the increase of funding sources in colleges and universities, there have been frequent illegal and disciplinary violation behaviors in recent years. Colleges and Universities are the main institutions of national talent training, academic research and social service. In order to improve the operational efficiency of teaching and scientific research, ensure the safety and integrity of its property, and effective anti-corruption, the policies on regulating the internal control of colleges and universities have been published in succession. In 2014, the Ministry of Finance promulgated the Standard of Internal Control of Administrative Institutions, which defined the goals of internal control in colleges and universities, and opened the prelude to internal control system construction in colleges and universities. In 2016, the Ministry of Education formulated the Guidance to the Internal Control of Economic Activities in Colleges and Universities Directly under the Ministry of Education, emphasizing the main tasks of internal control in colleges and universities (Liu Ningbo, 2017) and pointing out the direction for perfecting the internal control system. Therefore, it is imperative for colleges and universities to strengthen the construction of internal control and carry out relevant research on financial internal control process.

At present, many scholars have carried out the research on internal control in colleges and universities. Daniel explored to relieve the benefit distribution contradiction between the internal control degree in colleges and universities and the use efficiency of financial allocations by establishing effective internal control standard (Daniel, 2005). Wang Weixing tried to construct the evaluation index system of internal control in colleges and universities, and established a fuzzy comprehensive evaluation mathematical model (Wang Weixing, 2008). David believed that including university internal control into cloud computing strategy helped to improve college budget control (David, 2010). Based on previous research, this paper studied five subsystems of college monetary control, budget, material procurement, fixed assets and engineering projects in specific financial control links of colleges and universities. The colleges and universities in the United States, the United Kingdom and China were compared to study the corresponding criteria and performance of internal control construction. This research results are expected to provide guidance for effective financial risk avoidance, improve their financial performance and implement the national policies.

2 Internal Control Process in Colleges and Universities

2.1 Budget internal control process

Budget preparation and approval. Budget preparation is the basis of budget control (Qiao Chunhua, 2015), and should follow the principle of "keeping expenditures within the limits of income and balance between income and expenditure". Budget approval is based on a clear post division. The examiners should carry out the examination and approval within the limits of their respective powers and shall not exceed their authority. The process is shown in Figure 2.

Budget implementation. The monthly financial allocation plan submitted by the second-level units should be strictly checked for the examination and approval procedures. A periodic reporting system is required in budget implementation. Each unit responsible for budget should follow up the budget implementation in time, analyze the existing problems according to the difference between budget and practice, and take active remedial measures.

Budget adjustment. The budget adjustment shall be approved by the principal office in accordance with the original budget approval procedure. Other departments shall make the decision of reducing or increasing the expenditure within their authority.

Budget supervision. The financial department should audit the implementation of the school budget at all levels, and include the results of budget income and expenditure audit and assessment into the annual assessment of responsible persons at all levels. The flow chart of internal budget control is shown in Figure 1.
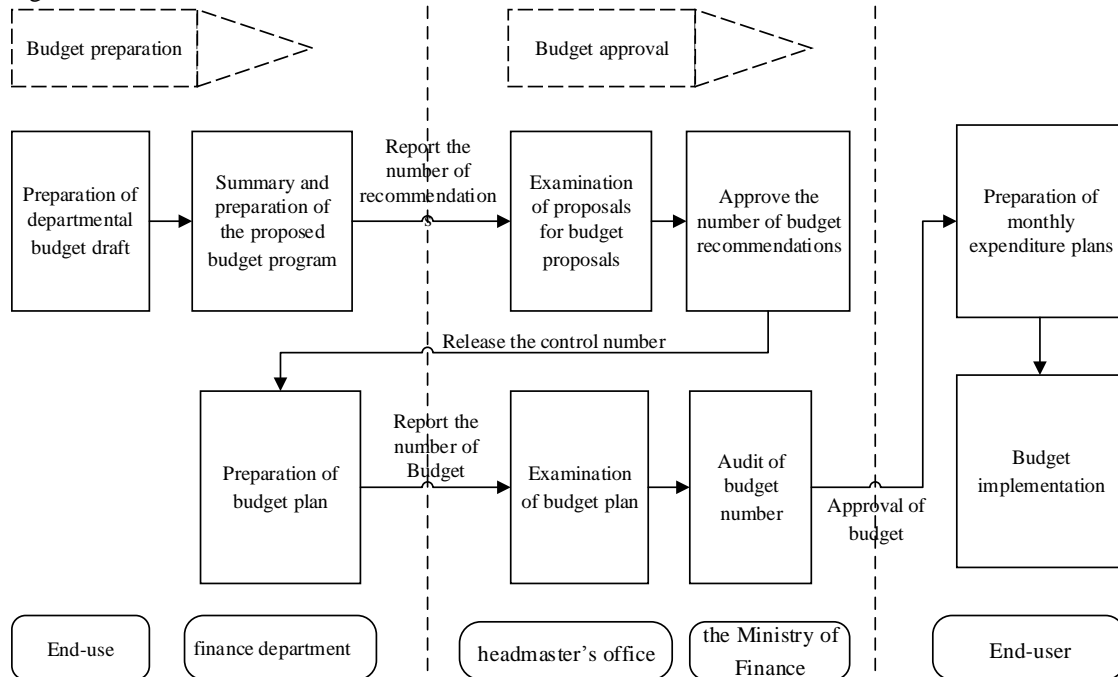
Figure 1   Flow Chart of Internal Budget Control

2.2 Control process of material purchase

Post setting. Colleges and universities should set a special purchasing management organization or a management department to unify the management of material procurement business and improve the professional performance of the business (Zhang Zhaoxu, 2012). The post responsibility system is implemented, and the duties and powers of incompatible posts are separated. The personnel in the posts of purchasing budget approval, procurement execution, acceptance, contract management and payment perform theirduties, coordination, constraints and supervision.

Purchase approval. The use department and other relevant departments fill out the requisition according to the purchasing budget and actual demand. The purchasing department compiles the requisition and approves the purchase list. The hierarchical examination and approval system is adopted. The authority is granted according to the purchase amount to approve the funds, define the responsibility of the personnel at all levels, and ensure the safety of fund use.

Purchasing by invitation. The centralized purchasing mainly adopts public bidding, invitation bidding, competitive negotiation, inquiry and single-source procurement, among which public bidding is the main method. The colleges and universities should ensure that the bidding process is fair and prevent corruption by establishing the bidding committee and reasonably determining the pricing mechanism and the bid evaluation method and the information disclosure. See Figure 3 for detailed process.

Purchase acceptance. The receiving department shall control both the quality and quantity of the goods, accept the goods independently according to the contract requirements and issue acceptance documents or inspection reports. State-approved quality inspection agencies should be invited to participate in the acceptance process of large-scale purchase projects.

Payment approval. The finance department shall review the authenticity, validity and validity of contracts, purchase invoices, acceptance documents and other relevant documents, and pay the goods strictly in accordance with the cash management regulations. For large advance payments, tracking of procurement payments should be strengthened and final verification should be conducted on a regular basis. When there isabnormal money is, timely measures should be taken to recover the funds to avoid loss. The flow chart of internal control for material procurement is shown in Figure 2.
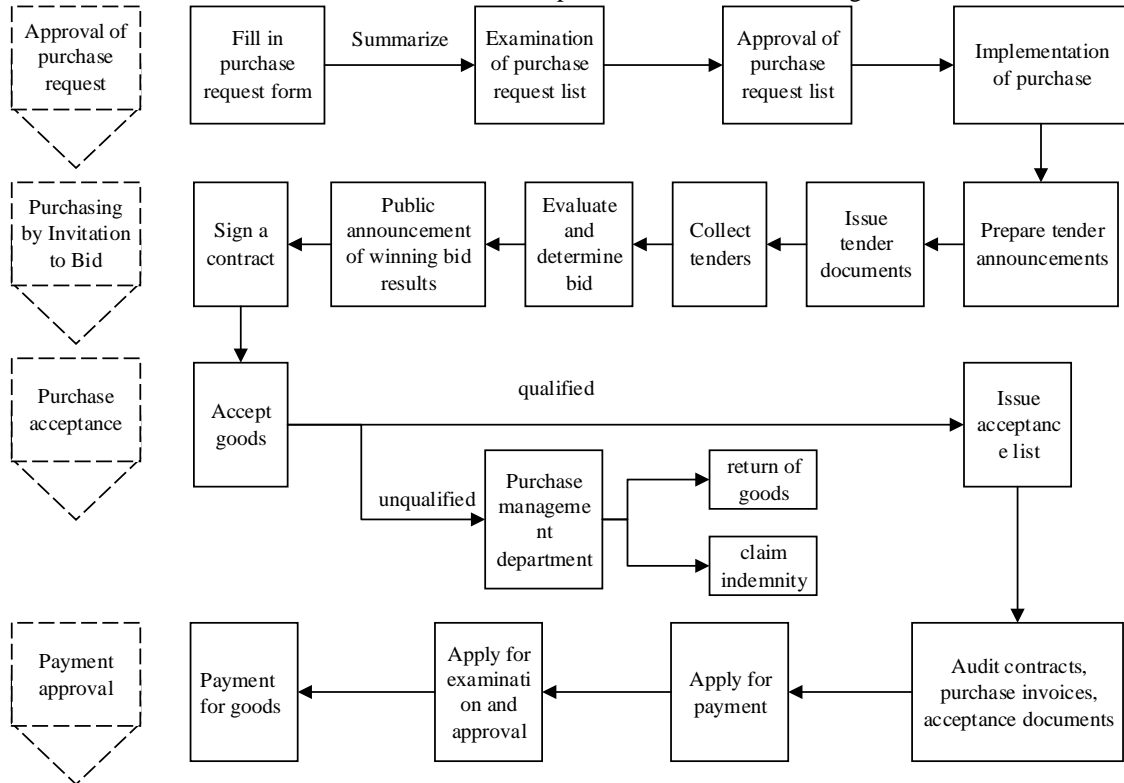
Figure 1   Flow Chart of Internal Control for Material Procurement

2.3 Internal control process of monetary capital

Application and approval. When handling cash business, relevant departments or individuals should submit the fund receipt and payment application to the approver in advance, indicate the amount, use approachand time, and show the valid economic contract or the related original certificate. The approver examines and approves the receipt and payment applications according to authorization. Collective decision-making and approval shall be carried out for matters belonging to "Three-Importance's& One-Large" system.

Receipt and payment review. According to the subordinate relation of the internal level in colleges and universities, review can be divided into longitudinal review and horizontal review. The former refers to the superior's review of subordinate activities, and the latter refers to the cross-review of persons with equal or no superior or subordinate relation. When reviewing the approved receipt and payment application, the reviewer shall review whether the scope of approval is correct and whether the receipt and payment business is true and legal. The cashier shall complete the receipt and payment formalities and register the cash and bank deposit journal for correct receipt and payment after review.

Account registration and check. The cashier registers a journal according to the receipt and payment voucher. The accountant registers the detailed ledger according to the relevant voucher. The competent accountant registers the general ledger after review. The auditor shall carry out account-voucher check, account-account check, account-chart check and account-actual amount check at the end of each month.

Cash counting. The cashier summarizes the economic operations of the day, settles the book balance of cash and reconciles it with the physical count. If the actual cash is below the stock limit, cash should be replenished in time. Otherwise, the excess part will be deposited in the bank.

Note and seal management. Colleges and universities should make clear the procedures and duties of purchase, custody and use of bills, register records in a timely manner, and avoid false transactions of blank bills. The principle of separation of incompatible duties should be adhered to in seal custody. It should be strictly prohibited for a single person to keep the seal relating to the payment business (Zhao Zhihong, 2014). Seal and blank bill should be kept separately. The Flow Chart of Internal Control of Monetary Funds is shown in Figure 3.
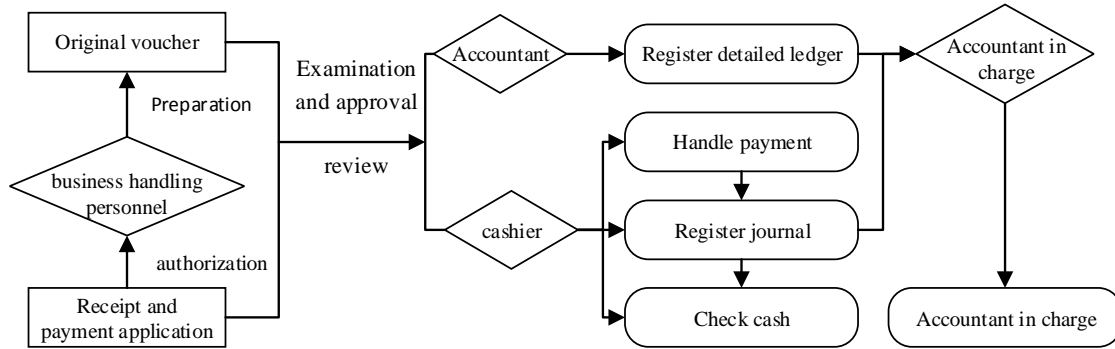
Figure 2   Flow Chart of Internal Control of Monetary Funds

2.4 Internal control process of fixed assets

The fixed assets of colleges and universities refer to the assets with the unit value above the prescribed standard, the original material form of which is kept originally and the service life is longer than one year.The construction of internal control process of fixed assets is one of the key internal control in colleges and universities. In order to ensure the safety and integrity of fixed assets, the following control points should be grasped, as shown in Table 1.

Table 1   Key Control Points of Fixed Assets

Key control points	Specific contents
Budget control	Each end-user should prepare an asset acquisition budget after considering the asset stock, demand and acquisition standards. Personnel accountability should be implemented. The relevant budget personnel should be responsible for missing items, wrong items and other abnormal problems affecting the process of fixed asset acquisition in budget preparation.
Delivery and acceptance	The capital construction, asset management, user units and other related departments implement the acceptance and review the quality and quantity of fixed assets.
Receiving management	Colleges and universities should perfect the fixed assets account book registration system and card account, register the receiving behavior in time, ensure that the asset account, and realize the dynamic management of the fixed assets. In the case ofany loss or damage, the recipient shall be held liable for compensation in accordance with the corresponding system.
Periodic inventory	Colleges and universities should establish and improve the periodic fixed assets inventory system, grasp the use of assets in time, avoid the damage and loss of fixed assets, and ensure the integrity and safety of fixed assets.
Scrap disposal	When the fixed assets are scrapped, the "fixed assets scrapping form" should be filled in, and the use of the fixed assets and the reasons for the abandonment should be explained. The asset management department clears the fixed assets according to the approval result and cancels the fixed assets card account.

2.5 Internal control process of engineering project

Project decision making. Firstly, the engineering project planning is generally compiled by the investor or the capital construction departments. Secondly, the finance department proves the feasibility and necessity of the project planning based on the quantitative and qualitative dimensions, issues the feasibility report, and finally implements the collective decision.

Budget control. The professional staffs of the capital construction department and the finance department of colleges and universities should strictly examine the preliminary planning and budget estimates of the engineering projects, particularly whether the compilation basis, project contents and quota application are true, scientific and reasonable. The amount of project investment shall not wantonly exceed the approved project estimate. If adjustment is required, it shall be submitted for

approval according to regulations.

Engineering project tender. Colleges and universities should adopt public bidding to select the units of investigation, design and construction of engineering projects, and employ professional evaluation organizations to evaluate the bids and prevent unreasonable winning bids.

Engineering construction. The financial departments of colleges and universities should strengthen the control of project progress payments and implement the system of "two pens" countersigning for payment of project funds (Niu Yanfen, 2011). The capital construction department shall regularly submit the project schedule and project price settlement statement. After the budget personnel, the capital construction department and the project price payment examiner have examined and approved the project price payment, the financial department shall further check the settlement information.

Completion and acceptance. After project acceptance, colleges and universities should complete the final accounts according to the prescribed time limit, organize the final accounts audit, and evaluate the project value after completioning of the project. The Flow Chart of Internal Control for Engineering Project is shown in Figure 4.
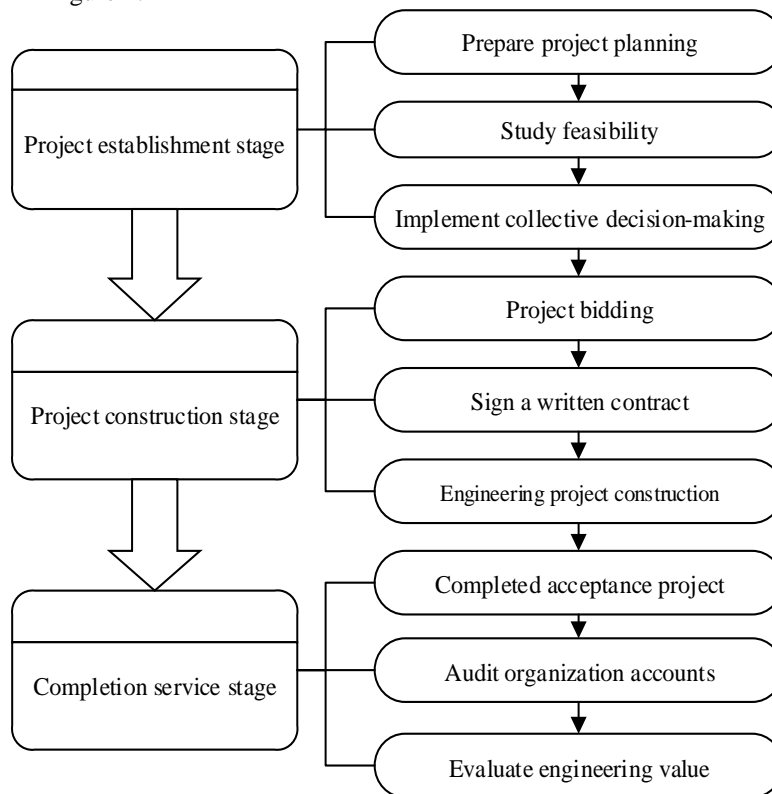
Figure 3   Flow Chart of Internal Control for Engineering Project

3 Comparison of Internal Control in China, the United Kingdom and the United States

In this paper, the internal control guidelines published by Oxford University, Harvard University and Peking University on their websites were taken as the samples. Limited by the availability of information, comparison is only made in three aspects: capital supervision, budget and fixed assets. It is found that standardized internal control process and effective implementation mechanism have been established in the developed countries with relatively perfect internal governance structures such as the United Kingdom and the United States, and they have relatively perfect internal governance structures. Sound performance appraisal system or risk management has not been established in Chinese colleges and universities. There are still some problems such as unclear division of labor and ambiguous power and responsibility in various functional departments.Detailed comparison is given in Table 2.

Table 2   Comparison of Specific Internal Control Regulations

Specific regulations	Oxford University	Harvard University	Peking University
Monetary fund control	Budget Subcommittee of the Planning and Resource Allocation Committee will receive and keep under review the five-year plans of income, expenditure and capital commitments for the University Administration and Services and the Academic Services and University Collections division	Schools must regularly monitor the fees for restricted funds. School supervision using the centralized approval model shall include analytical reviews; the use of a decentralized approval model shall also include transaction sampling.	Whenever a large amount of money is involved, the financial officer should handle it according to the specific approval content within the duty scope.
Expenditure budget	Every instance in which a budgetary unit is allowed materially to exceed its budget must be reported to the next meeting of PRAC by the parent body or by the relevant divisional board.	OSP implements cost management in accordance with the cost management principle and divides the budget for project scientific research into direct costs and indirect costs.	Under the leadership of the principal in charge, the Finance Department is responsible for supervising and controlling the implementation of budgets at all levels of the school and reporting budget execution to leaders at all levels on time.
Fixed asset	The purchase, leasing, or sale of all real property owned or leased by the University, which is not held as an investment, must be authorized by PRAC.	When the loan term of a componentized building is required, it shall be ensured that the loan term does not exceed the weighted average service life of all components in the project.	At the end of each year of fixed assets, the equipment management department, the financial department, and the use department must jointly conduct an inventory, so that accounts, materials, cards, and fund can be matched.

4 Suggestions and Enlightenment for Chinese Colleges and Universities

Information publicity is not only an important measure to promote colleges and universities to run schools and manage financial affairs according to law, but also a major way to promote the openness and transparency of the fund use and management in colleges and universities. Firstly, the information communication channels in colleges and universities should be perfected. Although many colleges and universities have set up the open information network for the public, it is virtually empty because of its selective publicity. Colleges and universities should further refine their active open scope and increase information disclosure in areas such as recruitment, finance and infrastructure so as to realize open operation and eliminate corruption. Secondly, the information communication platform should be established in colleges and universities, and the cooperation mechanism of each department should be perfected (Wang Chunjv, 2016),to solve the problems of self-made system in each department, realize the information exchange and sharing (Xi Zunxiao, 2010), and improve the operation efficiency.

Chinese colleges and universities lack the examination on budget implementation and benefit investment. There is the problem of insufficient risk management (Liu Gang, 2018). Therefore, colleges and universities should refine the performance evaluation index system (Yan Meirong, 2016) and set up a risk assessment team to analyze the risk points in each process and post, formulate risk countermeasures, and pay attention to scientific and effective resource management. For example, colleges and universities can set performance indicators of expenditure on funds, evaluate the

effectiveness of budget control, give material rewards to schools that have excellent performance in fund management, and encourage them to invest in the teaching staffs and the construction of educational resources. Meanwhile, the risks of expenditure activities should be evaluated systematically and objectively evaluated, and corrective measures and suggestions should be put forward.

5 Conclusion

Based on the theoretical basis of internal control, this paper summarized the internal control process for monetary fund supervision, fund budget, material purchase, fixed assets and engineering project in colleges and universities. The key control points weredivided reasonably to provide a feasible scheme for the construction of internal control system in colleges and universities. According to the comparative results of the specific internal control regulations in three universities of Oxford University, Harvard University and Peking University, this paper puts forward the countermeasures of strengthening the disclosure of information, perfecting the risk management and enhancing the performance appraisal system in Chinese colleges and universities so as to improve the efficiency and effectiveness of internal control. However, there are still some limitations in this paper. Due to difference in scale, specialty and system background of each university, the universality of the internal control process constructed in this paper is unknown. Therefore, colleges and universities are suggested to further explore their own particularities. In addition, limited by the availability of information, this paper only studied the construction of internal control processes in five aspects: capital supervision, budget, material procurement, fixed assets, and engineering projects, and the involved scope is relatively narrow. Other researchers can further explore the basis of this research.

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Research on the Process of Risk Management in College Students' Affair

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Abstract: Introducing the risk management into the college students' affair department has become an important method. In the process of students' affair risk management, ideological guidance has its value in colleges and it should be emphasized and studied in the management of students' work risk. In the management of students' affair risk in colleges, it is necessary to give full information for ideological guidance in stage of the risk of pre-treatment; to clarify the misunderstanding on the matterin stage ofRisk management stage; to rehabilitate the emotion and to risk re-education in the stage of risk management later.

Key words: Students affair; Risk management; Ideological guidance; College students

1 Introduction

In recent years, college students have frequent emergencies, which have taken great challenges to college students' affair. Introducing the risk management into the college students' affair department has become an important method.

Inabroad, Entering the 1990s, systematic security and non-traditional security theory emerged(Siegel D,1991). Crisis management began to enter the field of public administration and entered the campus. As the development of the event is a dynamic process, and the development of the situation is constantly affected by the internal and external environment (Landman, 2015). More and more attention is paid to the early warning of emergencies (Garc á J P, 2005). The management scholar proposed the crisis life cycle theory, that is, the crisis factor from emergence to the end of the process of the emergence of different life characteristics, such as the birth, growth, maturity to death of the biological process.Robert Heath proposed the "4R pattern" of crisis management (including Reduction, Ready, Response, and Recovery). As the development of the event is a dynamic process, and the development of the situation is constantly affected by the internal and external environment, and the development of the event affects the internal and external environment constantly, so the emergency manager of the university should not only input the historical information to the system, but also constantly input the updated real-time information to the system (Silverman,2014).

On the domestic research, students' affair risk management started earlier than in China.The awareness of early warning is insufficient, and the passivity is strong. The early warning plan is the main content of early-warning management, and the early warning lacks scientific guidance.The goal is to control the development of emergency, and to prevent and eliminate the occurrence of emergencies as much as possible and try to minimize the risk of sudden events on people and property. The management scholar briefly summarized the university student group emergency management mechanism as "three stages" and "four mechanisms"(Qiu Kai, 2007). The "three stages" concretely refer to three stages, namely, the pre-management stage, the event management stage and the post management stage. The "four mechanisms" refer to four mechanisms of early warning mechanism, evaluation mechanism, processing mechanism and feedback mechanism.

At home, the present situation of the early warning research of mass emergency in Colleges and universities is that the awareness of early warning is insufficient and the passivity is strong, and the early warning plan is the main content of early warning management, and the early warning is lack of scientific method guidance. The contingencies plan for unexpected incidents in Colleges and universities is an important part of the early warning mechanism. The goal is to control the development of emergency, and to prevent and eliminate the occurrence of emergencies as much as possibleand try to minimize the risk of sudden events on people and property. Aboveall, ideologicalguidance has its valuein the process of setting up students' affair's risk management (Zhang Yaocan, 2006). The process of students' affair's risk management should be divided into three stages: the early stages of risk management, the current period of risk management and the later stages of risk management (Tang Jun, 2010), as it's shown in Figure1.The basic functions of the early warning system of University emergencies can be reduced to monitoring function, information analysis function, preventive function

and communication function.
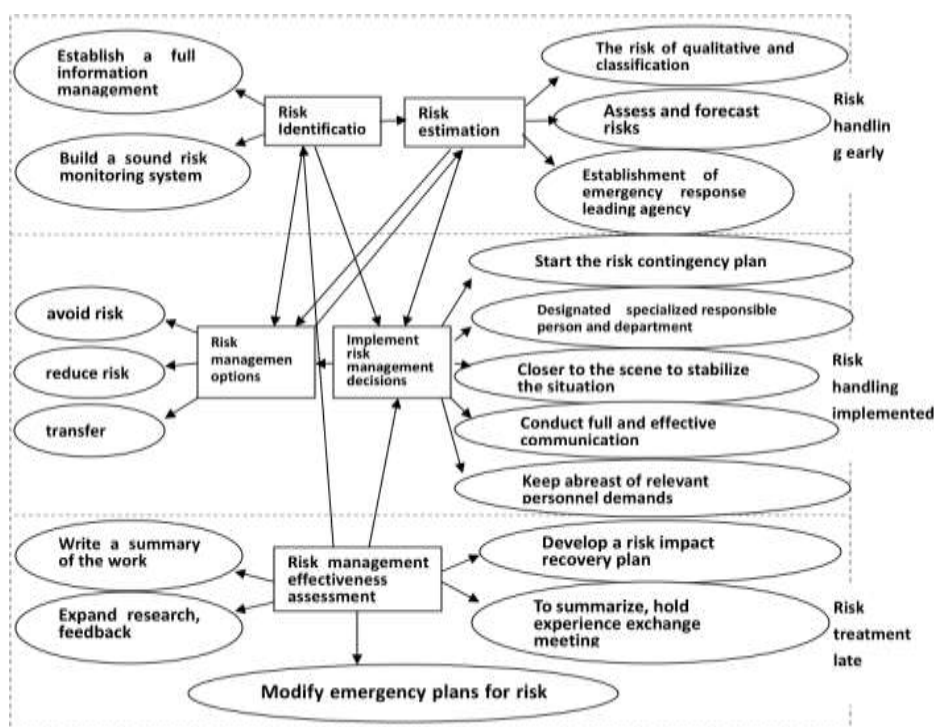
Figure 1   College Students'Affair Risk Management Stage

2 The Function of Ideological Guidance in the Stages of Risk of Pre-treatment

In the stages of risk of pre-treatment, the main tasks are identification and estimation. The objective is to minimize or eliminate the possibility of risks. The measures mainly include actively prevent, eliminate incentives, intervene early, persist in persuasion and so on.Pre-risk management, including risk identification, risk assessment. At this stage, the core element of student affair risk control is the control and management of information and information, which are important tasks of this class. At this stage, focusing on the core element is information. Ideological guidance should focus on information (Dance R, 2014).

2.1 Information collection

Educators can effectively collect and control student thoughts and behavior and other information, and identify risks based on the information. In the field of Ideological guidance, thoughts and behaviors are the most important category. The occurrence and development of social events can lead to the change of students' thinking, and the thoughts and behaviors transform into each other. The daily ideological guidance workers in colleges, including counselors and class teachers, have the most contact with students and are most familiar with the students 'living conditions. They can detect the students' various ideological fluctuations in time and observe the behavior changes of students (Zhang Yaocan, 2006).

In practice, in the students' affair risk management system of colleges, counselors contacting with students are regarded as the based organizations. Including the establishment of daily Ideological guidance risk awareness, enhance risk identification capabilities, smooth its risk communication channels, standardize the operation of communication standards and processes. Relying on professionalism and skills, educators often timely and effectively collect information. Counselors and class teachers, in a broad and intimate contact with students, can grasp the student's ideological trends, timely detection risk and hidden dangers. Especially with the development of the wireless network, the use of big data collection advantages, timely capture of information to make predictions. Risks should be promptly notified, so early warning, standardized forecast, in order to promptly take emergency measures.

2.2 To resolve potential risks

In the stages of risk of pre-treatment, we should make full use of the leading role of Ideological

guidance to guide the values of college students, to avoid the drastic fluctuations of thoughts and emotions, effectively to prevent the occurrence of incidents situation. Students' affair risk is usually manifested from the students' tiny thoughts and behaviors, and then brought together into larger contradictions and conflicts, resulting in adverse effects.

In the face of external difficulties and internal confusion, counselors and class teachers,who is supported by the specialized knowledge system of the Ideological guidance, can find out in time and resolve the students' ideological confusion. Students should be encouraged to cultivate correct values in all kinds of contradictions and conflicts. In the end, students should not be confused by external thoughts, not under the control of your own passion, and learn how to deal with things correctly. In this way, ideological guidance has the function of further evolution to solve potential risks and avoid causing crises, in the stages of risk of pre-treatment.

In practice, the students' affair should be treated according to the institution, which is the best way to prevent crisis. Specific methods to implement function are to develop and implement risk management training programs for front-line educators, to improve the awareness of risk prevention, to learn theory both the risk management and ideological guidance. Educators should be encouraged to using methods, such as listening, career planning, psychological interview and counseling and so on. It can broaden students' vision, regulate their emotions, and guide students to change their behaviors.In this way, ideological guidance makes true of functional implementation on enhancing students' subjective judgement of potential risks and increasing their confidence in resolving potential risks. It is necessary to establish an information notification system and early warning system, including the type of information to be notified, the requirements for communication of different risk levels, the notification feedback process, etc... If there is sufficient awareness of early warning, there are certain ways to prevent risks and a more complete early warning system, the risk of occurrence will be greatly reduced.

3 The Function of Ideological Guidance in Stage of Risk Management Stage

In stage of risk management stage, the main task is the disposition, including risk management and risk management decision-making. The objective is to minimize the risk possible hazards. The measures mainly include process management, coordination and communication, situation circular and so on. Once a risk event occurs, it promptly initiates the plan and adopts a risk control strategy. The aim of this stage is to increase the capacity in the operation and the handling of events for the risk management organization. Ideological guidance should focus on the following functions in stage of Risk management stage.

3.1 Unifying thought

Ideological guidance can produce the unity ideas of students' affair risk management, to improving efficiency and effectiveness crisis management. It has different opinions on the analysis of risk management and the choice of tactics on usual. The disunity of thinking is the most unfavorable to achieving the objective of students' affair risk management. To realize the expected effect of risk management, we must enhance the thought unity in the process of risk management. In the risk event, colleges must start-up risk controls, enhance the thought unity bothrisk managers and object. In this process, it must stimulate their subjective consciousness to achieve risk management's aims. At the same time, the unification of ideas is also the essential function of ideological guidance (Z Christian Uhr, 2008). Another way of saying is that the management of students' affair risk in colleges is the function of the subject of Ideological guidance,in stage of risk management stage.

In practice, it must clear and clarify aims at students' affair risk managementin three groups of groups which are includingcommand layer, executive layer and management object. In this way, command layer, executive layer and management object control object could unity ideasfor crisis management. On the base of the risk assessment, the command layer must make clear the general objective and formulate a scheme of the students' affair risk management. At the same time, to prompt the publicity must be taking by means of conferencing or instant messaging to facilitate the risk management, in order tounify participants' thinking. The executive layers have duty on makingaimknown and clarify to participants, taking part instudents' affair risk management while using the method of target analysis. The risk management aimstoset the basis for all their actions, in order to deal with all the circumstances in the risk. If all the executive layers would work together on the same aim, it will be on optimal state. On the layer of management object, all the participants need to do a good job propaganda and explanation of risk management aims, strive for the spread of the crisis and

may affect the group's understanding, won the support of public opinion, and create a good external environment for risk management.

3.2Psychological counseling and humanistic care

The psychological counseling and humanistic care is the main function of Ideological guidance. It can effectively arouse the awareness of students to participant into students' affair risk management, which could maximize the effectiveness of risk management. Ideological guide is good at psychological counseling and humanistic care,compared with students' affair risk management. In the students' affair risk management, the students'behavioris usually limited by the rule, accompanied by passive attitude. At this situation, it failed to get the understanding and recognition of students at all. To a certain extent, it would be a new hidden danger. At the same time, Ideological guidance use psychological counseling and humanistic care to calm down negative emotion and to solve various conflict and perplexity, so that the students are cultivated morality and values advocated by the state.

In practice, the ideological guidance must pay attention to "Soothing" and "guiding" two links. "Soothing" refers to psychological counseling and humanistic care, through the appropriate way to make the target more objectively aware of their selves feeling. Firstly, Ideological guidance needs to make students' emotions tend to be rational peace and mental state in crisis by the way of conversations face to face. Students would have intensive experience that there is someone understood and care for his or her feeling. Once students get the belief that more than one solution to difficulties and problems in the crisis,students could return to calmness and reason. "Guide" refers to guide and inspire methods, in order totransmittingthe positive value to students. Ideological guidance workers focus on guiding students in crisis, try to clarify and adopt reasonable ways to deal with the plight and give support to making students out of the crisis.Through the organic combination of "Soothing" and "guiding" two links, the students in the crisis can be transformed in a thoughtful way, form the correct world outlook, outlook on life and values, and reach consensus on the concepts and goals with students'affair risk management workers. Fundamentally, it can work by students'affair risk managementon the side of ideology root.

4 The Function of Ideological Guidance in the Later Stages of Risk Management

In the later stage of risk management, the main task is the evaluation of risk management effectiveness. The objective is to recovery after a risk event. The measures mainly include psychological comfort, material remediation, feedback and so on. In the later stage of risk management, colleges must take the measures of assessing the effectiveness of students'affair risk management, formulate the risk impact recovery plan, evaluate the effect, and summarize the experience to correct the contingency plans for risk events to provide reference for future risk management and decision-making and improvement of management. At this stage, risk control mainly focuses on the recovery after the risk, Ideological guidance should focus on the following functions.

4.1Emotional recovery

Colleges should focus on giving full play to the repairing function of Ideological guidance in the later stage of risk management of students' affair and do a good job in the emotional repair work of people involved in crisis events. In the later stage of risk management, it is relatively easy to repair the physical loss. However, the crisis events often make students and college workers and teachers psychological trauma, resulting in the deviation of normal behavior. For psychological rehabilitation work, colleges should actively carry out Ideological guidance, with particular emphasis on restoring the psychological trauma of direct impactors, adjusting the mood swings of related objects and eliminating the psychological negative effects caused by the risk treatment to the greatest extent.

In practice, emotional repair requires educators pay attention to those, who were directly affected and who were involved. Ideological guidance workers should take the initiative to psychological impact of risk on the parties and witnesses and make proper use of methods of mental health and assessment. According to the actual situation, effective psychological consultation and treatment are given to the negative emotions in risk management. Especially, psychological trauma rehabilitation and long-term follow-up counseling are required.The emotional repair work of relevant people should be reach consensus on the handling of crisis events, by psychological communication in a timely manner. At the same time, through the ideological guidance to achieve the elimination of psychological shadow and to maintain the security and stability of the campus.

4.2 Risk re-education

Colleges should pay attention to reeducation of ideological guidance in the latter stage of students'

affair risk management. Risk re-education is education with the actual casein a timely manner. Every occurrence of a risk event is a lesson; every risk handling is a process of accumulation of experience and learning. In a timely manner to carry out ideological guidance, with vivid examples of the narrative and commentary, so that managers and objects will be better understand the risks and guide students to form a correct outlook on life, values and world outlook and good moral character, personality accomplishment, to avoid Risk events happen again.

In practice, the risk re-education of ideological guidance should be given to both re-education of risk control personnel and the re-education of students. At the re-education of risk management, the risk control personnel should be organized to evaluate the management and control implementation process, identify the risk point in control operations, optimize the risk management plan and so on. It is up to trainstaff of risk management learning from real cases to promoting overall ability to deal with crisis.To compile internal data on risk events and their processes，to optimize the exist risk emergency treatment system，to summary management method and keep pace with the times, which are optimum selection for train staff by the risk re-education of ideological guidance.To compile the risk events into a case to educate students vividly and timely in the process of student re-education is the responsibility of Ideological guidance. Having done these tasks, an important link of "turning crisis into opportunity", which are more important to help students to establish a correct outlook on life, world outlook and values, which ultimately implement the basic mission of education.

5 Conclusion

In the process of students' affair risk management, ideological guidance has its value in colleges and it should be emphasized and studied in the management of students' work risk. In the management of students' affair risk in colleges, it is necessary to give full information for ideological guidance in stage of the risk of pre-treatment; to clarify the misunderstanding on the matterin stage ofRisk management stage; to rehabilitate the emotion and to risk re-education in the stage of risk management later.

Acknowledgement

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Research on Internal Governance Structure of Non-governmental Schools

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Abstract: As an important part of educational business in China, non-governmental education plays a significant role in the cultivation of talents and the development of science and technology. This paper uses the qualitative and quantitative research methods to analyze the problems of internal governance structure, such as the imperfection of system and party construction work, the lack of education resources and the unscientific management of faculty. Based on the analysis, it proposes new paths for the development of non-governmental education and provides theoretical support for operation and management of non-governmental education.
Key words: Non-governmental education; Institutional system; Party construction; Internal governance structure

1 Introduction

With the continuous development of the economy and society, the main contradiction in society has changed. The public's demand for education has increased, requiring education to be diversified, quality-oriented and personalized. However, the development of educational undertakings is uneven, the development of different stages is not balanced, and the quality of education is not fully developed, which cannot meet the current multi-level needs of education. The transformation of government system and functions makes the limitations of public education in the process of providing educational services more and more obvious. (Thomas Baumann, 2013). Non-governmental education has the natural advantages of social strength, flexible system and strong social factors. As an important part of Chnia's education, it will be able to be more sufficient in releasing resources, optimizing structure, enhancing efficiency and cultivating the efficiency. (Zhou Haitao, 2017) It plays an increasingly significant role in improving the quality of education, optimizing the structure of education, and promoting fairness in education. The relevant laws of the country have been continuously improved, and the development of private education has also been elevated to a new height. This provides a historical opportunity for exploring the internal governance of non-governmental education and exploring new internal governance models. The high investment of public finance in education will attract society investment, increase social donation and promote the healthy development of education. (Calin Arcalean, Ioana Schiopu, 2016)

2 the Development of Non-governmental Education in China

"Non-state Education Promotion Law of the People's Republic of China (2016 Revision)" defined the private education as "Schools and other educational institutions which are runned by any public organs or individuals, except for the state organs to meet the demand of the society by utilizing non-statefinacial funds." Originated in the 1980s, China's non-governmental schools made up for the lack of funds and capabilities of the government in education by providing education service. According to "Statistical bulletin for the development of social services" from 2014 to 2017 (Figure 1), the number of non-governmental education   has increased year by year and the growth rate has remained stable, reflecting that China's non-governmental education has a good development trend and has made up for the insufficient resources of public education. From the perspective of the external macro environment, non-government education has great room for survival and development. It conforms to the economic and social development of China, the reform of the government system and the expanding demand for educational services. The government actively encourages and supports non-governmental education and continuously improves the supporting conditions of policies, funds and projects,so that it has good environment and guarantee for its survival and development. From the perspective of the internal governance environment, China's non-governmental schools mainly adopt the principal responsibility system under the leadership of the board of directors, which can improve the enthusiasm of social investment of non-governmental education, promote social attention and support for non-governmental

education. However, the development history of the board of directors is relatively short in China. Simply imitating the west has deviated from the reality of the development of China's non-gvernmental education, which has seriously affected the self-development.
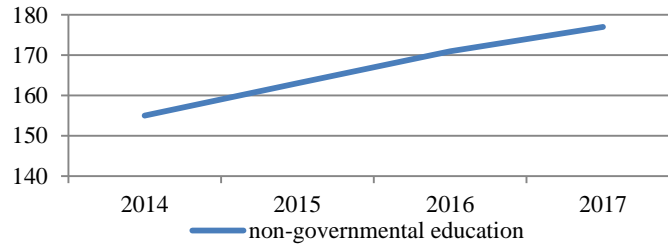
Figure 1   Non-governmental Education in Recent Years（unit: thousand）

3 Internal Governance Dilemmas of Non-governmental schools

3.1The imperfect institutional system

Improving the internal governance structure of legal persons and establishing a modern school system is the basis for the standardized management of non-governmental education. (Zhou Haitao, 2014) The existing laws and policies lack specific regulations and guidance for the principal responsibility system under the leadership of the board of directors, resulting in the lack of corporate governance institutions and operational mechanisms for non-governmental education in China. Non-governmental education varies greatly depending on time, location and policy scope. (Daniel C. Levy, 2016) Teaching quality and teaching management are the lifelines of running a school (Wang Dong, 2015), the key of improving teaching quality and strengthening teaching management is supervision. The imperfection of the internal self-regulatory mechanism of non-government education and the unclear definition of property rights have led to poor implementation of the organizational management system.(Luo Jun, 2015) Most of them lack supervisory institutions and supervision mechanisms. Due to the lack of funds for education, there are frequent violations of school-running scope, malicious charges, scattered false advertisements, and crowdfunding. Taking the income of education funds for private colleges and universities in 2017 as an example (figure 2), business income accounts for 80.7%, of which 73% comes from tuition and fees income, and 11.6% in national fiscal education funds. In view of this, they can only be market-oriented in order to survive, and gain social reputation by cultivating practical talents. This "bottom-up development path"(Yan Fengqiao, Lin Jing, 2012) leads to the power   decision-making, execution, and supervision are relatively concentrated or excessive, which in turn affects the autonomy and self-discipline of private colleges and universities.
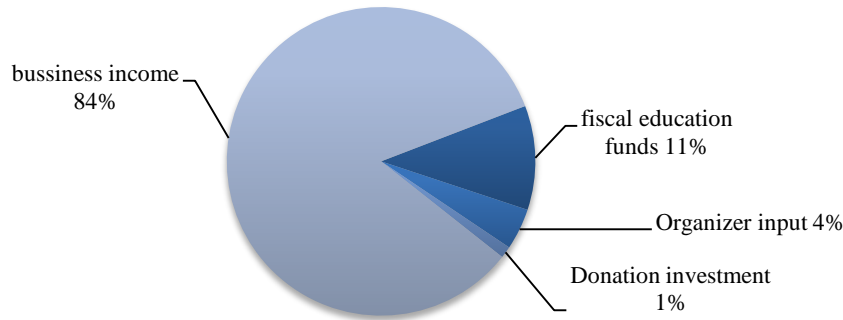
Figure 2   the Income of Education Funds for Private Colleges and Universities in 2017

3.2 The defective governance structure

Influenced by the organizational form of the enterprise, non-governmental schools investors have a large proportion of the right to speak, which has seriously affected the teaching of the school. The corporate governance system of non-governmental schools needs to form operational mechanisms inclouding authority, decision-making, supervisory, and executive agencies. In theory, between the authority mechanism and the decision-making mechanism is the principal-agent relationship, between the decision-making mechanism and the executive agency is the authorized management relationship. The independent operation of the supervisory mechanism can ensure the benign operation and

development under the mode of multi-study. (Figure 3) Affected by the government's management functions, non-governmental schools have become a subsidiary of the government to a certain extent. (Ma Pengwei, 2013) From the education of teaching to the allocation of enrollment, from the appointment of cadres to the remuneration of teachers, they are managed by the higher education administrative department. (Sui Xiangping, Song Tingting, 2016). Light supervision and heavy management of government to the non-governmental schools are not only the restriction and control for principal responsibility system under the leadership of the board of directors, but also the barriers to Innovate teaching methods and display school characteristics. The rigid management model of schools cannot stimulate the flexibility and autonomy of teaching and running schools, resulting in relatively concentrated or decentralized decision-making, execution and supervision power. The weakening of internal supervision of schools, especially the existence of loopholes in decision-making execution and management, has resulted in the educational status of "no features of teaching, no characteristics of school, and no special skills of students".（Chen Mingtong, Chen Peijun，2017）
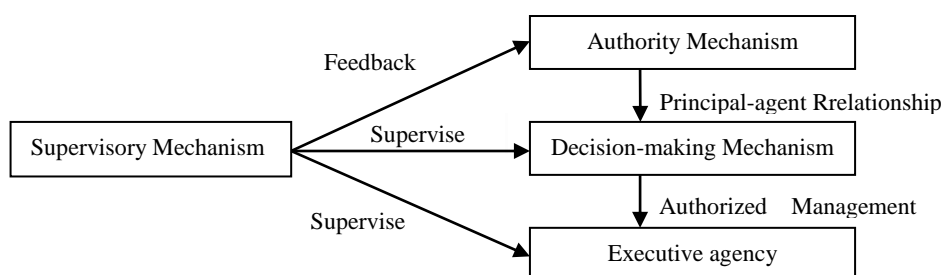
Figure 3　Non-governmental Schools Internal Management Model

3.3 The unscientific faculty management

According to "Statistical bulletin for the development of National education business" from 2012 to 2016(Figure 4), compared with the public schools, non-governmental schools generally have the problems of the lack of teachers and the instability of the faculty. At the social level, China's market economy starts relatively late, and the construction of social organizations' integrity is at the primary stage. Some teachers of non-governmental schools have low barriers to entry and lack effective supervision and management. Many malignant cases such as Nan yang education group, private kindergarten abuse and internet addiction school cause strong social reaction so that people are skeptical to non-governmental education. From the government level, the guidance of government to education is extremely important. The government should pay more attention to the practicability of education for adapting it to the current economic environment. (Allan O'Connor, 2013) The insufficient investment of government's livelihood projects and financial funds has led to serious funding problems of non-governmental education, the lack of guarantee of teachers' salary and the insufficiency of teaching facilities and treatment. From non-governmental education level, low quality of the managers whose internal management and distribution policy are unreasonable. They cannot implement rewards and punishment incentive policy, which lead to more weaken teachers' teaching motivation and serious brain drain.
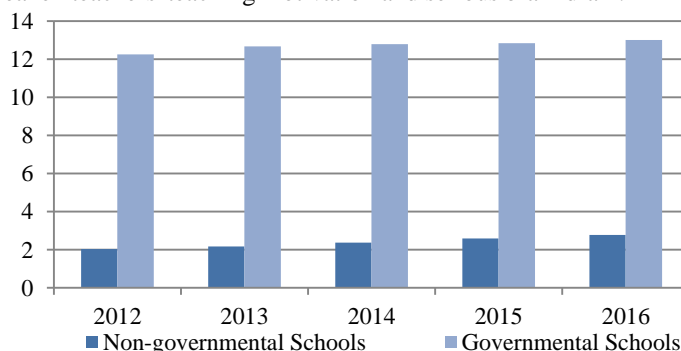
Figure 4　Teachers in Non-governmental Schools and Governmental Schools　（unit: billion）

4 Internal Governance Strategies of Non-governmental Schools
4.1 Perfect the system

At the legal level, the state has continuously improved the support of non-governmental schools, which provided the policy and legal basis for the development of private education. First of all, it is necessary to clarify the ownership of non-governmental education and establish the legal subject status of non-governmental education. According to the legal requirements, government should formulate the implementation rules for the classified management of private education and guide non-governmental schools to give the priority to the social benefits. Secondly, the essence of corporate governance structure is the scientific distribution and mutual restriction of power and responsibility within the organization, so that the organization can achieve the set goal.(Liu Jingyang, 2016) Non-governmental schools should improve the principal responsibility system under the leadership of the board of directors and form an non-governmental education structure with Chinese characteristics including the decision-making system, the consultative system, the executive system and the supervisory system. In addition, it is necessary for non-governmental schools to implement a unified and standardized accountability mechanism, improve the internal management system and improve the self-restraint mechanism, which in order to make up the loopholes in the current internal management. Formulate and improve the internal management rules and regulations including the accounting system, personnel management system, meeting system, file management system, form a complete and orderly management system to enhance the feasibility and effectiveness of regulations and lay the foundation of development of non-governmental schools.

4.2 Strengthen supervision

The main leaders are in charge of setting up a leading group leading group including financial, auditing, and others to participate in the internal control, quicken construction of internal control system and ensure the institutionalization, regularization of the internal supervision system. (Yang Zhaohui, 2017) Non-governmental schools need to maintain the independence of internal supervision and set up a scientific and reasonable system of budget, review and settlement around financial management for ensuring the disclosure of financial information. They should intensify the examination of teachers' qualifications, find out and solve teachers' academic misconduct in a timely manner, maintain the healthy development of the teaching of non-governmental schools. Furthermore, non-governmental schools shall enlarge the breadth of supervision and provide teachers and students with supervision methods and approaches, set up special reporting channels and form the bottom-up and top-down combining the internal supervision mechanism. At the same time, with the aid of third party supervision mechanism, non-governmental school ought to establishment a unified examination standard to carry out comprehensive supervision and evaluation on non-governmental schools and within the industry to set up rewards and punishment mechanism make public periodically to the public. Non-governmental colleges and universities should further promote education management evaluation and separation and improve the education evaluation system of multiple entities and the academic integrity status. (Lu Yao, 2017)

4.3 Improv the faculty management

The author suggests that strengthen professional training for employees and improve the employment system, it's also should raise barriers to entry for industries and reduce the deterioration of teachers at the source. Non-governmental schools should enlarge the coverage of party construction and set up party organizations at the grass-roots level, similarly, should pay attention to strengthen party member's education and develop party organization's fight fortress function and the general party member's cutting edge exemplary role. There is no doubt that enough concern must be paid to cultivate the values of "education first" and transform the personnel system of education institutions and improve teaching staff's importance to teaching. The school leaders should follow education rule, implement the operation and management mode consistent with education essence and return to education standard. It's also essential to fully respect the opinions of teachers and students, and concentrate the wisdom of the group. Non-governmental schools shall improve the salaries and benefits of non-governmental education staff and formulate incentive and guarantee policies for enhancing the professional identity of faculty and staff and stimulating the vitality of teaching. To maintain the healthy and orderly development of the school, organizers and managers of non-governmental schools should improve their scientific management level and expand the extent for school-running autonomy. Meanwhile, actively search the funds, policies, and resource that is good for school development and education public services.

4.4 Seek external support

Government should respond to the provisions of the law and actively formulate financial support policies and preferential tax policies that meet the development of non-profit private schools, plan the relationship between governmental education and non-governmental education. Non-governmental schools should expand the channels of income generation under the guidance of the government to

maintain the sustainability of their own development and release the vitality of running schools and lay a foundation for improving the quality of running schools. They should form an internal and external supervision system to maintain the sustainable and healthy development of non-governmental schools. The external supervision which is coordinated by the supervision of the news media, the supervision of the private education industry, the supervision of the relevant civil affairs departments of the government, and the supervision of the public should be formed. Non-governmental schools need to use social media and public opinion to enhance their social influence and publicize the social value of non-government education. It's also need to raise public awareness of non-governmental schools to form a good social atmosphere and stimulate the enthusiasm of the society to invest in education.

5 Conclusion

Non-governmental schools are an important driving force for the development of China's socialist education. They solve internal operations management problems of the current through improving the internal system, strengthening internal supervision, improving the level of teaching management and seeking external support help. The transformation of the main contradiction of socialism with Chinese characteristics in the new era reflects the great gap between the demand and supply of education public service. It is of great significance to actively explore the development of private education, but the road of the healthy development of non-governmental schools is still long. The internal and external governance system of non-governmental education needs to constantly improve and innovate, which requires coordination and cooperation from the government, non-governmental schools, society and other aspects.

Acknowledgement

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Analysis of Group Irrational Factors in Mass Events

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Abstract: In recent years, many mass events have brought adverse effects to the peace and harmony of the society, and also brought great pressure to the government. From the perspective of group psychology, this paper focuses on analyzing the five psychological sources of irrational behavior of the group by restoring the process of its production: self-categorization leads to deindividuation of group members, bandwagon effect of individuals under the influence of information society, relative deprivation caused by psychological frustration, high cognitive dissonance of group members, and the fluke mind of "The law cannot be enforced when everyone is an offender". Meanwhile, it is recommended that members of the society establish a sense of crisis, and make full use of the power of the media and the government to build early warning and emergency mechanisms to reduce the occurrence of mass events.
Key words: Population; Irrational factors; Psychological; Mass events

1 Introduction

In terms of quantity, the absolute number of mass events in China has increased from 80,000 in 2007 to 139,000 in 2011. By 2014, this number reached 172,000. Although there is a lack of statistics on data after 2014, However, according to the "China Social Mass Events Analysis Report" published by Professor Zhang every year (Zhang,et.al, 2017), the mass event "has not undergone a fundamental change in the overall pattern" since 2014. The number of mass events in 2015 is even slightly higher than that in 2014. "In 2016, the number of mass events in China has basically maintained the previous level." In addition, the "China Rule of Law Development Report NO.12 (2014)" issued by the Institute of Law of the Chinese Academy of Social Sciences shows that the number of mass events of more than 100 people has increased from 23 in 2007 to 163 in 2010, and even reached 209 in 2012. Start. In the first half of 2016 alone, there were 12 mass events of more than 1,000 people (Yu, 2018). The types and proportions of mass events can be described as shown in figure 1.
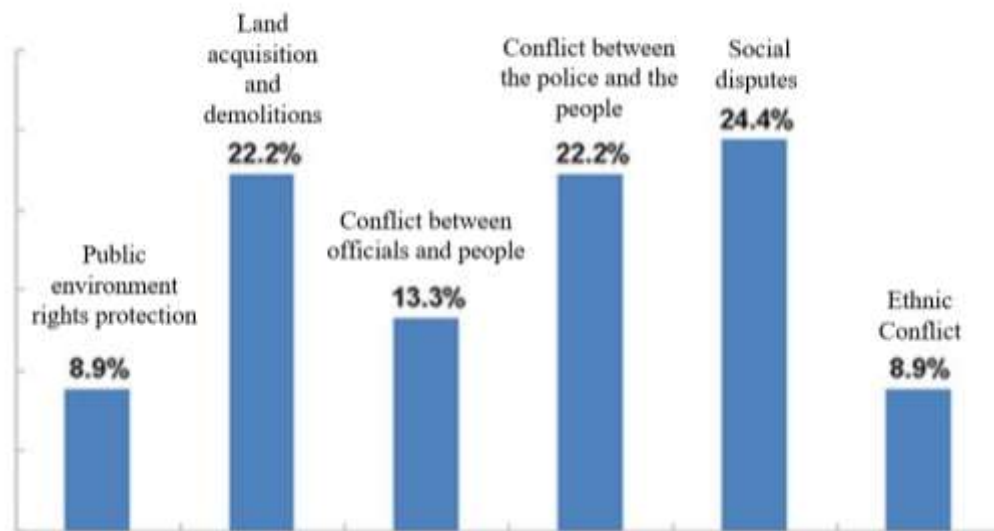
Figure 1   Types and Proportions of Mass Events

The survey found that more than half of the mass events were triggered by disputes between equal subjects, and the contradiction between the government and the people was second. This phenomenon has aroused the attention of many researchers, and the cause of mass events has become the top priority of research (Xin, 2015). From the perspective of sociology, the issue of interest is recognized as the most important cause of mass events. Hu Lianhe analyzes several theories of foreign mass events (Hu,

2017). At the same time, some scholars pointed out that there are other influencing factors besides the interests. Wu Fuguang and others believe that the lack of public reason has aggravated the structural contradictions of China's society and is an important cause of mass events (Wang Zili,et.al,2012). Lai Anting discovered through investigation that the spread of group emotions is an important factor in triggering mass events (Lai Anting, 2013). The 2010 China Social Development Report of Renmin University of China summarized the causes of the outbreak of mass events in China: weakened social control mechanisms, increased class conflicts, lagging government response mechanisms, and highly developed information dissemination. As shown in figure 2, the six factors of environmental factors, behavioral anomie, weak control mechanism, relative deprivation of interests, weak government response, and highly developed information are the internal motivations of mass events.
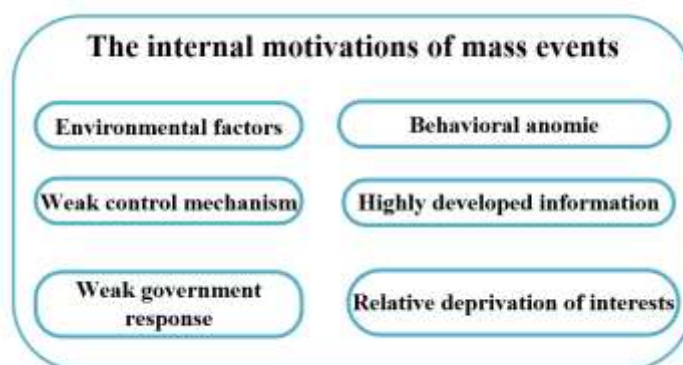
Figure 2   The 6 internal motivations of mass events

Regarding the governance of mass events, Wu Fuguang believes that the government should make public decisions from the requirements of public reason rather than from the rationality of the government (Wang Zili, 2012). The media should be a public platform for expressing and aggregating various interests. From the perspective of political science, Liu Chao proposed to establish and improve measures such as interest adjustment mechanism, social mobility mechanism, interest expression mechanism, diversified contradiction dispute resolution mechanism, petition mechanism, social catharsis mechanism, and social stability early warning mechanism (Liu Chao,2009). Many of the above reasons show us the possible conditions for the occurrence of mass events from rationalism. However, mass events are not only caused by unreasonable social factors, but also by the interaction and transformation of the psychology and behavior of individuals and groups. What psychology in a society ruled by law has prompted many people to choose to express their own interests through group action? What factors have prompted rational individuals to participate in group irrational behavior? Under what circumstances does individual behavior lead to rational or irrational group behavior? Understanding the law of group development from the perspective of social psychology and the psychological roots of individuals' excessive performance in irrational group behavior have become the breakthrough point for dealing with mass events.

Therefore, this paper aims to analyze the causes of this kind of irrational group psychology, hoping to avoid the irrational behavior of the group and maintain social stability.

2 Mass Events and Group Behavior

Group is composed of different individuals. The group behavior is based on the individual's psychological activities. The individual's psychology and behavior directly affect the group's state. First of all, we must explore the relationship between individual psychology and group psychology. Secondly, mass events disturb social order and threaten social stability. There must be some degree of irrational reasons.

2.1 Relationship between individual behavior and group behavior

Mass events are behaviors triggered by specific contradictions, which express material or spiritual interests, safeguards rights and interests, vents dissatisfaction, and directly affects social order and social stability. Mass events are external manifestations of group behavior, while group behavior is composed of countless individual behaviors, and individual behavior is the basis of group behavior. But in reality, individuals act according to their own cognition and rational judgment, while group behavior shows a

certain degree of unconscious blindness. Thus, group behavior is not a simple addition of most individual behaviors. In the process of integrating individuals into groups, individual psychology and behavior have undergone qualitative changes. Le Pen also pointed out that "individuals are mostly rational people in reality, but they become barbarians in the group - that is, an animal whose behavior is dominated by instinct. He is fierce, excitable, involuntary, and instinctive. He is willing to be impressed by his impassioned words and desperate behavior, and these words and actions cannot have any effect when the individual in the group is alone." (Gustave Le Bon, 1895）Similarly, it is not appropriate to speculate on the individual's psychology and behavior from the perspective of group behavior. Group behavior also can not reflect the psychology and behavior of all individuals. Whether individuals involved in mass events are rational, this requires re-judgment according to specific circumstances.

2.2 Irrational factors existing in mass events

In most cases, the psychology and behavior of individuals and groups are both rational and irrational. Not all mass events are caused by group irrational behavior. In reality, there are also planned and organized rational group action. Not all group irrational behavior will cause mass events, and only the behavior rising to the level of endangering social stability will constitute mass events. However, there must be a certain degree of irrational factors in almost all mass events. Social psychology holds that cognition, information and environment are the three major factors that determine individual behavior. If group members play their cognitive functions and fully understand the information provided by the internal and external environment to make certain behaviors, then members' behavior is the rational behavior within the social norms. On the contrary, when the rational judgment is lost due to the uncertainty of information and environment, the behavior based entirely on emotion, intuition, blind obedience and temporary impulse. So the behaviors are irrational. According to the theory of social infection, it occurs in the same physical space, but its members cannot be contacted by everyone in a large group. The cyclic reaction is very strong. Individual emotions can trigger others to produce the same emotions, while others' emotions in turn aggravate the original emotions of individuals. In this infection, emotional agitation is easy to break out. It is easy to cause irrational behavior of group. Once irrational emotions begin to spread in the group, they will spread to other individuals at a viral rate, which will trigger the turmoil of the entire group and cause mass events. Mass events are caused by interest disputes. Some irrational factors that are bound to exist. It is used as a means of giving vent to discontent, which has caused negative effects.

3 Psychological Analysis of Group irrational Behavior in Mass Events
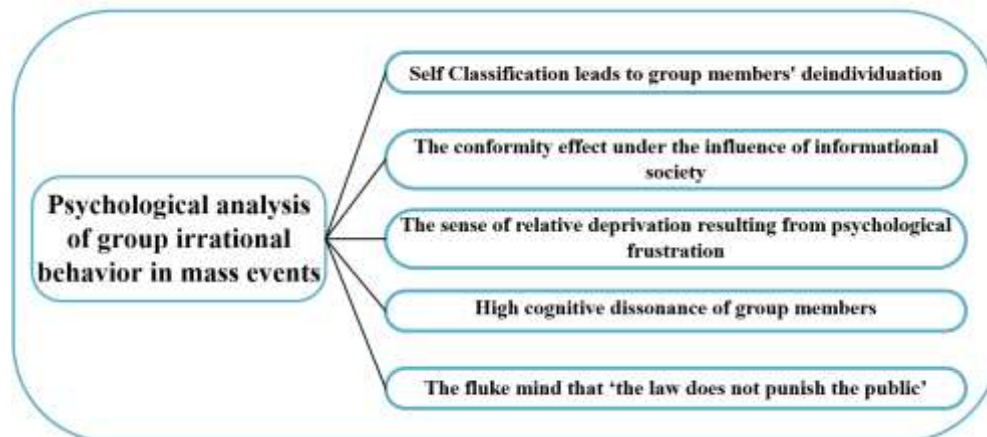
Figure 3   Psychological Roots of Irrational Behavior

3.1 Self Classification leads to group members' deindividuation

The theory of Self Classification holds that when an individual's status in a group becomes more prominent, the individual regards himself as a model of the group rather than a single individual. The theory holds that individuals differentiate themselves from others according to certain characteristics and then classify them as internal and external groups.（Lai Anting, 2013）At this point, the members of the internal group actually become part of the individual, and the individual will consciously identify the values, attitudes and behaviors of the members of the group. Individuals also discover and accept

themselves in this way of self-classification and find a sense of belonging. When the internal group is subjected to external threats, their own interests are damaged or spiritual oppression, people will take the initiative to cater to members of the internal group and exclude members of the external group. Individuals lose their individuality and merge into groups. This process is called deindividuation. For example, in the process of demonstrating against the forces of foreign aggression, individuals classified themselves as members of the nation, and the concept of internal group members extended to the whole country. At this point, the internal contradictions disappear, and individuals shift their attention to the topics of collective concern. Group emotions are no longer dominated by rational individuals. With the continuous development of the situation, group emotions are expanding and irrational behavior is triggered.

3.2 The conformity effect under the influence of informational society

Conformity is a common psychological condition in mass events, and it is also a psychological impetus that cannot be neglected to cause group irrational behavior. American scholar Solomon Assy conducted a study of individual stress in groups in the early 1950s.It is found that individuals may have herd behavior in the face of group pressure, and the size of the group has a direct impact on the herd pressure. There is a functional relationship between them. When the majority of the members increase to more than three, the growth of the herd curve tends to be gentle.(Ji Naili, 2010)Informational social impact theory says that we conform because we believe that other people interpret a vague situation more correctly than we do, and that it helps us choose an appropriate way of behaving.(Social Psychology, 1999) Since the individual is unclear about what should be done in a situation that is overwhelming or unusual, then the behavior of the surrounding people becomes the source of their response to the situation, and they decide to act in a similar manner. Others are not willing to be laughed at because they are different or are excluded by group members. Individuals will think that the behavior of group expectations will not be ignored by others. Because "under the pressure of Group Consensus, individuals have an instinctive fear of deviating from the group, and lifting the conflict between themselves and the group can enhance the sense of security."(Mao Zhihong, et.al, 2013)In 1961, during the American Civil Rights Movement, militants trained people to fight violence in a negative way. Thousands of blacks, faced with repeated beatings, sticks, and floods, chose to persist in non-violent resistance. It can be seen that people in any situation, even when threatening their own lives, will make irrational herding behavior in an extreme and unexpected way.

3.3 The sense of relative deprivation resulting from psychological frustration

Merton believes that relative deprivation refers to the feeling of deprivation when people find themselves in a disadvantaged position by comparing their situation with a certain standard or a certain reference. This feeling produces negative emotions, such as anger, resentment or dissatisfaction. When the individual's group suffers from some kind of deprivation or threat, the members of the group will be angry and take irrational behavior under the influence of psychological frustrating pointed out that the actual process of group action consists of three stages: the emergence of dissatisfaction, the politicization of dissatisfaction and the violent actions against political goals.(Gao Chunya, 2014)First of all, group members are psychologically deprived of feelings due to certain events, which in turn leads to dissatisfaction. As the situation develops, this kind of emotion escalates and leads to psychological imbalance of group members. The government has become the appeals object of group action and hopes to eliminate this sense of relative deprivation. However, when an existing system cannot accommodate the regular interests of the group, some people will incite the entire group to make irrational behavior. For example, many land acquisition problems and mass events caused by demolition problems in recent years have followed such a law. The accumulated deprivation of individuals has prompted them to attract attention only through irrational group behaviors such as gathering people and sitting in demonstrations.

3.4 High cognitive dissonance of group members

Cognitive dissonance occurs when a person's behavior threatens his self-image and does not conform to a positive self-concept. Most people believe that they are rational individuals, but in some cases, people's ideas for maintaining their self-esteem are not necessarily rational, but are rationalized. People who are in a state of maladjustment are committed to convincing themselves that their actions are right, so that they tend to show irrationality and maladjustment. When an individual makes a decision and spends a lot of time and energy on the decision, the rational need for rationalization of these investments is stronger. When it is found that the development of the situation is mismatched with the individual's own cognition, it is emotionally unacceptable and then they would choose irrational coping behavior. In the Tianmen education incident in California in 1997,believers sacrificed a lot for

their beliefs, and eventually committed mass suicide because they couldn't see the so-called spacecraft.

3.5 The fluke mind that 'the law does not punish the public'

In group irrational events, the fluke mind has prompted some people to take the opportunity to mislead the public to vent their emotions or defend their own interests, so that the event continues to expand in an unusual direction. The fluke mind is the human instinct consciousness, which is reflected in the individual thinking activities, usually not enough to control people's behavior activities, but when a person's self-control ability is not strong, this subconsciousness is gestated and expanded, will trigger impulse. Members of irrational groups generally believe that "the law does not punish the public." When a group event occurs, the individual who has lost his sense of social responsibility will do whatever he wants to escape the legal responsibility. This provides an opportunity for individuals who take the opportunity to use their own means to gain profits for themselves.

4 Measures to Prevent Mass Events

4.1 Cultivate the crisis awareness of social members about mass events

Maintaining social order to ensure social stability is the responsibility of every social member. For various reasons，most mass events are not accidental. Reasons include either organized and premeditated maintenance of self-interest appeals, or the outbreak of social conflicts in daily life, or inciting emotions by people with ulterior motives. In the face of such mass events, members of society must first establish a correct attitude, hold a rational and tolerant mentality, curb ignorance and extreme emotion, promote civilization and cooperation, and fully recognize the important role of law. Only in this way, individuals will not be affected by the conformity psychology, the lucky psychology and cognitive dissonance in the face of crisis events, in order to maintain the right direction. Secondly, the crisis response ability of members of society is an important requirement to prevent irrational mass events. Individuals should pay attention to cultivating their ability to be acutely aware of the development of those events. And provide early warning to government departments or use their own resources at an appropriate time. Measures such as mitigating contradictions promptly prevent the expansion of the situation. In an appropriate time, by providing early warning to government departments, or using their own resources to temporarily ease conflicts and other measures can prevent the expansion of the situation in a timely manner.

4.2 Give full play to the power of the media, solve the problem of unsmooth information in time

It can be inferred from many mass events that a large part of group irrational behavior is due to the lack of the right to know. Once information is lost, people's cognitive judgments will be affected, and irrational behavior will follow. At the beginning of a mass incident, government agencies should promptly use the mass media such as television, online news, Weibo, WeChat to make detailed reports and actively dispel the rumoring addition, the network information dissemination exists one-sidedness and exaggeration, we should use authoritative media to report objectively and fairly. The handling process and results of the incidents should be timely announced and explained through the media, so as to enhance the credibility of government departments at all levels and stabilize the people's minds.

4.3 Government departments must establish an early warning and emergency response mechanism

Because irrational groups are extreme and impulsive, the government must not simply ignore or judge the psychology and behavior of such irrational groups, or require their irrational psychology and behavior to undergo rational qualitative changes, but should be more open and tolerant. Under the current situation, the government should standardize the law enforcement actions, and establish an early warning and emergency mechanism that can react to such irrational group behaviors immediately. Through the popularization of law education, efforts should be made to improve the people's awareness of the rule of law, so that they can understand and abide by the law, so as to stimulate the rational thinking of the whole society to achieve the effect of treating both the symptoms and the root causes and achieve the unity of legal effect and social effect.

5 Conclusion

This paper proposes the relevant measures to prevent irrational behavior by focusing on the five psychological root causes of irrational behaviors. It provides some basis and reference for social governance such as cultivating members of society to cope with the crisis awareness of mass events, exerting the power of the media, and establishing early warning and emergency response mechanisms for government departments.

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Engineering Harmony Evaluation Based on System Dynamics

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Abstract: There are many factors influencing the engineering harmony. Harmonious engineering is not only to pursue the shortest duration or the best quality or the lowest cost, but to seek the harmony among schedule, quality and cost. This paper takes schedule, quality and cost as three major objectives of harmonious engineering management. Based on the method of system dynamics, the sub-models of quality, duration and cost coordination relationship are firstly constructed respectively, and then the structure equation of engineering harmony evaluation including cost overdraft factor, schedule delay factor and quality loss factor is established and analyzed by simulation.
Key words: Harmony; Quality; Duration; Cost; System dynamics

1 Introduction

The engineering construction has experienced the development process of "revering nature, conquering nature, and the harmonious coexistence of human and nature" (Yin ruiyu, 2008). The engineering construction cannot be separated from the harmonious development of human and nature. With the development of The Times, the harmonious engineering aiming at resource conservation, environmental protection and economic development is the goal pursued by enterprises and society. Lin maoguang put forward the basic framework of engineering construction harmonious management from 2014, and put forward the mechanism of human, matter and material on engineering construction harmonious management (Lin maoguang, wang qiankun, peng huatao, etc., 2014). The fundamental purpose of building a harmonious engineering is to keep human, matter and material in the most ideal state, so as to improve and optimize the economic and environmental benefits of the system continuously (wang yumei, 2018). The existing research mainly focuses on the pairwise comparison of duration, cost and quality in engineering construction management (expensive gold, 2015; Gao hanbing, ma zhiming, gu wenjie, et al., 2014).There is a lack of direct modeling and simulation of the relationship between the three to find the best harmony value.

2 Model hypotheses

There are many factors involved in the harmony engineering, which can be regarded as a complex system. The system constructed in this paper is designed to realize ideal engineering schedule, quality and cost, so as to achieve the harmonious engineering goal of technical goal, economic goal and environmental goal.

2.1 Mutual influence of engineering materials, labor force and capital

The realization of engineering cannot be achieved without the availability of resources, and the availability of resources depends on the four production factors of engineering materials, labor force, capital and equipment. As the use of equipment is small for the three relatively, this paper will not discuss it here (zhong yong, Chen zhigao, zhou zhong, 2016). The stock material is in positive feedback relation with the engineering schedule. The faster the stock material consumption, the faster the engineering schedule, and the more cash flow is needed to purchase materials. Stock material is sufficient, the engineering is adopted at any time, and there is no need to wait for procurement, the more likely the engineering schedule will be completed ahead of time. As for the negative feedback relationship between the labor force and the engineering schedule, the slower the schedule, the less the completed workload, the more the remaining workload, the more the work intensity or quantity of the labor force, and the more the cash flow is needed to realize the overtime wage or employment wage of the labor force. Based on this, the paper assumes that the worker's level of labor productivity and speed remain unchanged throughout the construction process.

2.2 Mutual influence of engineering schedule, quality and cost

Schedule, quality and cost are the most important factors in engineering management. Some scholars consider the three linear relations (Badu, Suresh), while others consider them as non-linear relations (Tareghian). When the engineering schedule falls behind the planned schedule, the schedule pressure will be generated. Generally, the working intensity of the workers will be increased to catch up

with the engineering schedule. However, the work intensity will make the workers feel tired, which will lead to the decline of quality, the rework of the engineering, and lags behind the schedule. This is a positive feedback system (liu Yang, lu mei, 2011). Based on this, the system assumes that the management staffs take measures to improve the work intensity of workers to catch up with the schedule. When the engineering quality is optimal, the engineering period is approximately the most likely duration. When the quality is worst, the period is approximately the shortest duration. When the quality is the best, the period is approximately the longest duration.

3 Model construction and simulation

The three core objectives of harmonious engineering management are quality, schedule and cost of engineering. As long as one of the three variables changes, the other two will also change. Under the same conditions, blindly accelerating the schedule will inevitably lead to unqualified quality and rework, and the cost will increase accordingly (Yang fang, 2012). The harmony engineering is not only to pursue the shortest duration or the optimal quality or the minimum cost, but to seek the harmony among schedule, quality and cost. Engineering has multiple processes, multiple schemes and multiple objectives, and the whole system is complex relatively. This paper assumes the construction of a harmonious engineering system based on multiple processes, one scheme, and multiple objectives. Besides, there are punishment of cost overexpenditure, delay and quality loss (Mrad, al-gahtani, Hulchafo, 2017). The total objective function is:

$$opt（Z）= minf（T,Q,C）\tag{1}$$

$$T = \sum_{j=1}^{n} t_j \qquad Q = \sum_{j=1}^{n} w_j q_j \qquad C = \sum_{j=1}^{n}（c_j + a_{1j}K + a_{2j}K + a_{3j}K）$$

In the above formula, "T" represents the total construction duration, "i" represents the mode of the engineering (i.e. the execution scheme), "m" represents the general mode type of construction, "j" represents the process of the engineering, and "n" represents the total process quantity. "t_j" represents the construction duration of the j process, "a_{1j}" represents the delay punishment of the backward schedule; "Q" represents the total quality level, "R_q" represents the required quality level, "W_j" represents the weight of the quality of the "j" process, and "q_j" represents the quality of the "j" process. Meet the requirements $q_j \geq R_q$."a_{2j}" represents daily penalties for deviation from required quality levels, "K" represents total delay time, "C" represents total cost, "c_j"represents the cost of the "j" process, "a_{3j}"represents cost penalty for exceeding deadline π ,"L" represents deadline of the engineering, $K \geq T - \pi$ and$T \leq L$，assuming that $a_{3j} = 2 * C/\pi$, Parameter constraints are as follows: $0 \leq j \leq$ n, $0 \leq W_j \leq 1$。

$$H = minf\{|\frac{T_p - T_s}{T_s} \quad \frac{Q_p - Q_s}{Q_s} \quad \frac{C_p - C_s}{C_s}|\}\tag{2}$$

"H" represents the degree of engineering harmony, which is the comparison between the actual situation and the standard situation of the plan. "T_p"represents the actual time, T_s represents the standard time, and Q, C means the same. The degree of harmony is the harmonious and stable state, and the state of the most reasonable cost, optimal quality and optimal schedule is sought.

3.1 Quality-cost model

According to the relationship between engineering quality and cost, the higher the quality requirement, the higher the cost. However, when the quality reaches a certain range, the quality needs to be improved again, and the cost will increase exponentially, which means that the improvement of the quality will require more expensive costs than before. Engineering cost includes quality assurance cost and quality loss cost, total quality cost is the sum of them. Through the research of scholars, it is found that the quality assurance cost increases with the rise of quality, and the quality loss cost decreases accordingly. The relationship between the two and the engineering quality level presents an exponential function relationship (zhang lianyin, luanyan, zou xuqing, 2013), while both the quality assurance cost and the quality loss cost are limited. In this case, the relationship between engineering quality and engineering cost is a positive feedback seeking behavior. The quality of engineering is not completely consistent. There are the highest and lowest standards for the overall quality level. In any case, the completion of works required is reasonable. Based on this, the following relationships exist:

$$Q = \sum_{j=1}^{n} w_j q_j \tag{3}$$

$$q_j = log\left(x_j * c_j + y_j\right) \qquad c_j = c_{1j} + c_{2j} = k_{1j}Q^{r_1} + k_{2j}Q^{r_2} \qquad (4)$$

$$x_j = \frac{e^{0.99} - e^{0.75}}{maxc_j - minc_j} \qquad y_j = e^{0.99} - a_j max\,C_j$$

"q_j" represents the quality level of the "j" process, "c_{1j}" represents quality assurance cost, "c_{2j}" represents quality loss cost, "k_1, k_2, r_1, r_2" represents constant(zhang lianying, 2013), Q ∈ [0.75,0.99], "j" represents process, "x_j, y_j" represents the constants corresponding to different processes, "c_j" represents the costs corresponding to different processes, "$min\,c_j$" represents minimum quality standard, "$max\,c_j$" represents highest quality standard（Mrad、Al-Gahtani、Hulchafo,2017）.

3.2 Duration-cost model

Too short or too long construction period will lead to increased engineering costs. There is always the possibility of rework. The probability of error increases the probability of rework. From the perspective of the relationship between duration and cost, no matter how to shorten or catch up the construction duration, it will promote the increase of cost (zhang lianyin, luanyan, zou xuqing, 2013), and it is believed that the direct cost and schedule are in a quadratic function relationship. The construction period is shortened, the management cost of management staff is reduced, and the engineering indirect cost and the engineering period become linear positive correlation. Based on this, the following functional relationship exists:

$$C（T) = Me^{-\mu T} \qquad (5)$$

In the above formula," M" represents the cost factor, "μ" represents constant, and$M > 0, \ \mu > 0$.

3.3 Quality-duration model

The improved of quality level is limited; it is hard to be perfect. If we blindly pursue the schedule, quality problems may arise, resulting in rework phenomenon, which will reduce the economic benefits of the construction enterprise. In order to guarantee the quality, the careful and careful work will lead to the delay, and the cost will increase accordingly. Moreover, there is deviation between the actual quality and the required quality, with the highest quality level and the lowest quality level. This paper assumes that the level change range is [0.75, 0.99] (Mrad, al-gahtani, Hulchafo, 2017).

$$Q = \sum_{j=1}^{n} w_j q_j \qquad q_j = Ne^{-\lambda t}, \ t_{jmin} \le t \le t_{jmax} \qquad (6)$$

In the above formula," N" represents the quality factor,$0.75 \le N \le 0.99$, "λ" represents the constant of the concave function,$\lambda > 0$.

3.4 Structure of system flowchart
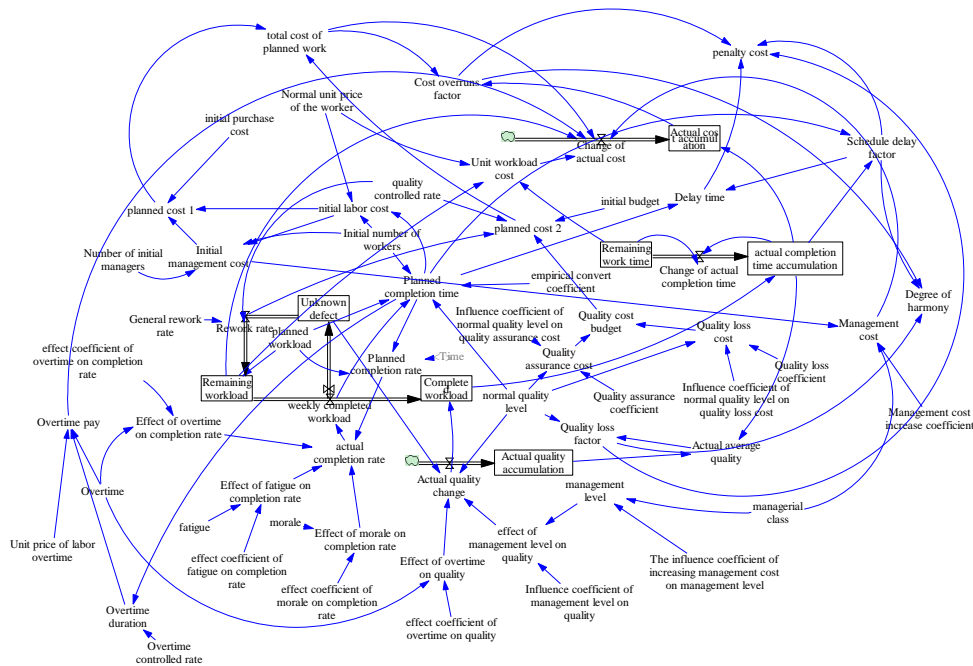
Figure 1   System Flowchart

3.5 Fundamental structural equation

Remaining workload = planned workload - weekly completed workload + planned workload * rework rate

Weekly completed workload =INTEG (- actual completion rate, weekly completed workload)

Planned workload =100, dimensionless

Rework rate = general rework rate/quality controlled rate (zhang shan cong, dong xiaohuan, 2013)

General rework rate =10%, dimensionless

Quality controlled rate =100%, dimensionless

Actual completion rate = planned completion rate * (1- effect of overtime on completion rate) * (1- effect of morale on completion rate) * (1- effect of fatigue on completion rate)

Effect of fatigue on completion rate = fatigue * effect coefficient of fatigue on completion rate

Effect of morale on completion rate = morale * effect coefficient of morale on completion rate (or using table function)

Effect of overtime on completion rate = overtime * effect coefficient of overtime on completion rate

Effect of overtime on fatigue = overtime * effect coefficient of overtime on fatigue

Effect of overtime on morale = overtime * effect coefficient of overtime on morale

Effect of overtime on quality = overtime * effect coefficient of overtime on quality

Overtime, fatigue, morale ={0,1}, means yes and no.

Overtime pay = overtime * overtime hours * unit price of labor overtime

Unit price of labor overtime =500 yuan/day

Overtime duration = overtime controlled rate * planned completion time

Overtime controlled rate =25%, dimensionless

Planned completion time = weekly completed workload /(empirical convert coefficient * normal quality level * planned workload/initial number of workers)

Initial number of workers =50

Normal quality level = {[0.75, 0.99]}

Planned cost = planned cost 1+ planned cost 2

Planned cost 1= initial purchase cost + initial labor cost + initial management cost

planned cost 2=(initial budget + quality controlled rate * quality cost budget)*(1+ rework rate)

Quality cost budget = quality assurance cost + quality loss cost

Quality assurance cost = quality assurance coefficient* normal quality level $^{\text{Effect coefficient of normal quality level on quality assurance cost}}$

Quality loss cost = quality loss coefficient* normal quality level $^{\text{Effect coefficient of normal quality level on quality loss cost}}$

Initial management cost = initial labor cost /{ number of initial managers /(number of initial managers + number of initial workers)}

Number of initial managers = 2

Initial labor cost = normal unit price of the worker * number of initial workers * planned completion time

Normal unit price of the worker =300 yuan/day

Management cost = initial management cost * managerial class * (1+ management cost increase coefficient)

Managerial class ={0.3,0.5,0.8}, the higher the value, the higher the management level, the better the management level.

Management cost increase coefficient ={0.3,0.5,0.8}, respectively representing the increase coefficient of management cost corresponding to the management level.

Schedule pressure = table function (remaining workload/weekly completion workload)

Planned completion rate =10 pieces/day

Unknown defect =INTEG (0, rework rate), dimensionless

Material inventory on construction site =INTEG (material purchase rate - material consumption rate, initial inventory on construction site)

In the formula, there is pipeline DELAY and DELAY FIXED (material procurement rate, delay time, initial value) when material procurement arrives at the construction site, and material consumption rate = actual completion rate.

The managers will adjust the schedule according to the remaining construction period. Planned completion rate = IF THEN ELSE (planned completion time -Time ≤ 0, planned workload, planned workload/(planned completion Time -Time))

Completed workload =INTEG (100, actual quality change + weekly completed workload) piece

Other purchase costs = 500,000 yuan

Actual quality change = normal quality level *(1- unknown defect)*(1- effect of overtime on quality)*(1+ effect of management level on quality)

Actual quality accumulation =INTEG (actual quality change, actual quality accumulation)

Actual average quality = actual quality accumulation/actual completion time accumulation

Remaining work time =INTEG (- change of actual completion time, remaining work time)

Change of actual completion time =(actual completion time accumulation - remaining work time)/ actual completion time accumulation

Weekly completed workload =INTEG (- actual completion rate, weekly completed workload)

Unit workload cost = remaining workload/remaining working hours * normal unit price of the worker

Change of actual cost = total cost of planned work- remaining workload * unit workload cost + overtime cost + management cost

Actual cost accumulation =INTEG (+ change in actual cost * actual completion time accumulation, 1000000)

4 Results of Simulation

Cost overruns factor =ABS (total cost of planned work - Actual cost accumulation)/ total cost of planned work

Schedule delay factor =ABS (completion time of planned project - actual completion time accumulation)/ completion time of planned project

Quality loss factor =ABS (normal quality level - actual average quality)/ normal quality level

Degree of harmony = cost overruns factor * schedule delay factor * quality loss factor
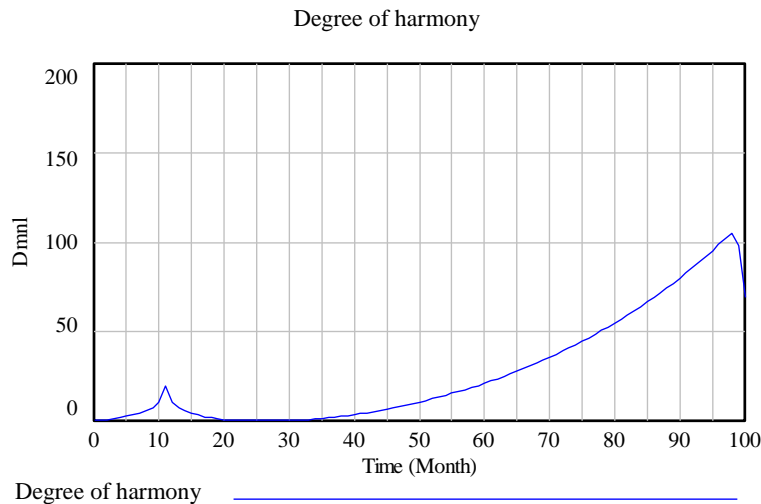
Degree of harmony

Figure 2   Simulation Results of Harmony Degree

In the initial state, the engineering harmony changes in stages. From 0 to 11 months, it shows a linear growth trend, and the engineering harmony increases from 0 to 19.6513. In the period of 11-22 months, it then shows a downward trend, falling to 0.0674499. In the period of 23-98 months, it shows an exponential growth trend, and the degree of harmony is once increased to 104.659. In the last two months, the degree of harmony drops to 68.7107. The lower the harmony value we pursue, the better. It indicates that cost overruns, schedule delays, quality losses and other problems will be less. This point is in the 22nd month, the harmony value is 0.0674499.

5 Conclusion

Engineering has multiple processes, multiple schemes and multiple objectives, and the whole system is complex relatively. This paper assumes the construction of a harmonious engineering system based on multiple processes, one scheme, and multiple objectives. And at the same time, there are punishment of cost overexpenditure, schedule delay and quality loss. The study found that, in the initial state, the engineering harmony changes in stages. From 0 to 11 months, it shows a linear growth trend. In the period of 11-22 months, it then shows a downward trend. In the period of 23-98 months, it shows

an exponential growth trend. In the last two months, the degree of harmony drops to 68.7107. The lower the harmony value we pursue, the better. It indicates that cost overruns, schedule delays, quality losses and other problems will be less. This point is in the 22nd month, the harmony value is 0.0674499.

The harmonious engineering construction is different from the general engineering construction. The engineering itself is to achieve the balanced optimization of quality, duration and cost, rather than the maximization of a single goal or the comparative optimization of two goals. Therefore, a single objective function of quality, duration and cost should not be constructed, and multiple multi-objective functions must be built. That is to say, the harmony of engineering construction is not to seek the optimal solution of single objective with the highest quality, the shortest construction period and the lowest cost, or comprehensive optimal solution of them, but to seek a satisfactory solution of quality, construction period and cost coordination under the consideration of economic, political and environmental factors. Thus it achieves the technical goal, the economic goal, and the environment goal of harmonious engineering system.

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A Critical Review of Financial Distress and Business Failure Prediction Models

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Abstract: This report, based on past academic literature, aims to provide analyses on the concept of financial distress and to assess the Altman's Z-score model by comparing it to other financial distress prediction models. To achieve this end, the report introduces in section 2 the theory and the definition of financial distress, as well as presenting an example of the shipping industry in China. Section 3 gives a literature review of preceding financial distress prediction methods. In section 4, this report discusses advantages and limitations of the Altman's Z-score model. The final section offers conclusions and critically evaluates the following view: "Altman's Z-score approach provides us with all we need to know in this area, therefore alternative approaches are surplus to requirements."
Key words: Financial distress; Altman's Z-score model

1 Introduction

Financial distress theory has become one of the forefront and hot issues of capital structure theory, especially in recent decades.

In Beaver's (1968) study, he identified 79 firms as in financial distress, including 59 bankruptcy firms. Carmichael (1972) following Beaver's study, defined the financial distress as to fulfil their obligations for the company blocked, with specific performances such as lack of liquidity, equity, debt default or lack of funds and other four forms. And according to Pastena and Ruland (1986), financial distress is a condition where a firm is unable to pay debts when due, and the market value of its assets is less than total liabilities. The firm usually continues to trade under court protection.

Kahl (2002) observed that financial distress had long-term impact on the capital structure, investment policies, and performances of many firms even after they emerged from debt restructurings. While preceding studies have also shown the same tendency. Campa and Camacho-Miñano(2015) indicated that firms' negative operating income existed for 5 years after their bankruptcy protections. And Gilson (2012) showed that firms continued to be highly levered, even after suffering from financial distress.

Financial distress can be very costly(Guariglia et al., 2016)(Baghai et al., 2016). Gupta et al.(2014) clearly indicated that the cost of financial distress could be separated as direct and indirect. This is also the most used method. Direct costs include bankruptcy fees and legal fees. Indirect costs, according to Erel, Myers and Read (2015), can be caused by underinvestment. And this underinvestment can also lead to the loss of good employees and the product-market issues.

However, Adelino and Dinc(2014) and Farooq et al.(2012) used ex ante cost and ex post cost to evaluate the total cost of financial distress. Ex ante cost means the cost before firms go bankruptcy, such as the managerial cost and the risk cost. Ex post cost means the cost after firms go bankruptcy, such as the transaction cost during the process.

2 The Literature Review of Bankruptcy Prediction Models

Beaver et al. (2016) used financial information utilized univariate techniques to predict financial distress. He computed a financial ratio to separate failed from non-failed companies, based on a historically derived benchmark for that ratio. He also indicated that the ratio of cash flows to total liabilities proved to be the most efficient.

Altman (1968) first used multiple discriminant analysis, also known as MDA. This method is able to deal with combinations of two or more variables, and has largely increased the prediction accuracy. In 1977, Altman, Haldeman and Narayanan have brought ZETA model to people's eyes. The model is specified as: $Z = 1.2A+1.4B+3.3C+0.6D+1.0E$, where Z means Score, A means Working Capital/Total Assets, B means Retained Earnings/Total Assets, C means Earnings Before Interest and Tax/Total Assets, D means Market Value of Equity/Total Liabilities, E means Sales/Total Assets.

Meyer and Pifer (1970) applied the least square method to predict financial distress, mainly bank

failures however. They ran the regression analysis and discovered that one of those variables had shown a high level of goodness of fit, with R-Square equalled to 0.70.

Several more recent studies conducted by Jabeur(2017), Antunes et al.(2018), Alessi and Detken(2011), Caggiano et al.(2014), have all used probit and logit techniques. These approaches are widely known as conditional probability models.

Shumway (2001) has brought a simple hazard model in the paper "Forecasting bankruptcy more accurately: A simple hazard model". This approach uses both market-driven and accounting variables to identify firms in financial distress. It also adjusts to risk in different periods and allows for time-varying correlation variables.

3 Reasons for Financial Distress

Agbasonu and Osuagwu(2015) has proposed 8 reasons for financial distress, using theoretical analysis and case studies. These 8 reasons are: poor firm management, insufficient information, no proper response measures taken according to changes in the operating environment, restricting firm to react to environmental change, excessive business operation, large projects' development, business risk, and highly levered.

According to Chen et al.(2013), a firm's profitability depends not only on its managerial efficiency and its business condition, but also on the outside environment. If the economic does not go well or the industry of this firm underperforms, the level of competition will go up. In China, for instance, the change of policy will significantly influence the market, due to its incomplete market regulations. Therefore, some firms may face more risks of being financially distressed.

4 Example– the Shipping Industry in China

As an important foundation and service sector of China's economy, the shipping industry contributes greatly to China's foreign trade development. In recent years, however, following the slowdown of global economy, as well as the international shipping market recession and severe overcapacity, China's shipping industry has met a sharp deterioration. In the year of 2012, the public annual report showed that over 80% of 12 listed shipping companies suffered a huge loss and fell into severe financial distress. This situation not only decreases these companies' share price, but also weakens the faith of both investors and creditors. (Liang, 2014)

Liang (2014) has concluded three evidences on the shipping industry's financial difficulties: Increasing debts, decreasing debt-paying abilities, and less profit.

According to the table below, the total liabilities of China's shipping industry have increased enormously during this period. The long-term debts have increased 199% from the year 2008 to the year 2013. While on the contrary, the equity capital has experienced a huge decrease, from 611.25 to 399.15 (￥100 million). Hence, Liang (2014) suggested that the shipping industry in China raised funds mainly by issuing debts.

Table 1   Balance Sheet of the Shipping Industry in China

2008-2013 Balance sheet of the shipping industry in China (￥ 100 million) (resource: Liang 2014)

	2008	2009	2010	2011	2012	2013
Liquid Assets	440.12	551.97	610.25	638.86	634.5	715.88
Fixed Assets	865.44	956.74	1035.63	1092.02	1178.68	1185.97
Total Assets	1167.63	1386.2	1508.68	1574.37	1652.28	1721.95
Short-term Liabilities	239.3	270.68	284.03	473.16	399.05	475.35
Long-term Debts	2045.86	4097.65	3758.59	3315	5301.76	6119.39
Total Liabilities	556.38	852.27	886.48	1072.66	1235.3	1322.8
Equity Capital	611.25	533.93	622.2	501.71	416.98	399.15

However, this empirical approach has several limitations: It only observes the shipping industry in China. Thus, this result may not suit shipping industries in other countries. The result is regional limited; Liang (2014) has not indicated these listed companies' credit ratings; These statistics used are not up-to-date anymore. From our observation (Finance China.com, 23 Mar 2016), the financial situation of the shipping industry in China has experienced the worst year in 2014, and then has become slightly better.

5 Assessing Altman's Z-score Model

This section mainly introduces Altman's Z-score model in details, and discusses its achievements as well as limitations. Then it comes to the comparison between various bankruptcy prediction models, such as ZETA, Smaranda's(2014) application of Ohlson's conditional probability model, and the simple hazard model. At the end of this section, there is a summary including some criticisms of traditional accounting-ratio-based measures.

Basically, the multivariate discriminant analysis suggested by Altman (1968) classifies a firm into one of two groups: failed firms and non-failed firms, using a statistic Z score, which is a weighted combination of ratios. If Z score is bigger than zero, then the firm is healthy and not distressed; if Z score is smaller than zero, then the firm is classified as distressed. In United States business environment, Altman (1968) predicted 72% of the firms' financial distress with two years prior to their happening.

Although this approach is widely used: over a hundred studies have applied multivariate discriminant analysis to the prediction of business failure (Keasey and Watson, 1991), this does not necessarily equal to a high level of predictive accuracy.

According to Keasey and Watson (1991), there is a major disadvantage in Altman's Z-score model. That is: the multivariate discriminant analysis is not able to determine the significance of individual variables, for this analysis' coefficients can take on any value as long as the ratios between the coefficients of the variables are held.

The ZETA model (Altman et al, 1977) is an updated new version of z-score model (Altman, 1968). In ZETA model, two more variables are added in order to give a better prediction of bankruptcy firms. Altman himself has implied in 2000 that the ZETA model showed more accuracy in predicting firms' failure.

Conditional probability models are less demanding compared to multivariate discriminant models. Because the probit and logit techniques apply cumulative probability distributions and do not demand the independent variables to be multivariate normal (Keasey and Watson, 1991). This method can also determine the significance of individual variables, while not having the same demanding assumptions as multivariate discriminant analysis.

Shumway (2001) developed a hazard model for predicting firms' bankruptcy. This method is theoretically superior to the traditional accounting based models used previously for it is said to have corrected for period at risk and allowed for time-varying correlation variables. At the same time, this hazard model is quite simple to perform.

Agrawal and Maheshwari(2016), Matús(2016) and Andrikopoulos and Khorasgani(2018), Lee et al.(2015), Gupta et al.(2015) have outlined some criticisms towards the traditional accounting based measures. The first one is its historical nature: accounting based models present only past performance of companies. Secondly, accounting based models are built on sample analysis, which indicates that such models are very likely to be sample specific. Thirdly, management can easily manipulate accounting statistics. In addition, there could be various accounting standards.

To sum up, Altman's Z-score approach does have great many advantages. However this approach is definitely not a perfect one and needs to be continually amended.

6 Conclusion

This report focuses on the interpretation of financial distress and provides comparisons between various bankruptcy prediction models. It firstly discusses the concept of financial distress, based on many academic literatures. Then it uses an empirical approach, analysing the shipping industry in China. After given an overview of financial distress prediction models, this report continues to study the uses and limitations of Altman's Z-score model.

Finally, this report gives following conclusions: A). Financial distress has long-term impact on the capital structure, investment policies, and performance of many firms. B). Financial distress is never costless. C). Altman's Z-score approach cannot provide us all we need to know in this area, every model has its limitations.

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A General Analysis of Enterprise Risk Management

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Abstract: Enterprises will encounter various kinds of risks in their daily production and management activities. Developing and strengthening risk management has become an indispensable work to maintain the existence and development of enterprises and is also an important content of modern enterprise management. This paper explains Enterprise Risk Management in details from four different perspectives. This paper analyzes the definition of Enterprise Risk Management, some factors influencing ERM, the ERM process and value at ERM. It comes to the conclusion that ERM makes great contribution to the development of companies and it can be improved through continuous effort and attention. This paper is beneficial for companies which needs more attention on ERM.

Key words: Enterprise Risk Management; Factors influencing ERM; Process of ERM; Significance of ERM

1 Introduction

Because of the economic crisis, many executives now realize that single risk can only be taken serious in the interaction with other risks. Risk is no longer considered isolated, but is identified, analyzed and controlled within the framework of all interaction risks (Passenheiem, 2013). Recent research has proved that almost all companies are looking at these risks in isolation. In the past few years, many subsidiaries have developed independent subsystems, such as legal requirements for managing risks. These companies focus on single risk, such as the Ministry of finance or compliance. The dependence between risks is often unnoticed.

This paper shows some information about risk management and enterprise risk management in detail. At first, this paper explains the main definition of risk management and enterprise risk management. It is not only about the definition of those two, but also about some specific relevant information, such as processing method etc. Then, it focuses on some factors which would make an impact on enterprise risk management.The fourth part shows the process of enterprise risk management. In short, the process includes risk identification, risk analysis, risk response and risk controlling. The final part is the significance of enterprise risk management to enterprises. In other words, it analyzes the reasons of enterprise risk management and how it could add value to the firm. The paper analyzes the significance of Enterprise Risk Management (ERM) from a comprehensive and detailed perspective.

2 Definition of Enterprise Risk Management

The structure of corporate risk management and the model and method of risk management based on established, technical and statistical experience do not always take into account the constant changes in market environment and the structure of the company. What usually lacks is the logical alignment between risk management and strategic business objectives. (William, 2015)

The challenge for the company is to integrate its built subsystems to develop a dynamic, integrated, company-wide risk management system. To establish a risk management function, administrators should not only position themselves in the company's goals, but also position themselves in strategy and culture. The company hopes that the objectives achieved through its risk management strategy must be compatible with the overall business objectives. At the same time, lessons learned from risk management can also lead to the adaptation of corporate goals and corporate strategies.

Finally, enterprises must look at the whole risk area they are in. In addition to classic risks, it can be strategic, operational and financial, or concerned with the legal environment, and the so-called emerging risks must also be taken into account. The emerging risk is global risk, which can be predicted only by climate change, political instability or energy price fluctuations. (Best, 2006)

The overall risk management is to carry on the comprehensive risk management to each link and process of the enterprise production and sale according to the enterprise management strategic goal, to cultivate the good risk management culture of the enterprise, and through the establishment of the comprehensive risk management system to achieve the overall goal of enterprise risk management.

Through the research and analysis of many scholars and experts, it is concluded that there are some

root causes of the current internal control of enterprises, such as the insufficient risk management of enterprises, which often limits the internal control of enterprises. Now people begin to pay more and more attention to the effective combination of internal control and risk management, strengthen risk management on the framework of internal control of enterprises, enhance internal control, and promote its identification and judgment of its own business environment and risk factors. (Gao, 2018) It would help enterprises keep up with the pace of market development, conducive to strengthening enterprise management, improve the strength of enterprises.

In the current theoretical research, there is no consensus on the interaction between risk management and internal control. Among the more mainstream views, the first is the framework theory of the United States, which holds that the latter includes the former, while the view of the Canadian scholars is that the former includes the latter, which gives rise to a third understanding. There is no relationship between the two. In the current research city, the first case is that internal control contains risk management.

3 The Framework of ERM

First is the internal environment. Whether the internal environment is good or not has an important impact on the future development of the enterprise. The internal environment is the important basis of other risk factors and provides the structure and rules for other elements. Whether the internal environment is good or not directly affects the construction and implementation of the enterprise risk management system, and directly affects the implementation of the enterprise risk management framework. (Zhou, 2018) Therefore, to strengthen the enterprise risk management, the first step is to strengthen the enterprise internal environment construction. The internal environment includes the knowledge system of risk theory, such as risk management philosophy, risk preference, internal moral integrity, board of directors' trustworthiness, moral value, human resource policy and assessment standard, competence and so on.

The goal setting refers to the enterprise management personnel, based on the current management objectives, to formulate and improve the strategic objectives of the enterprise, to clarify the related objectives, to strengthen the responsibility decomposition, and to implement to the people. Other related objectives mentioned again refer to three objectives that do not include the strategic objectives of the enterprise. The determination of strategic objectives is the most important part of enterprise risk management.

In the process of enterprise management, the enterprise managers should further clarify the uncertain factors in the process of implementing the strategy, and the factors that have adverse effects on the development of enterprises are called risks, and managers should respond to them in a timely manner. We call it an opportunity to promote the development of enterprises and reduce the possibility of risk. We should clearly distinguish risk from opportunity, so as to carry out relevant activities, reduce risks and seize opportunities.

Based on the analysis of the possible risks and adverse effects in the future development of enterprises, the management of enterprises is formulated and perfected. Before the risk assessment, we should fully integrate the strategic objectives of the enterprise. First of all, we should evaluate the existing risks, formulate reasonable measures to deal with the risks, and strengthen the measures to deal with the inherent risks. Secondly, the residual risk of the enterprise is evaluated.

After the enterprise risk assessment is completed, as the managers of the enterprise, it is necessary to formulate reasonable measures to deal with the risks. The ERM framework puts forward the following four types of countermeasures: risk avoidance, reduction, sharing and bearing. Enterprise managers should effectively integrate cost expenditure and risk tolerance, give full consideration to the dispersion of risk and the impact of various coping schemes, and find the best risk response plan to be implemented through comparison. Effective risk management requires managers to fix the possibility and impact of risk within the scope of SCR.

In the whole process of risk management, the establishment and adjustment of the activities, so that the real implementation of risk response measures. Risk management is accompanied by various links, levels and functional departments of enterprise production and management. It mainly includes two parts: to determine the policy and the degree of policy influence. Activities include approval, authorization, validation, reconciliation, performance audit, asset safety, and segregation of duties.

The process of enterprise production and operation is full of a lot of information, financial management information and enterprise management information is particularly important, is an

important part of enterprise production and management activities; In the early stage of information processing, responsibility and other important issues occupy a very important position. Information is the main content and object of communication, and communication is an important way to ensure the steady transmission of information. The research shows that the timeliness and effectiveness of communication are more conducive to the management right of enterprise managers and the smooth realization of enterprise management goals. Therefore, it is necessary to strengthen the information identification and processing, realize the effective communication of relevant departments, clarify the responsibility and implement the responsibility to the people.

The process of managing multiple components of risk and sustainability of risk management level. Risk monitoring prior, in the event, after the information has changed at any stage, monitoring information, reasonable adjustment. Monitoring methods are mainly divided into two categories: first, continuous monitoring. In the process of implementation, continuous monitoring is carried out to deal with all kinds of risks quickly to ensure the healthy operation of the enterprise; the second individual evaluation. Management decisions have a significant impact on frequency. In the process of enterprise decision, the following factors should be synthesized: the degree, nature and related risks of the internal and external environment change, the ability of risk execution and reaction, the strengthening of staff experience ability control, and the conclusion of continuous monitoring. (Li, 2017)

4 The Relationship between Enterprise Internal Control and ERM

Internal control and risk management are consistent to a certain extent. This is because both internal control and risk management play a positive role in the production and management of enterprises, and they run through the daily management process of enterprises, which is helpful for enterprises to realize the strategic goal planning smoothly. Risk management can prevent risk, detect risk, assess the loss that risk may bring to enterprise and effectively control risk. Internal control is the risk management adopted by enterprise, and its basis is risk. The greater the risk, the more internal controls need to be put in place. (Gong, 2018)

There are three views on the relationship, one is that risk management includes internal control, the other is that internal control includes risk management, and the other is that internal control is equal to risk management. At present, what has been unanimously recognized by the academic community is the former, that is, risk management includes internal control, and in addition to the goal of including internal control, it also expands the scope of the overall framework. To stand on the enterprise strategic development level to analyze the problem, and to solve the enterprise in the management process of many drawbacks, in the enterprise risk management involved in all aspects can play a greater role, and the internal control is mainly in accounting control, Role of audit activities, etc.. (Zhao, 2013)

5 The Factors Influencing ERM

One of the main factors which would influence inspection is that the existence of chief risk officer is positively related to the implementation of ERM (Mark et al., 2015). People will expect that having CRO will make the company more inclined to implement ERM because of its professional knowledge and possible CRO fit in the organizational structure. In addition to having CRO, researchers believe that the higher proportion of independent board members may lead to a higher likelihood of ERM implementation. Researchers put forward this hypothesis from the research done by Kleffner (2003), which shows that Canada Company's adoption of ERM is achieved through the encouragement of the board of directors.

The board of directors plays an important role in affecting the implementation of ERM, and management is the driving force of ERM implementation within the company. Without the support and guidance of management, ERM will not succeed in the organization. The study (Kleffner ,2003) examined the explicit requirements of chief executive officer or chief financial officer on internal audit participation in ERM. This has questioned the relevance of external auditors and its impact on the implementation of ERM. The researchers studied the relationship between the existence of the Four Auditors and the ERM deployment stage of the enterprises. Researchers believe that the four auditors are more inclined to risk management because of the explicit requirements of industry regulators and leaders. The study also examined the size of the organization and the implementation and phase of ERM within the company. It is expected that the size of the company is related to the four audits, two of which can work together to promote ERM.

The ability to cause economic fluctuations, such as the banking industry, is further found in the

implementation of ERM because of the inherent risks that shareholders, auditors and regulators experience after a variety of corporate scandals. With the development of the industry, the ability to manage risks must evolve along with the understanding of ERM managers in enterprises.

6 The Process of ERM

The purpose of monitoring all risks is to increase the value of every activity within the company. The enterprise risk management process mainly consists of target setting, risk identification and analysis, risk assessment measures, risk response, control activities to risk response, information and communication and good operation of monitoring and ensuring risk prevention.

Risk identification is the premise of all the following steps in the process. Risk identification should be done as a continuous process. If it is regarded as a one-off event, the whole company will be faced with the risk of emerging problems. The process begins with determining the start-up stage of the first risk. Resource allocation, scheduling and budgetary reserve plans at the planning stage should also be recorded.

All in the initial stages of risk identification, risks must be managed, until each risk was closed or terminated. And along with the development of the company, the changes of the company's external environment and internal environment will arouse new risks. The possibility of increased risk or risk into reality, the risk management team should respond to its managers and executives must consider the problem and develop strategies to deal with it. All the rezoning of action means change, which became the basis for the budget schedule and resource planning.

7 The Significance of ERM to Enterprises

Companies that maximize profits should consider implementing an ERM plan, only when it increases expected shareholder wealth. Although the individual advantages of different risk management activities are obvious, the traditional "silos" risk management methods are inadequate. Lack of coordination among different risk management departments will lead to inefficiency in managing each risk level in a separate silo. By integrating decisions of all risk categories, enterprises can avoid duplication of risk management expenditure by using natural hedging. Companies engaged in ERM can better understand the total risks inherent in different business activities. This provides them with a more objective basis for resource allocation, thereby improving capital efficiency and return on equity. Organizations with a wide range of investment opportunities may benefit from choosing a more precise risk adjusted ratio than traditional risk management methods.

Although individual risk management activities can reduce the volatility of earnings by reducing the probability of catastrophic loss, there is a potential interdependence between the cross activity risks that may be ignored in the traditional risk management model. ERM provides a structure that integrates all risk management activities into an integrated framework that helps identify this interdependence. Therefore, although individual risk management activities can reduce the volatility of income from specific sources, the ERM strategy reduces volatility by preventing risk aggregation between different sources. Another source of value for the ERM program is the improved information on the company's risk profile. Outsiders are more likely to assess the company's financial position and risk in terms of financial risks. ERM enables these opaque companies to better inform of their risk profile and signal their commitment to risk management. By improving risk management disclosure, ERM may reduce the expected cost of regulatory review and external capital. (Cui, 2016)

In addition, for insurance companies, the major rating agencies have placed the focus of risk management in a higher range, especially ERM as part of their financial review. This may provide additional incentives for the insurance company to consider the ERM project, and also imply the potential value implication of the ERM project of the insurance company. In October 2005, Standard & Poor's announced that with the emergence of ERM, risk management will become an independent main category of its analysis. In February 2006, A.M. Best released a special report describing its increasing concern for ERM in the rating process.

8 The Specific Suggestions to Enterprises based on ERM

First of all, the company should perfect the internal risk management system, combine the development goal and development strategy, construct and perfect the risk system, know the standard of the risk management work, and give the concrete risk management mechanism. The risk management of the company mainly combines the risk management direction and the idea of risk management. Based

on this, the strategic conception and goal that accord with the development of the company are worked out, which is the premise of the construction of the risk management system. The construction of enterprise comprehensive risk management system involves more complex theory, and also related to the work of various departments within the enterprise, so the company should build a multi-angle and three-dimensional management plan. In establishing a risk management system that conforms to its own characteristics, the company applies the eight elements of risk management, risk identification, risk analysis, and risk assessment. Risk management system should be set up in four links, and risk management system should be re-established and improved, and the system should be set up around these four basic links.

To create a good enterprise culture atmosphere is helpful to promote the enthusiasm of employees and create the atmosphere of risk management culture, then to improve the level of risk management within the enterprise, to ensure that the enterprise risk control goal to meet the standards. In the process of cultural construction and strengthening the risk control mechanism of the enterprise, it is also necessary to carry out the construction in this respect, which is regarded as the key goal of the development of the company. In the eight elements of risk management, it is pointed out that the quality of internal environment directly affects the normal operation of the company. It is the cornerstone of the company culture to improve the skills of the employees on the basis. Modern enterprises should not only strengthen their business, but also strengthen their corporate culture. The culture is inherited, and the employees of the company are highly qualified talents. Working in this kind of good and upward cultural atmosphere can stimulate the enthusiasm of employees and improve work efficiency, which is of positive significance to the construction of risk control mechanism framework of enterprises. The enterprise carries out many kinds of education and training to the employees to understand the culture of the risk control mechanism of the company. While creating a good corporate culture environment, management and middle-level cadres should play a leading role. At the same time, the core staff of various departments should take the initiative to respond positively to the call, give play to the backbone role, and form good professional integrity. The internal and external business of the company is carried out under the operation of legal compliance. In addition, we should establish the system of prevention and control in advance, predict beforehand, control in the middle, and strengthen the management of all aspects of risk after the event.

Messaging is the form of communication, learning, use and advice across multiple departments within a company. Good message delivery enables the company to keep track of the business situation and to prevent and defend against internal emergencies. Therefore, the establishment of the risk management information channel from top to bottom can ensure that the information can be transmitted and shared from top to bottom or from bottom to top, so as to ensure the accurate and timely transmission of information. The transmission of information needs the following conditions: first, there is a clear text that can be related to the risk control mechanism, so that those employees in the risk control mechanism can communicate with Curie; The second is that the risks that have emerged can be dealt with at an accelerated rate, and that information can be used between every department of the company and its managers.

After the improvement of the risk control mechanism, the enterprise should supervise and improve the implementation of the risk control in the future. These work need the close cooperation of all the staff and the management, and the basis of cooperation is that the employees can clearly understand their post responsibilities. Management can exercise supervision and guidance. And risk monitoring must have a dedicated body, such as a risk supervision and management team. The company itself has a low ratio of human resources to wind control. If a risk management chief executive is introduced to the management level, then the management can take the importance of risk management seriously. The Chief Executive Officer of risk Management will be able to put forward rationalization proposals when making risk decisions in the future H Investment Company, so that the risk crisis of the enterprise will be reduced, and the investors' investment will be guaranteed. The risk control mechanism must be combined with the risk prevention department to perfect the risk management.

In the eight elements of risk management, each element involves the executor, every link of the executor to do in place, risk management work twice the result with half the effort, so the executor factors are very important. There is also a wide range of risk awareness, prevention, control and decision-making, wide knowledge, and the need for high-skilled personnel in many fields. In this way, we need to focus on talents, according to the advice of risk prevention in many aspects, to be responsible for people's thinking, to increase the training of enterprise staff, to upgrade their skills, to enhance the quality of risk management of the team, and to create a cohesive force. Responsible, professional

knowledge of the risk management team. In addition, enterprises establish effective and practical training programs for all employees, so that each employee can mention the training time, increase the professional knowledge of those risk control personnel, and increase investment in skills education. So that they can keep up with the needs of the company and business needs, the quality of continuous improvement. In addition to the company's risk control staff training, but also external recruitment of those with strong professional skills to strengthen the company's personnel structure.

Generally speaking, the establishment of the risk management framework system of the company should meet the needs of the development of the company, mobilize and publicize the importance of risk management within the company, and raise the risk management awareness of all employees. Raise risk management to strategic management and set long-term planning goals. In addition, the paper analyzes the current situation and reasons of the company, and puts forward some suggestions for optimizing the internal operation process of the company. When supervising the internal operation process of the company, it should communicate and convey the information in time, strengthen the internal risk management mechanism, and improve the external risk supervision. Optimize the organizational structure and responsibilities of risk management and strengthen the training of talents.

7 Conclusion

With the acceleration of the integration process of the global economy, the internal control and risk management are an eternal theme for any country's enterprises. If administrators do not attach importance to the risk, it will seriously threaten the healthy development of the enterprise and even the survival of the enterprise, which will seriously cause the bankruptcy of the enterprises.

In order to drive the enterprises to pay more attention to ERM, this paper analyzes the various aspects of ERM from the elementary to the profound. After the generalization of the basic definition of ERM, this paper lists four factors which might influence ERM that are CFO, the board of directors, the industry that enterprise dwells in and components of the headquarters of the enterprise. And the paper also gives an ideal process of the process of ERM while putting emphasis on the stage of risk identification. By integrating information and citing appropriate examples, this paper aims to highlight the significance of ERM to the enterprises in today's economic environment.

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Connective Leadership, a Challenge for Organizations: How to Manage a New Tool in the Whats App Business Groups

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Abstract: The main goal of this article is something that concerns to the corporate world that is working with social networks, more specifically the WhatsApp application, in mediating a business leadership proposal. More broadly, social networks facilitates the communication process, speeds and issues such as time as space for improvement in organizations because today we know the need for agile and effective communication, and for this, to work efficiently if should make use WhatsApp Business, a revolutionary tool that is changing the way organizations communicating with their internal and external customers, and have greater control over the results from this new tool. As a study contribution, effective use occurs with good connectivity with adequate and effective functioning, using a PDCA tool, whose approaches will be presented in the course of this work.
Key words: WhatsApp; Leadership; WhatsApp business; Connectivism; PDCA

1 Introduction

Many companies of the world already work their leadership model based on connectivity, by social network like Facebook, Instagram or more popular and conventional as WhatsApp. The main question about use of technology is not implicit only about facilities as speed and time given, but on the effectiveness of the actions, process and ways of work using applications. What more bores the group's administrators is the organization of them, besides the respect about the established rules for efficiency on the processes of leadership applied to optimize the activities in the companies.

The applications in a general way facilitates the communication process when applied in benefit of the company, but must have their rules and for this must have good leadership that many times passes on the basis the leading format and has to be respected by the whole member of the construction process for excellence of leadership in a connectivity purpose.

The applications in general facilitate the communication process when well applied to the company, but must have rules and for this must have a leadership.

The ideal based on the purpose is working with small groups of at most 50 persons to have homogeneity of language, when it come subjects and collaborate to improve the leadership process in the WhatsApp group.

In a general sense, the social media have shortened and improved the distances on communication. Nowadays, the messages are answered instantly, with the possibility of instantly receipt too. The actor of nowadays has been bombed with information beyond of what researched by many information sources. This is because telephone that before was a set to make and receive calls nowadays has many applications. A Social Media Apps (SMA) found a way of entering the work environment by the computer, tablet or IPhone and Smartphone, online and all time.

WhatsApp is an example of one of many applications that comes standing out concerning the user membership for personal use and recently for professional use too. Here in Brazil we have reached the mark of more than 1 million users only in 2015 (Carvalho, 2015), arousing interest of the organizations for this tool, and what was personal, migrated to the professional quickly. Business conduction has been done by SMAs, that strengths relationship between leaders and employers, customers, and narrowed providers and other companies. Although it may be identified on the researches made, in different fields of science, it is not noticeable yet, for the researchers, indications referring to the frequent utilization of the social networks during work (Rinker, Bessi, 2015).

In contrast, using the social networks for performance of the work's activities generates repercussion on labor courts, once employers do allege that misuse of this tools at work period and worker, by another hand allege that the app has been used as a vehicle for tasks that demand additional

hours beyond the pre-set time by theirs employment contract. A fact, that became observed, is that WhatsApp has been used by professional purposes, modifying the routine and efficiency of working communication, improving this into organizations. The inclusion of new technologies are changing the nowadays scenario about working day, and carrying effects in the way as workers are relating with their work's activities, observing that occurred increasing instability this way. The main proposal of this project is related to (PDCA) into the group of WhatsApp, collaborating significantly for that the leadership be aligned to the established strategies in a work with the proposal approaching connectivist leadership.

With this is expected for companies are more efficiency and excellence of productive processes by using the app on leadership processes.

This work searched identify the changes promoted by the use of app WhatsApp potentialized by PDCA tool in a corporate environment. After the contextualization of the research object, occur the review of text and then the demonstration of methodological procedures, followed by the socialization of the conclusion of their authors.

2 Theoretical Revision
2.1 Social Networks, Apps and their importance for the communication process in companies through the WhatsApp

WhatsApp has its source from California (USA) in 2009 by two persons that, together, have spent 20 years working on Yahoo! before founding WhatsApp. Their names are: Brian Acton (American) e Jan Koum (Ucranian) with the objective of replacement the SMS. Its principal function is exchange messages by cellphone, just having a date plan of internet and a Wi Fi network (Carvalho, 2015).

The app works in iPhone, BlackBerry, Android, Windows Phone, Nokia and Sim.

It allows create groups, changing written dates or figurative beyond audio, therefore, one complete tool for dissemination of information from mobile to mobile.

In 2014, WhatsApp has been sold to Facebook – strongest world's social network – by approximately 16 billion dollars. Their founders were introduced yet to the Board of Directors of Facebook (Carvalho, 2015).

These 2 giants joint venture of social network collaborated significantly for the propagation of information and facility of connectivity among people.

An important factor that must be viewed is that WhatsApp is a free app and, therefore, facilitates connection of people encouraging many people have this app in his mobile.

Second Oliveira et al (2014) in Saccol, (Shlemmer and Barbosa, 2011):

Learning processes based on usage of information technologies or communications mobile wireless, which main characteristics is the mobility of the apprentices that can be far one of each other and from education formal places, like training classrooms or place of work (Oliveira et al, 2014, p. 23; Barbosa, 2011).

Practicality of the app is in the fact the student doesn't need to be in the same physical place the teacher, and so this kind of education may be propagated by M-Learning in real time so that the student can open texts, illustrations, pix and audios any place, since he is connected to a mobile network of internet.

These advantages may be seen on the table down:

Table 1   Advantages Using WhatsApp for Learning

Practicality	The content can be accessed from any place since it has a Wi Fi network and internet
Cost	There is no cost being a free app
Autonomy	The person who belong the group may access any hour of the day, because the dates are stored.
Leadership	Always we deal about learning processes, teacher must be the mediator of the subjects with participation of the students.
Organization	The guidelines and subjects must be organized by group with professor's help.
Interactivity and participation	Everybody can contribute for the elaboration of the questions and solutions.

2.2.1 Practicality

The app WhatsApp is a model of network where inedible can access from where they want, including around the world, just have a Wi Fi network for connection and one internet wave, practical for people who want access their dates wherever they are and at moment they want. Everybody can see texts, open pix, graphics and tables, hear audios an also pass on doubts interacting with another people of the group and yet building information with other members.

2.2.2 Cost

For many times it has been tried to charge the app utilization, but it is a free model without costs where inedible, accessing and downloading the app, can create many groups that can be for studies, professional or even entertainment.

2.2.3 Autonomy

The question autonomy depends on which group the person participates, because the group work may be scheduled at times and accessibility, therefore, the configuration variables of study, if scheduled, must be discussed by the group and their members.

2.2.4 Organization

Another point to be elaborated is the organization of ideas willing in the group of WhatsApp that may be worked with a mediator teacher of the established information by items (subjects) where students interact and collaborate for the creation of contents at the same time they can solve their doubts with the professor, as also help other participants towards the construction of the knowledge in a scheduled form, that is, by items to be explored by the group.

2.2.5 Interactivity and participation

Everybody must interact in the group for it to become a collaborative tool of learning construction. Teacher perhaps will not be the main agent of this, because the pupils, having doubts may have help from other participants through the collaboration of other members of the group. The essential is collaborating somehow, being doubts or solutions for the problems on schedule. By this purpose of education and learning about inserted contents in the group will have an effect much more productive and assertive on construction of improvements about the subjects addressed in the research group.

2.3 WhatsApp and his creator

Jan Koum, creator of the WhatsApp was born in Kiev, a small city in capital of Ucrania and had a childhood without liquor or stewardship and his home nor hot water had. When he has migrated to USA when seventeen, he could survive with food coupon and nowadays, will become a millionaire of the Silicon Valley, because the company founded by him five year ago, WhatsApp will be, certainly, the biggest acquisition of the Facebook history.

Koum signed an agreement of US$ 19 billion in the social center he used to attend with his mother, place where they received the food coupons, responsible for their subsistence at the first years they have spent living in USA and, this way, it worth point out that they moved to America escaping from the Soviet Ucrania tensions as so try to find better future prospects. This brilliant boy is a housewife and a master of works, both already dead, and the attitude and profile of Koum are, surely, an antithesis of what is expected in general from a new multimillionaire from what can be named the Technology 'Meca', the famous Silicon Valley, in California.

This entrepreneur, only 38 years old is, with no doubt, a man of simple habits, and extremely carefully with his intimate life, with solid principles, with relevant ideas, of which it does not intend to depart, although the owner of a company that has the collaboration of   55 employees and becoming an acquisition of the gigantic Facebook, that is known as the most popular social network, with the antagonistic philosophy in in several respects, relevant to the spirit that Koum has developed the most popular instantaneous message service that world has already noticed.

Koum and his partner Brian Acton, created WhatsApp, a free of adverts and related platform that the users hate in the technological world and this new tool take the Yahoo! users to abandon this. For the creators of free instantaneous   message service for universal Androids and Iphones , there are two red lines that weren't exceeded, not even by the   multimillionaire value that Facebook paid by his, up until, small company, however, analysts consider this amount paid a little exaggerated.

Private life of Koum and his childhood and adolescence in a country where it was looking for communications relevant to citizens as well as their privacy, were the precursors of the idea and assured, since WhatsApp beginning, for about five years, this app is able to collect less amount of data of their users who need their cell number only to be possible that their identification, and so, access the service. It's interesting that privacy, particularity of the app collides with the Facebook philosophy that has the striking feature expose the life of their users as an opened book and it was precisely on account of these

dates that achieved too much profit and by this way the social network made a market segmentation, impossible to measure this value.

The fact is thatKoum exactly with the intention free the users of WhatsApp of the usual avalanche of advertisement coming of other platforms, as with his own Facebook, was a prerogative of this self-taught entrepreneur known, by the way, that was a rebel student and that left university before concluding his studies to ingress at Yahoo!.

Mark Zuckerber, Facebook owner, affirmed that will respect, in principle, the goal of do not incorporate advertisers, but yes, do capture new users and on account of this affirmative, Koum and Acton accepted the commercial agreement once Mark won't commodify the differentiated communication service that both offered their users. The young millionaires entrepreneurs are convinced that it will be possible keep the principles, even their company pass to be property of Facebook, surely the social network, on its tenth birthday, that as gift had their acquisition of WhatsApp, keeping attractive to the public, mainly the younger, and keep on sticking its passage to the cell (Carvalho; Carvalho, 2017).

2.3.1 WhatsApp and Slack: group message improvement

One of the problems when using the famous group's on WhatsApp is the inundation of messages that happen in the associations of their users. It is simple: how much more the number of people in a group, bigger the probability in interaction between members multiply with ones with subjects where they think urgent. For some of them that will work until midnight oil, for example, the situation bordering unbearable chaos because, besides the cell has thousands of messages not read, there is also the problem that the battery that through the entering of messages it unloads quickly. It's only one hour away from de cell to create a chaos also including the cell owner that will not have battery.

Trying to solve this disorder, WhatsApp created a new tool that search precisely make easier the administration of innumerable messages exchanged by members of the group. It was titled as *group catch up*, and it is localized in the right corner, at the bottom of the screen, and it can be identified by the "@" (arroba), being that this function allows the user hand the uncountable messages, identifying only at the moments that the user is mentioned on the messages exchange. In this sense, it is easier to reach the parts more pertinent of the chat to the user. There is also another function disclosed by the company, that are the questions with more specifications in reference of the groups configuration only for administrators and, in this sense, only the responsible for the creation of the group can introduce some controls like allow who can change some icons or same the name of the group.

Some proposal to update the app are great and have been created to help and to develop the groups dynamic, as well as help the privacy of members disabled of participating chats during the business hours, for example, or during important meetings. The curious thing is that these ideas had been created and performed by Slack some time ago, like activity notification tools or searching, incorporated to the internal communication program for corporations, centered on the functions like all threads or show activity, tools that search keeping a good cooperation rhythm, that must be constant in the groups that host.

WhatsApp via Slack will increase time limit to include member after it has been excluded or left the group, in order to reduce many possibilities of harassment or *spam* on the platform. The update packet will be available for iOS and Android systems (Carvalho; Carvalho, 2017).

2.3.2 WhatsApp Business

The company developed an app focused exclusively in small and medium-sized enterprises. This app baptized as "WhatsApp Business", with resources that aim to make the entrepreneurs life easier and who search to meet, with primacy their clients by smartphone. It is the result of a crossing between WhatsApp and Slack, commonly known as being a message app that has intelligent resources. This friendly interface had a sober version for companies, but has kept the simple resources for final consumers, as it used to be in the app.

Bellow the main resources of this communication tool

(1) Quick message

Messages Automation: it is possible to configure shortcuts, like "thanks", with the intent of creating thanks texts, valuing the company and reflecting their values. Beyond the automation, there are message for the absence periods too.

(2) Profile

In WhatsApp Business it can be developed the profile of your company as it was a business card for many potential consumers that can come to the enterprise by this new communication channel.

(3) Metrics

It is a statistics menu. It's simple but is a tool for measuring the usage of corporate account in the

organizations. It's possible to view dates pertinent by the sent messages, received, handed out and also read ones.

(4) Hang tags

Also used for messages identification. The idea is using markers lik 'paid' or 'new client' or even about outstanding payments, between other particularities. It also can ad new hang tags, only initializing a new talking, choosing the option reference "ad new hang tag" (Carvalho, Carvalho, 2017).

2.3.3 Connective Leadership and the use of PDCA (Plan, Drive, Control and Evaluate) WhasApp groups

Among many tools of quality, the PDCA is one more widespread and its usage must be seen with caution. Smith (1988) highlights that, in general, the managers tend to apply such tools rather than think about the real solution of the problem. And this can occur due the necessity for obtaining quick results, applying these tool and technics.

In fact, it is much simple than thinking jointly with the Direction on understanding the solution of problems pertinent to quality.

In reference of the technology and apps of WhatsApp, it worth to emphasize that software developers companies are already watching in this app, already widespread among organizations and in this sense, the PDCA will transform PDCA the WhatsApp Business in a tool that will aggregate too much in this app, providing much control and quality, helping the organizations to leverage their business with much more efficiency and quality.

According to Mattar (2013):

Although some authors argue the connectivism mustn't be considered a new learning theory […] The connectivismor learning distributed is purposed by a much more proper theory for the digital era, when is necessary action without personal learning, using information out of our primary knowledge.

This is a relevant and significant fact that must be observed in the companies, because there are people with differentiated cognition about leadership, as well as different models of leaders. So the application of a connective one will depend on many elements that collaborate for the development of this leadership, even if it's based in a active learning where the individual understand the importance of working with mobile.

The connective leadership will work with aspects used on the real world into the app making that de virtual structure is appropriate to the classroom. There are already formal and informal groups that have leadership, as standards and rules established for the utilization and also to be part of the group.

According to Coll (2004) the development consists on the construction of series of structures that determine the nature and breadth of people's exchanges with their medium that, besides this, invariably happen respecting the tendency towards a better balance.

The medium in question is the virtual, through the WhatsApp group, the changes are necessary for good progress of the group, it's up to the leader, by the connectivism be capable keeping the order and do that the planned and expected actions occur through the established exchanges into the virtual environment.

3 Methodology

This study was developed considering a qualitative approach, seeking to value the context that individuals attribute to it (Flick, 2009).

This article was elaborated through a bibliography research, involving articles, sites and books, interpreting their real theoretical contributions (Gil, 2008). As proposed analysis, it was applied a line of reasoning and PCDA model in WhatsApp use.

3.1 How the Project WhatsApp using the PDCA is based on?

(1) Diagnoses

Nowadays there are problems of time and space for information. The idea is create leadership groups in the companies for that the actions can happen in short time and distance without the individuals need be together in the organization. Most of these waste time when the subject is leadership because they need his leader be present to give information to their contributors and the proposal is work with WhatsApp optimizing questions towards these aspects.

But for this to occur the created group for connective leadership must be well structured in a way that people do understand how work by this tool searching for proper quality in the virtual work proposal.

(2) Action

When creating a group specifically to work with leadership based on conectivism the responsible or leader will have to set purposes establishing standards, usage rules as well as goals to be achieved into the work proposal. Thus facilitating the leadership and empowering the exchanges into the app for productivity improvements.

(3) Implementation

The group will be created according the necessities of the enterprise and of the work team; it is suggested that it can't be a bigger one so the leader, by the conectivism can work with dates, planning the content, achieving drive the actions and talks into WhatsApp, controlling the information flow in a time lapse.

(4) Going along

In a WhatsApp group is important keeping focus when do exist a project of leadership, therefore is fundamental monitoring that the leader verify if the subjects really refers to the project, if the persons are participating of the construction process not only of leadership, but of the ways of working and check if the standards of the group are being respected.

(5) Validation

The validation of WhatsApp group will be done according the achievements done by the team within a proposed time on some project and what can be validated is if the use of the WhatsApp tool, trough the leadership, based on connectivism can optimize the leadership processes of a team bringing quality to it.

(6) Evaluation

In this part of the Project it's up to the leader and their led ones establish a clear communication where will be cleared in it what did not go as it should, if there was something behind that could be improved, some settings to the next one using the mobile so as not to happen again.

(7) Feedback

It's important emphasize that the whole involved in the connective leadership project using WhatsApp must be informed about the results and for this it's up to the leader after the end of this inform the team members how was the result using the app.

4 Conclusion

The conclusive dimensions point to for signifying tendencies with respect to constructs referring to personal relationship in organizational environments, as so as in the structure of the organizations. If the intense use of the app is positively valued in reference of its agility to contact people, seek to solve problems and search decisions, in contrast, it has been criticized as regards aspects not fore seen in its unplanned organizational accession intensifying, this way, the absence of organizational boundaries that are not clear. This way is explicit that the critical point is why not its use.

Thus, the app was inserted in the in the everyday organizational environment as a new communication model without being regulated by institutional norms. Because of this, it is observed that the lack of formal internal procedures occurs because of the novelty: organizations did not have time yet to adapt to this tool and, that is why did not formalize institutional norms, then, it can be affirmed that, unofficially, occurred an incorporation of the app by physical persons. It is a simple question, and this is because it is an intimate forum or, maximum it can be affirmed that is a peer negotiation, that choose to answer, or not, a message. If this scenario is taken to the organizational scope, it can be got complexity in its amplitude, because questions like authority line, hierarchy and responsibility, decision power among others are launched.

This point is convergent because it anoints the *emergence* of the contents belonging to horizontalizationand empowerment of people on WhatsApp groups. This way, these contents indicate changing taking place in 'real' structures of organizations that happen in the world, perceived internally in the organizations. These are related to personal and interpersonal changings that people discover, occur with the app utilization since it is from the same that organizational change have been built.

In this sense, individual perceptions are distinct, because there are ones that can't more realize their tasks the same way, changing their routines since they are permanently seen stimulated by the tool: some of them they serve customers till midnight oil and many times do not know how to deal with certain issues with the company; other ones arbitrate different cases, assuming the risk of their bosses among others situations.

The perceptions related to productivity are very varied. Therefore, the WhatsApp normalization by PDCA is imminent, a short way without return. The purpose of this study was precisely to demonstrate

the this tool use that is growing in a frightening way around the world taking organizations begin the use of it, baptized as WhatsApp Business and its resources in order to make easy business life, since attending with success their customers, suppliers and contributors through the use of Smartphones and IPhone. The new version of this app for organizations has been optimizing time and consequently minimizing costs given that it is a free one.

The fact is that many nowadays of space and time problem with information is leading executives create leadership groups in the organizations the way to optimize time and short distances among inverted staff. In this sense, managers that need send information to their subordinates, customers and suppliers quickly implement WhatsApp Business, taking care of questions directed towards space and time instantly.

And for this, just create a group focused on convective leadership, well structured, together with the administration tool, PDCA, so that those involved have cohesive and effective groups for all learn and understand that WhatsApp is more than an entertainment app, a value tool that search adequate quality in a virtual work proposal and it is and it is undeniable to affirm that these are the future organizational tools: very soon, the whole organizations will use WhatsApp Business along with PDCA to administrate and measure the organizational groups in an efficient way, with more profitability at lower cost.

The results of this work point to the necessity of future studies in an interdisciplinary perspective with more deepening the areas of Information Technology, Organizational Studies and People Management, in that the results are related to a new way of organize groups, manage people, beyond consider themselves very important leadership, being formal or informal, as well as the organizational structure and behavior are of major importance on WhatsApp and PDCA thematic tools.

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Linking Ethical Leadership, Value Congruence and Employee Creativity

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Abstract: The aim of this paper was to examine the effect of ethical leadership behavior on followers' creativity. The linkage was investigated with the mediating role of value congruence. The data were collected from 200 employees working in diverse industrial sectors in Gujrat. Data were analyzed using SPSS 22. We used Hayes process to statistically test the mediating effects. The results show that ethical leadership has a positive significant effect on employee creativity. The results also show that mediating effect of value congruence was statistically different from zero. These results have important theorical contributions and managerial implications. Lastly, we recommend longitudinal design for future research.
Key words: Ethical leadership E; Employee creativity; Willingness to take risks; Value congruence

1 Introduction

In the present times, there are rapid changes in the world of technology. The changing technology has shortened the product life-cycles. In order to cope with the competitive situation, companies need to be innovative. Organizational novelty or overall creativity is enhanced by personal creativity (Zhou & Shalley, 2003), which is prejudiced by personality characteristics or by the organizational environment. Consequently, the leaders' role is important. They have deep insights into followers' work and can influence the work environment (Shalley & Gilson, 2004). Various authors have explored leader impact on employee-creative-behavior, focusing on leader–member exchange (Tierney, Farmer, & Graen, 1999), empowering leadership, and transformational leadership (Zhang & Bartol, 2010), but insufficient studies have been conducted on the relationship between ethical leadership behavior and creativity. (Chughtai, 2016) found the relationship between ethical leadership and creativity to be positive and he also reported that authentic leadership nurtures environments that encourage creativity. Nevertheless, there is still a scarcity of research into the process of the effect of ethical leadership behavior on employee-creative-behavior. According to Amabile and her colleagues' intrinsic motivation theory (Amabile, Conti, Coon, Lazenby, & Herron, 1996), intrinsic motivation is also a significant mediating variable in the creativity process, environment affects work force's intrinsic motivation, and this, in turn, affects their creative behavior. The creative process is full of uncertainty and work force must be willing to take risks. Within organizations, risk taking is a willingness to accept challenging tasks to yield positive, organizational beneficial outcomes while being receptive to negative consequence at a personal level. It has also been demonstrated that willingness to take risks is a significant predictor of creativity (Dewett, 2007).

Rokeach (Rokeach, 1973) defined the value concept as "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence". All other values and measures of integrity are based on are called principle values, they are the foundation upon which rest of the values are relied. Among various types of values that may include moral or ethical values, religious, political or ideological values, aesthetic values or the communal or social values. Values may be thought as being hierarchical in nature, in the need to discover the idea of being a value system. A value system is a set of rand ordered values. Which may be heavily disheveled and look on an individual's personal values and independent and cannot meaning fully explain the values of another person or individual. In early life stages, values systems tend to be formed and are very stiff in nature i.e. are very stable. Many longitudinal research studies on values have generally shown the remarkable stability (Rokeach, 1973). A person who observe obedience as his or her value is very unlikely to believe that being disobedient is preferable that being an obedient person. To bring a change in value systems, requires a rearrangement of the relative importance given to the other values (Krishnan, 2008). Same in the case of Organizational values, which are defined as "criterion for work force's evaluation about events, activities, and persons desirably or undesirably". The subjective and internal side of any culture is formed by organizational values all over the world. It indicates that organizational issues can be seen as being solved by values as acceptable and convenient. General aims and standards of any subject organization can be reflected by its organizational values.

They make the individual's personal values and organization's values congruent with each and to complement and supplement each other. Organization causes work force to want to imitate the behaviors which serve reaching aims (Krishnan, 2008).

  In this research paper, we had aimed to answer whether in an unethical work environment under unethical leadership, work force' are willing to take risk and show creative behavior. Do Ethical leaders always show support and allow risk taking? Outcome of such risk can be either positive or negative. Given the importance of willingness to take risks to the creative process, we wanted to explore the mediating role of value congruence in the relationship between ethical leadership and employee-creative-behavior. In all, the purpose of this paper is to contribute to the Pakistani as well as international knowledge by examining how unethical leadership impacts employee-creative-behavior through the mediating role of value congruence.

2 Literature Review

  According to Northouse (Northouse, 2012), ethics is an essential part of leadership. Ethical leaders support and reinforce organizational values. Leaders, consequently, have an important influence on the values created by the society in general and by the organizations in particular. A kind of leaders who give respect to others, allow them to be themselves and behave like their true nature, with cooperative support, convey a sense of absolute value and gratitude of their contributions.

  Ethical leaders highlight the implication for respect. According to Northouse (Northouse, 2010), respect entails tolerance to the opposing opinions, listening carefully to fellows, and empathizing the differing scenarios. Kant (Kant, 1981), however, warned that it is inappropriate to deal a person merely for personal means. A central issue here would be that whether workforce is also obligated to moral rights. Werhane et al. (Werhane et al., 2004) opined that all employees must be entitled to moral rights. In the provision of rights, no cultural or religious biases should be considered. The employer's obligations and worker's right should be integrated (Maitland, 1989). According to Ariss (Ariss, 2003), one of the prime rights of employees in the workplace is well-being and safety. An ethical leader is a torch-bearer of provision of moral rights to employees in the workplace.

2.1 Ethical leadership and employee creative behavior (creativity)

  Chen and Hou (Chen and Hou, 2016) found that "ethical leadership facilitates employee voice behavior, thereby enhancing employee-creative-behavior". High moral standards to the workforce are conveyed by the ethical Leaders, and the raised voices against problems and concerns regarding products, services, and processes are a demonstration of encouragement from certain norms and behaviors of the ethical leaders. Hence, we can state that the absence of the perspective of ethical leadership or presence of unethical leadership will discourage employee-voice-behavior, thereby reducing employee-creative-behavior. Ethical leadership and creativity (Ma, Cheng, Ribbens, & Zhou, 2013) examined the impact of ethical leadership on employee-creative-behavior. They used a multiple mediation model on a sample of work force and supervisors from four Chinese companies. The authors found that "ethical leadership was positively related to employee-creative-behavior, and that knowledge sharing and self-efficacy mediated this relationship".

  Risk taking behavior involves accepting the challenging tasks and taking decisions accordingly in an effort bring positive changes in the workplace. Risk takers do so regardless of the negative outcomes at personal level (Dewett, 2004). Creativity is a high-risk activity, often with a high probability of failure. Only when work force has the willingness to take the consequences of risks are they likely to exhibit creative behavior. Several scholars have highlighted the relation between the willingness to take risks and creativity (Farr, & Klein, 1997).

  Risk taking behavior is a function of organizational environment and style of leadership. It has been argued that leader's style is a point of attention for the followers and they spontaneously react towards it (Tyler & Lind, 1992). For socially distant leaders, the reactions of workforce are far from risk taking (Edmondson, 1999). Ethical leaders lead the workforce according to organizational values, guide workforce to predict future requirements, and help them take risks. Furthermore, ethical leaders are respectful to their followers and give due consideration to the opinions of the followers which breeds positive behaviors in among them, such as creativity. Likewise, ethical leaders also affect outcomes, such as risk-taking behavior (Turner Parish, Cadwallader, & Busch 2008).

  In an increasingly competitive market, managers often confront ethical dilemmas. Enderle (Enderle, 1987) was the first one to propose the idea of ethical leadership. He defined it as a way of thinking highlighting the various dimensions of decision making. It was advocated that the ethical standards be

integrated into managerial decision making. Treviño, Hartman, and Brown argued that ethical leadership contains two elements: the leader as an ethical person, and the leader as an ethical manager. Treviño, Brown, and Hartman listed five elements of ethical leadership: setting ethical standards, taking ethical action, people orientation, performing ethical decision making, and expanding ethical awareness. Brown (Brown, 2005) drew on social learning theory to define ethical leadership as the use of encouragement mechanisms to inspire ethical behaviors among work force. "With regard to the impact mechanisms of ethical leadership, findings in studies show that leaders can positively affect employee outcomes" (Avolio & Gardner, 2005) and organizational citizenship behavior (Rego, Ribeiro, & Cunha, 2010). Furthermore, ethical leaders can be tasked to develop a culture based on values and practices considered to safeguarding interests of all stakeholders (Huhtala, Kangas, Lämsä, & Feldt, 2013). Toor and Ofori (Toor and Ofori, 2010) found that ethical leadership correlates with greater job satisfaction and with work force' willingness to expend extra effort. In all, findings reported by scholars suggest that ethical leadership positively affects work force' work performance and job satisfaction and promotes positive employee extra role behaviors. Consequently, we proposed the following hypothesis:

Hypothesis 1: Ethical leadership will be positively related to employee creative behaviors.

2.2 Ethical leadership and value congruence

According to social identity theory, desire for association with individuals, groups, or organizations is a means of fulfillment of shared motives. The individuals associate themselves with whom their values hold similar (Ashforth & Mael, 1989; Tajfel & Turner, 1985). It provides that employees assess the level to which their characteristics identify with the organization and its members while deciding to establish the association with the organization. Likewise, ASA (attraction-selection-attrition) model proposed by Schneider (Schneider, 1987) argues that people are attracted towards, selected in, and remain in the organizations which they find the best fit with of their personal preferences.

"Values" are one of those personal characteristics/preferences which employees consider to equate with their peers and their organization (Lee et al., 2009; Schwartz, 1992). According to Cable and Judge (Cable and Judge, 1996), values are beliefs that a specific set of attitudes and behaviors is preferable over its opposites. These values, hence, guide actions. According to Lee et. al. (Lee et. al., 2009), values are central to one's identity. It is highly likely that people would develop and strengthen relationships with the ones they think that their values are aligned. Empirical evidence provides that individuals would tend to apply for job in the firms that have parallel values (Chatman, 1989; Judge & Cable, 1997; O'Reilly, Chatman, & Caldwell, 1991). Analogizing, ethical leaders would establish similar values in their followers. Hence, we propose that:

Hypothesis 2: Ethical Leadership is positively related to Value Congruence.

2.3 Value congruence and employee creativity

As suggested in the literature, the "dark side" of value congruence, namely how value congruence affects personal creativity and organizational novelty, has not yet been examined empirically. The dilemma is that firms need diversity to boost their creativity and also a global norm and culture to coordinate work force' efforts. The symbiosis of diversity and fit within firm can be a fruitful field (Powell, 1998). Consequently, we proposed the following hypotheses:

Hypothesis 3: High Value Congruence have positive effect on employee creative behavior.

2.4 Mediating role of value congruence

As association with an organization becomes part of an individual's identity, so do the shared values between a leader and follower explain how a leader's behavior influences follower attitudes and behaviors (Ashforth & Mael, 1989). The followers may use information about ethical standards of a leader to predict the values, attitudes, and behaviors of leader (Hogg, 2001). Leaders' values are a better representative of firms' value than others. It may be inferred that an ethical leader would espouse values such as communal responsibility, fairness, and integrity. Contrarily, unethical leaders would practice values such as inequity and selfishness (De Hoogh & Den Hartog, 2008). Hence, prospective employees who share similar values with an ethical leader would more like to establish and retain employment relationship with him/her rather than with unethical leader. This goes in a fashion that value congruence would mediate between ethical behavior of a leader and job pursuance behavior of follower. This proposition is confined to certain conditions however. The values of an ethical leader are unique and may not necessarily be shared in entirety by all the followers.

Hence, those leaders who share the values of creativity and innovation with the followers would attract more creative follower and influence their behavior. Further, it is argued that perceived value congruence would potentially intervene between leader's ethical behavior and follower's performance. Ethical leaders personify certain specific principles which might not be imitated by all the followers. It

is however also notable that all the follower would not place equal emphasis on the values such as communal responsibility, fairness, and integrity as does an ethical leader. Hence, the following hypothesis is proposed:

Hypothesis 4: Value Congruence positively mediates the relationship between ethical Leadership and Employee creative behavior.
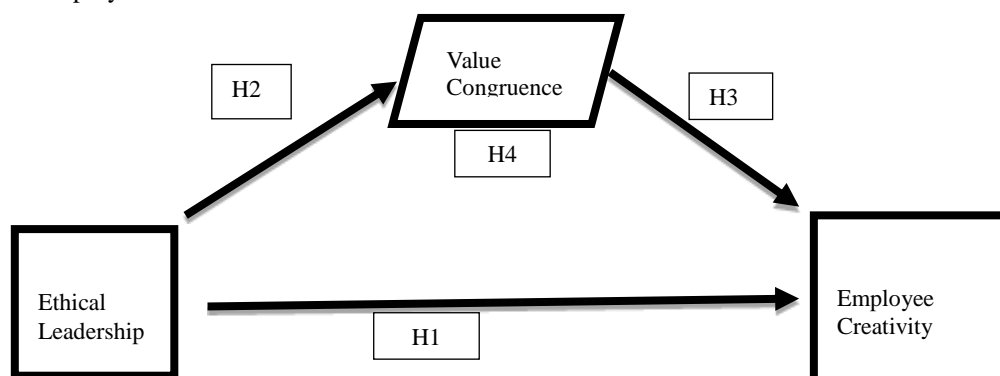
Figure 1   Conceptual Framework

3 Methodology
3.1 Participants
We collected survey data from 200 work force including front-line managers, Middle managers, Top Managers and workers working in various sectors of economy i.e. Telecom, Insurance, Banking, Hotel, FMCG, Retail, Financial Institution, Hospitals, Electronic Media, Education, IT (Information Technology), Print Media, etc. Each participant was briefed about the purpose and taken consent before filling this self-administered survey. The sampling technique used is non-random sampling as the actual population size is unknown.

3.2 Sample
The frequency distribution tables show that highest number of people were from telecom sector, computing to be of 37 percent. Followed by 21 percent from banking sector. Where, over 50 percent of the respondents were working in the operations departments of these firms. Over 70 percent of respondents were male and the most populated age group was 30-40, comprising on over 50 percent.

3.3 Measures
Ethical Leadership: We measured ethical leadership using the ELSQ (Ethical Leadership Style Questionnaire) scale developed by Brown et al (2005), in which the developers used four dimensions of character: integrity, altruism, collective motivation, and encouragement. An example of an item in our survey is "My supervisor can always make a fair and impartial decision." Cronbach's alpha coefficient calculated for the 12 items was 0.82 respectively.

Employee Creative Behavior: We used the Individual Creative Behavior Scale developed by George and Zhou (2001), which comprises 8 items. An example of an item is "Can come up with new methods to achieve a work target." The Cronbach's alpha for the modified scale was 0.79.

Value Congruence: We used the Q-POVC (QUESTIONNAIRE of personal and organizational values congruence for employee) Scale developed by (Vveinhardt, Jolita, Gulbovaite, & Evelina, 2015), which comprises 8 items. The Cronbach's alpha for the scale was 0.71.

4 Data Analysis
We used SPSS 25.0 to perform description, correlation, and regression analysis. For mediation, Hayes Process Macro 3.0 was used. For single mediation, model number 4 was suitable.

5 Results
5.1 Measurement model
First, we assessed the measurement model to confirm the factor structure of constructs in the model. Both the local and global fit values were within the threshold. Indices of local fit were within the range (χ^2/df=2.313, CFI=0.953, TLI=0.917 RMSEA=0.38). Similarly, for global fit, loadings were also

significant and above 0.50. Furthermore, we also tested an alternative model to verify if there were any alternative best fitting model(s). All the constructs were combined and a model with single construct was tested. The model did not show proper fit. Hence, our hypothesized model was accepted.

5.2 Descriptive

Below is correlations table showing relationship between constructs. The table shows that there is a significant positive relationship between ethical leadership and employee creativity (corr=0.311, p<.05). The relationship between ethical leadership and value congruence (corr=0.263, p<.05). Similarly, employee creativity and value congruence also showed a significant positive intercorrelations (corr=0.276, p<.05). The table also shows reliability, Cronbach α, of constructs under study. The Cronbach α of ethical leadership was 0.82, employee creativity was 0.71, and for value congruence was 0.79. All values were above 0.70 which is the threshold value.

Table 1   Reliability and Correlations

	Cronbach α	EL	EC	VC
EL	0.82	1		
EC	0.71	.311**	1	
VC	0.79	.263**	.276**	1

**. Correlation is significant at the 0.01 level (2-tailed).
EL=Ethical Leadership, EC=Employee Creativity, VC=Value Congruence

5.3 Hypothesis Testing

Hypotheses were tested using Hayes Process Macro in SPSS. Test was performed with 2000 bootstrap samples. H1 proposed that ethical leadership has positive effective on employee creativity. Results showed that there is a positive effect of ethical leadership on employee creativity (β=0.273, p<0.001). The bootstrap confidence intervals were also statistically different from zero (LLCI=0.1566, ULCI=0.3910). H2 proposed that ethical leadership has positive effect on value congruence. The results also showed that the H2 stands accepted (β=0.217, p<0.002). This effect was also statistically different from zero (LLCI=0.1056, ULCI=0.3290). H3 proposed that value congruence had positive effect on employee creativity. The results also provided the same (β=0.222, p<0.007). The bootstrap confidence interval was also statistically different from zero (LLCI=0.0783, ULCI=0.3665). Lastly, H4 proposed that value congruence intervenes between ethical leadership and employee creativity. The bootstrap samples provided that mediating role of value congruence was significant and statistically different from zero (β=0.116, p=0.001, LLCI=0.0136, UCLI=0.2447).

Table 2   Result of Hypotheses

Path	Coefficient	Standard error	LLCI	ULCI	P-value	Decision
EL→EC (H1)	0.273	0.0594	0.1566	0.3910	0.000	Supported
EL→VC (H2)	0.217	0.0566	0.1056	0.3290	0.002	Supported
VC→EC (H3)	0.222	0.0731	0.0783	0.3665	0.007	Supported
EL→VC→EC (H4)	0.116	0.0609	0.0136	0.2447	0.001	Supported

EL=Ethical Leadership, EC=Employee Creativity, VC=Value Congruence

6 Discussion

This study examines the mediating role of value congruence between ethical leadership and creativity for the very first time. This study expands the previous literature in the domains of ethical leadership and creativity. The results show that ethical leadership has positive effects on creativity. These findings are consistent with earlier studies which proved that ethical leadership affects employee attitudes and behaviors (Brown et al., 2005; Loi, 2012). Our results are also in line with Mayer et al. (2009) who established that there is a positive effect of ethical leadership on employee job performance. Establishing upon cognitive mechanism, we also showed that value congruence is a mediator between the ethical leadership and employee creativity.

This study also established that social identity theory is an important framework to explain the linkage between ethical leadership and employee creativity. Earlier, the researchers (Loi, 2012; Walumbwa et al., 2011) recommended that there should be further investigations into the mechanisms intervening between leadership and creativity. We found that ethical leadership has positive effects on value congruence and in turn it affects employee creativity positively.

Our findings suggest important guidelines for managerial practice. Managers should cultivate an

ethical environment in their workplace. While establishing an ethical environment, they must exhibit creative behavior. Those employees who identify with their leader's behavior would also engage in creative behaviors. It becomes imperative for the leaders to become ethical role models. They must establish those human resource practices which emphasize on ethical conduct.

7 Conclusion

A few issues limit the generalizability of finding. First, we rely on cross-sectional design which is detrimental to claim about the direction of causality. In cross-sectional study, we cannot control the temporal order of precedence. The future researchers should follow the longitudinal design. Second, we collected data from 200 respondents. Lager samples will provide reliable conclusions. Third, we used single source data. Single source data are prone to common method bias. We recommend the use of dyadic measures to future researchers. Fourth, for value congruence we relied on individual level. Group level evidence may provide more interesting conclusions.

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Measuring the Workplace Stresses and Their Impact on Employees at an Automotive Manufacturing Factory in Wuhan

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Abstract: The purpose of this study is to conduct a psychological analysis of mental health issues and causes of resignation (leaving job) at an automotive factory in Wuhan. The method will be clarified by comparing the psychological stress data of employees who left work and those who continue to work at this factory.The t-testsconducted through cross sectionindicatethat the workplace stressors and employees' job turnovers are influenced by the psychological impact to the employees. The findings will indicate tothe management team to improve employee job turnover by facilitating the psychosocial risk at this factory.This survey results only reflect the situation under the specific conditions at one particular time frame and setting. Thus, further studies with a larger sample size, improved and more specific survey methodologies for multiple settings are needed to further understand the workplace conditions as well as risks in job turnover for the factory employees.

Key words: Workplace stress; Job turnover; Mental health; Stress check

1 Introduction

The effect of mental health deterioration among workers is an important part of negative cause of work productivity (Deschenes, Desjardins, & Dussault, 2018). Workplace stress, mental issues and related drop-outs (turnovers)have long been recognized as potential risk for the management (Kitanaka, 2015).Especially, in Japan, workplace stress has broad and in-depth negative effects onto both employees and its organization (Kawada, 2016; Kawakami & Tsutsumi, 2016; Kitanaka, 2016) Based on the Japanese government research in 2017, nearly 60% of workers in Japan reported experiencing intense worry or stress related to employment and work. And over 50% of responding enterprises reported that workers increasingly faced toward mental health issues and forward actions (Tsutsumi, Inoue, & Eguchi, 2017).The organizational workplace and workers stress have been researched in many countries in recent years as well as in Japan. In fact,as a result of high job demands (Wang et al., 2016), manufacturing employees in China are facing with great workpressure (Zhang et al., 2016). Some research in China also indicated that work press can predict turnover intention(Shi & Wang, 2015), job satisfaction(Zhang et al., 2015)and proactive behavior significantly (Wang& Li, 2017), but it is necessary for in-depth workplace stress studiesto provide the recommendations at an automotive manufacturing factory in detail in China in this point of time.

This study is to investigate the workplace stress effects on worker mental health and resignation behavior at a famous factory in China. It is an automobile manufacturing company headquartered inWuhan. It currently produces a variety of foreign models and a handful of China-only products. Because of competition,turnover in this factory is much higher than before. It is estimated to reduces work performanceand increase various work-life risk with its worseningaccident rates, absenteeism, job turnovers and eventually their quality of life.

2 Research Methods

2.1 Psychological scales

Chinese version of Social Adaptation Self-evaluation Scale (SASS) and Hamilton Depression Rating Scale (Ham - D) and Beck Depression Inventory (BDI) was used for the factors analysis (stress factor, recognition, stress reaction, work satisfaction, social support, corporate culture and etc.) in the used research model. Independent variables were measured by Japanese version of Karas's Demand-Control questionnaire and Siegrist's Effort-Reward Imbalance Questionnaires. This model was consists of two components, one is psychological demands and another is task control which is defined by the expertise discretion and job position authority and autonomy. This model explains that high demand with low job control authority is negatively affect health at workplace. A confidence analysis was performed on each

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factor of each scale for the total sample and Cronbach's alpha was .70 to .92 for most factors, and some values were lower in workplace environmental factors and giving up or abandonment factors.

2.2 Sample Profile

A cross-sectional survey was conducted under instructions by Human Resources section of this factory. The questionnaire was distributed to this factory workers in April 2017 using in-house electronic equipment. Privacy and ethical considerations are implementedwith management approval for this research. The number of valid responses was 1055 (914 men and 141 women) with response rate of 88.7%. The mean age is 30.33 years for men and 30.78 years for women.

As for job title and profiles, general managers were 761 males (83.3% for total males) and 134 females (95% for total females). The engineers and general practitioners were 103 males (11.3%) and 1 female (0.7%). Interim managers were 42 males (4.6%) and 6 females (4.3%). Senior management personnel were 8 males (0.9%) and no females. Education background is as follows: The number of university graduates was 450 males (49.2% for total males) and 61 females (43.3% for total females). The number of junior college graduates was 45 males (4.9%) and 3 females (2.1%). Graduate with Master's degree holders were 410 males (44.9%) and 76 females (53.9%). Junior high school graduates are for two men (0.2%) and none women. Ph.D. holders are 3 males (0.3%) and 1 female (0.7%). The technical school graduates are 4 males (0.4%) and no females.

31 employees had left this factory at June 2017 from the time point ofthis stress survey conducted in April 2017. These 31 turnover persons were 28 males with a mean age of 28.89 years and 3 females with 30.67 years old. 207 subjects (142 males, mean age of 32.54 years, 65 females with mean age 30.14 years) are randomly selected from the total of 1024 subjects (excluding 31 retirees) were compared statistically in this analysis.

The data were analyzed for the Significance Testing (t-test) with using SPSS Statistics software version 22.0 (IBM, Armonk, NY). The data were analyzed using descriptive statistics such as mean, standard deviation, standard error of mean, 95% confidence interval, percentage, and frequency. Data were fitted using two-tailed Normal fitting first. The Normality was checked using *Shapiro-Wilk W* test. The null hypothesis (*H*o) posited that the data was from the Normal distribution; a *p*-value smaller than or equal to the significance level (0.05) rejects *H*o.

2.3 Structure of the questionnaire

The used questionnaire was consisted of 111 questions in total. For each item, survey participants choose rates from 1 to 4 options between "1 for none" and "4 for very much fit and often".Scales for sources of job stress are consisted with total of 23 items. It consists of nine factors: "amount of work," "difficulty in working," "supervisor's personnel management," "sense of acceptance of evaluation," "physical workplace environment," "understanding and fulfillment of the significance of work," "work discretion," "human relations in the workplace," and "private environment." The scale on the ability to cope with stress, a stress-tolerant capacity, are consisted of a total of 41 items. The cognitive approach to the stress is two psychological factors: "positive thought" and "retrospective pessimistic thought". The behavioral approach as stress management is based on four factors: emphasis on situation improvement, emphasis on mood improvement, habitual and reflexive thoughts, and abandonment. Stress coping consists of five factors: "Emphasis on improving conditions," "Liberal and abandoned behaviors," "Emotional behaviors," and "Mood-changing behaviors," and "Consultative behaviors with others".

As for the Psychological Stress Reaction Scale, a stress response, includes 17 items with four factors: apathy, anxiety/tension, anger, and feeling unwell. Job Satisfaction Scale consists of three items. As for social support, 15 items with three factors: "supervisor support," "peer colleague support," and "family and friends support." A total of 12 items are included in the scale for organizational and corporate culture with five factors: "respect for autonomy," "teamwork," "failure is not accepted," "aiming for too high a goal," and "equal opportunities."

3 Data Analysis

3.1 Analysis on mental health

The unpaired *t*-test result for the presence or absence of a significant difference is as follows.

(1) Differences between Genders

The overall scale for sources of stress at work is $M = 2.33$ ($SD = 0.37$).There is no significant difference between genders (t (1053) =1.08, *n.s.*). For example, the stress tolerance capacity was $M = 2.59$ ($SD = 0.18$); $M = 2.58$ ($SD = 0.18$) in males and $M = 2.62$ ($SD = 0.18$) in females, between genders (t (1053) = 2.24) with significant difference at the 5% level.In addition, the "unpaired *t*-test" is

performed for gender differences. For the Sources of stress at work: "understanding of the meaning of work/feeling of fulfillment" with (t(1053)=2.80, p<.01) and "workplace relationships" (t(1053)=2.99, p<.01).　As for the stress tolerance ability was "retrospective pessimistic thinking" with (t (1053) =2.27, p<.05), "Emotional behavior" (t (1053) =2.37, p<.05) and "mood swing behavior" (t(1053)=4.65, p<.01). Stress responses included "apathy" (t(1053)=2.22, p<.05), "anxiety/tension" (t(1053)=2.08, p<.05) and "anger" (t(1053)=2.89, p<.01.　For social support, support from supervisors (t(1053)=2.39, p<.05), in the corporate culture, "equal opportunity" (t(1053)=4.49, p<.001) with a significant difference.In the next step, "one-factor analysis of variance" is conducted to determine whether there are differences in mental health conditions among employees' positions.

(2) Differences between the Groups

There was a significant difference between the groups in the sources of job stress (workload: F(3, 1051)=10.32, p<.01, job difficulty: F(3,1051)=8.88, p<.001, Understanding/fulfilling job meaning: F(3,1051)=3.15, p<.05. Then, multiple comparisons are made by Tukey's HSD method (5% significance level). "Work amount" was higher for intermediate managers than general managers, and was lowest for engineers and general managers. "Difficulty in work" indicates that intermediate managers are more likely than general managers, and general managers have the same results as engineers and general managers. There was a significant difference in stress-tolerant capacity among the groups in "positive thoughts" (F(3,1051)=2.44, p<.10) and there were significant differences among "positive thoughts," "abandoned behaviors," "mood turning behaviors," "status improvement," "mood improvement emphasis," and "habitual and reflexive thoughts." (Emphasis on Situation Improvement: F(3,1051)=4.05, p<.01, Abandoned behavior: F(3,1051)=2.99, p<.05, Mood-transforming behavior: F(3,1051) = 3.01, p<.05, Situation Improvement Focused: F(3,1051) = 3.59, p<.05, Emphasis on mood improvement: F(3,1051)=4.73, p<.01, Habitual and reflexive thinking: F(3,1051)=4.32, p<.01. Then, multiple comparisons are made by Tukey's HSD method (5% significance level). "Positive thinking" is higher in senior managers than in general managers, and "Emphasis on improvement of situation" is higher in middle managers than in general managers, and general managers are the same as engineers and general managers. On the "mood change action", engineers and general employees were higher than the intermediate managers. "Emphasis on mood improvement" is higher in senior managers than in middle managers, and intermediate managers are the same as general managers. "Habitual and reflective thoughts" are the result that senior managers are higher than engineers and general managers, and that engineers, general managers and general managers are the same. There were significant differences in stress responses between the groups in terms of "apathy," "anxiety tension," "anger," and "feeling sick." apathy: F(3,1051)=8.28, p<.001 anxious strain: F(3,1051)=3.42, p<.05, anger: F(3,1051)=3.61, p<.05, Physical distress: F(3,1051)=5.12, p<.01. Then, multiple comparisons are made by Tukey's HSD method (5% significance level). For "apathy," general managers are higher than middle managers, and for "physical discomfort," general managers are higher than engineers and general managers. There was a significant difference in job satisfaction between the groups (F(3,1051)=6.64, p<.001). Multiple comparisons by Tukey's HSD method (5% significance level) are performed. Senior managers are higher than middle managers, and middle managers are the same as general managers. For social support, there was a significant difference between the groups in "Family Friends Support" (F(3,1051)=2.97, p<.05). Then, multiple comparisons are made by Tukey's HSD method (5% significance level). The result is that engineers and general employees are higher than general managers. As for corporate culture, there are significant differences between groups in respect of autonomy and teamwork. Respect for autonomy: F(3,1051)=6.27, teamwork: F(3,1051)=6.71. Both were p<.001. Multiple comparisons by Tukey's HSD method (5% significance level) are performed. For respect for autonomy and teamwork,both technicians,and general workers are higher than general managerial officials (see Table 1).

Table 1　Mean Scores and Standard Deviation by Employee's Position and Result of One-factor Analysis of Variance

Variable　（α）	engineers andgeneral workers （n=104）	general managers （n=895）	middle managers(n=48)	senior managers(n=8)	F	multiple comparisons
(Work stress)	M (SD)					
amount of work (.654)	2.50 (.59)	2.80 (.65)	3.08 (.60)	2.75 (.38)	10.32***	3 > 2 >1
difficulty in work (.545)	2.70 (.44)	2.79 (.42)	3.08 (.40)	2.85 (.28)	8.88***	3 >2, 1

Continual Table 1

Variable (*α*)	engineers and general workers (*n*=104)	general managers (*n*=895)	middle managers(*n*=48)	senior managers(*n*=8)	*F*	multiple comparisons
managerial management of boss (.766)	2.07 (.44)	2.11 (.47)	2.25 (.52)	2.15 (.40)	1.78	
sense of satisfaction of evaluation (.718)	2.14 (.49)	2.23 (.52)	2.31 (.56)	2.13 (.50)	1.50	
physical work environment (.317)	2.21 (.50)	2.21 (.55)	2.18 (.53)	2.06 (.50)	0.27	
understanding and fulfillment of work significance (.569)	2.08 (.44)	2.21 (.48)	2.09 (.49)	2.00 (47)	3.15*	
work discretion (-)	2.31 (.64)	2.38 (.70)	2.23 (.75)	2.25 (.71)	1.14	
workplace Human relations (-)	1.86 (.56)	1.83 (.62)	1.85 (.62)	2.00 (.53)	0.26	
Private environment (-)	2.57 (.80)	2.44 (.78)	2.35 (.70)	1.88 (.64)	2.52	
(The ability to deal with stress)						
[The way of thinking about stress]						
positive and aggressive thinking (.733)	2.99 (.48)	2.99 (.44)	3.04 (.57)	3.41 (.46)	2.44†	
retrospective and pessimistic thinking (.803)	1.89 (.46)	1.98 (.51)	1.92 (.47)	1.72 (.45)	1.68	
[How to act in response to stress]						
emphasis on situation improvement (.798)	3.23 (.47)	3.28 (.41)	3.47 (.39)	3.38 (.42)	4.05***	3 > 2, 1
give up and abandon behavior (.422)	2.09 (.46)	2.18 (.46)	2.08 (.45)	1.88 (.35)	2.99*	
emotional behavior (.717)	2.20 (.49)	2.10 (.53)	2.16 (.60)	2.04 (.55)	1.41	
consultation behavior to other companies (.670)	3.11 (.41)	3.08 (.43)	3.04 (.39)	3.22(.41)	0.61	
mood shifting behavior (.512)	2.65 (.49)	2.57 (.54)	2.38 (.59)	2.71 (.52)	3.01*	1 > 3
[The way of dealing with stress]						
emphasis on improving the situation (.709)	2.99 (.31)	3.05 (.37)	3.15 (.33)	3.31 (.46)	3.59*	
emphasis on mood improvement (.735)	2.77 (.52)	2.65 (.47)	2.60 (.39)	3.13 (.50)	4.73**	
habitual and reflexive thinking (.804)	2.39 (.49)	2.32 (.52)	2.40 (.54)	2.91 (.58)	4.32**	
thinking abandonment (.659)	2.29 (.37)	2.24 (.45)	2.18 (.44)	2.22 (.57)	0.74	
(Stress response)						
lethargy (.882)	1.92 (.46)	2.06 (.55)	1.76 (.57)	1.58 (.71)	8.28***	2 > 3
anxiety and tension (.863)	1.96 (.50)	2.07 (.57)	1.90 (.60)	1.68 (.71)	3.42*	
anger (.815)	1.99 (.50)	2.10 (.63)	1.90 (.69)	1.63 (.65)	3.61*	
physical disorder(.894)	2.08 (.62)	2.29 (.70)	2.08 (.66)	1.79 (.82)	5.12**	1 > 2
(Satisfaction with work) (.832)	3.04 (.55)	2.93 (.70)	3.18 (.45)	3.46 (.43)	6.64***	3, 4 >2
(Social support)						
support of boss (.896)	3.03 (.41)	3.04 (.48)	2.98 (.49)	3.15 (.72)	0.38	
support of colleagues (.876)	3.08 (.38)	3.04 (.43)	3.09 (.30)	3.13 (.62)	0.16	
support of family and friends (.876)	3.25 (.47)	3.12 (.46)	3.17 (.41)	3.03 (.61)	2.97*	1 > 2
(Organizational climate)						
respect for autonomy (.789)	3.21 (.48)	2.99 (.54)	3.12 (.59)	3.33 (.62)	6.27***	1 >2
Teamwork (.877)	3.19 (.44)	2.98 (.53)	3.13 (.48)	3.19 (.58)	6.71***	1 >2
not admitting to failure (-)	2.59 (.77)	2.44 (.77)	2.46 (.74)	2.25 (.46)	1.29	
aiming for high goals (-)	2.62 (.71)	2.51 (.71)	2.73 (.61)	2.63 (.52)	2.16	
equal opportunity (.915)	3.36 (.59)	3.40 (.54)	3.51 (.51)	3.42 (.73)	0.92	

annotation) † *p*<.10   * *p*<.05   ** *p*<.01   *** *p*<.001

3.2 Psychological analysis on leaving workers

Next, we do "unpaired *t* test" for mental health of the resigned person and the scale of each employee currently enrolled. Regarding stress sources, the incumbent is $M=2.10(SD=0.30)$, and the leaving person is $M=2.40(SD=0.44)$. There is a significant difference at the 1% level between affiliation ($t(34.26)=3.68$, $p<.01$). Regarding the stress tolerance ability, the incumbent has $M=2.56(SD=0.19)$ and the leaving person $M=2.64(SD=0.22)$. There is a significant difference at the 5% level between affiliation ($t(236)=2.34$, $p<.05$). Regarding the stress reaction, the incumbent is $M=1.77(SD=0.43)$, and the leaving worker $M=2.36(SD=0.67)$. There is a significant difference at the 0.1% level between affiliation ($t(33.71)=4.69$, $p<.001$). Regarding job satisfaction degree, $M=3.15(SD=0.44)$ for incumbent, $M=2.78 (SD=0.55)$ for leaving worker. There is a significant difference at the 0.1% level between affiliation ($t(236)=4.19$, $p<.001$). Regarding social support, the incumbent is $M=3.19(SD=0.42)$, and the leaving worker is $M=3.08(SD=0.48)$. There is no significant difference in affiliation ($t(236)=1.38$, *n.s.*). Regarding corporate culture, the incumbent is $M=2.92(SD=0.36)$, and the leaving person $M=2.85 (SD=0.33)$. There is no significant difference between affiliation ($t(236)=1.38$, *n.s.*). In order to study further in detail, perform "unpaired *t* test" for each factor. In the stress source, there was a significant difference in "difficulty of work" ($t(236)=1.75$, *n.s.*).

Furthermore, all other factors ("amount of work" ($t(35.71)=2.39$, $p<.05$), "managerial management of boss" ($t(236)=2.59$, $p<.05$), "conviction of evaluation ($t(33.92)=2.77$, $p<.01$), "physical work environment" ($t(236)=4.09$, $p<.001$), "understanding / sense of fulfillment of work" ($t(38.04)=3.88$, $p<.001$), "Working authority" ($t(236)=2.45$, $p<.05$), "workplace human relations" ($t(38.04)=3.88$, $p<.001$) "Private environment"($t(236)=2.16$, $p<.05$)) has a significant difference. In the stress tolerance ability, "positive thinking" ($t(236) = 3.75$, $p < .001$), "retrospective pessimism thinking" ($t(34.264) = 4.02$, $p < .001$), "emphasis on situation improvement" ($t(51.809) = 2.13$, $p < .05$), "habitual / reflexive thinking" ($t(236) = 2.84$, $p < .01$), "abandon thought" ($t(236) = 2.45$, $p < .05$) , "Emphasis on situation improvement" ($t(52.512) = 2.91$, $p < .01$), "give up / abandon behavior" ($t(236) = 3.09$, $p < .01$), "emotional act" ($t(236) = 3.27$, $p < .01$). for the "lethargy" ($t(34.062) = 4.76$) "Anxiety" ($t(34.174) = 4.76$) "Anger" ($t(33.152) = 4.58$) "Physical disorder" ($t(236) = 3.80$), all $p < .001$, there is a significant difference.In social support "colleague support" ($t(236) = 1.73$, $p < .10$). There is a significant tendency. But "Boss support" ($t(236) = 1.45$, *n.s.*) and "Family friends support" ($t(236) = 0.58$, *n.s.*). There was no significant difference. In corporate culture "respect for autonomy" ($t(236) = 3.08$, $p < .01$) and "team work" ($t(236) = 3.68$, $p < .001$). There are significant differences respectively (see Table 2).

Table 2   Mean Scores and Standard Deviation of Incumbent and Leaving Person

Variable	incumbent person	leaving person	t
(Work stress)			
amount of work	2.54 (.56)	2.85 (.71)	2.39*
difficulty in work	2.68 (.42)	2.83 (.46)	1.75
managerial management of boss	1.92 (.45)	2.15 (.61)	2.59*
sense of satisfaction of evaluation	2.02 (.46)	2.38 (.70)	2.77**
physical work environment	1.95 (.47)	2.32 (.51)	4.09***
understanding and fulfillment of work significance	1.99 (.41)	2.27 (.48)	3.43**
work discretion	2.08 (.64)	2.39 (.67)	2.45*
workplace Human relations	1.63 (.50)	2.03 (.55)	3.88***
Private environment	2.14 (.68)	2.42 (.67)	2.16*
(The ability to deal with stress)			
[The way of thinking about stress]			
positive and aggressive thinking	3.14 (.47)	2.80 (.44)	3.75***
retrospective and pessimistic thinking	1.73 (.44)	2.22 (.65)	4.02***
[How to act in response to stress]			
emphasis on situation improvement	3.32 (.46)	3.13 (.31)	2.91**
give up and abandon behavior	2.03 (.42)	2.29 (.49)	3.09**
emotional behavior	1.96 (.50)	2.28 (.52)	3.27**
consultation behavior to other companies	3.17 (.42)	3.02 (.36)	1.90
mood shifting behavior	2.66 (.55)	2.61 (.53)	0.40
[The way of dealing with stress]			
emphasis on improving the situation	3.10 (.37)	2.99 (.25)	2.13*
emphasis on mood improvement	2.62 (.48)	2.78 (.52)	1.69
habitual and reflexive thinking	2.27 (.55)	2.56 (.46)	2.84**
thinking abandonment	2.10 (.44)	2.36 (.55)	2.98**

Continual Table 2

Variable	incumbent person		leaving person		*t*
(Stress response)					
lethargy	1.72	(.46)	2.33	(.69)	4.76***
anxiety and tension	1.72	(.46)	2.33	(.69)	4.76***
anger	1.73	(.47)	2.41	(.80)	4.58***
physical disorder	1.91	(.59)	2.35	(.70)	3.80***
(Satisfaction with work)	3.15	(.44)	2.78	(.55)	4.19***
(Social support)					
support of boss	3.14	(.48)	2.99	(.67)	1.45
support of colleagues	3.19	(.43)	3.05	(.45)	1.73
support of family and friends	3.24	(.47)	3.19	(.42)	0.58
(Organizational climate)					
respect for autonomy	3.20	(.51)	2.90	(.45)	3.08**
teamwork	3.19	(.47)	2.85	(.52)	3.68***
not admitting to failure	2.37	(.75)	2.55	(.68)	1.27
aiming for high goals	2.37	(.68)	2.52	(.72)	1.12
equal opportunity	3.48	(.52)	3.43	(.62)	0.47

annotation)* $p<.05$ ** $p<.01$ *** $p<.001$:p value of unpaired t test.

Table 3   Pearson Correlation Coefficients Among Multiple Variables

	Work stress	The ability to deal with stress	Stress response	Social support	Organizational climate
Work stress		.252**	.512**	-.486**	-.272**
The ability to deal with stress	.705**		.039	.082	.015
Stress response	.603**	.336		-.415**	-.201**
Social support	-.560**	-.367*	-.428*		.526**
Organizational climate	.085	.255	.159	.414*	

annotation) * $p< .05$ ** $p<.01$(Upper: incumbent person ($N = 207$) Down: leaving person ($N = 31$))

4 Results and Discussion

As a result of examining the mental health status of employees according to job positions in this research, the stress sources for intermediate managers were significantly higher. And, the stress reaction of general manager, engineers and workers is significantly high. We divide the incumbent and the departure person, and correlated factors between each scale. We examined whether differences in the relevance of each scale between the leaving job and the incumbent person can be seen. Pearson's moment correlation coefficient was calculated. A weak correlation ($r=.252$) between the stressor and the stress tolerance was observed for the incumbent, but a strong correlation ($r=.705$) was observed for the departure person.

The organizational climate and the stress response are the same as in the past for the incumbent, and a negative correlation ($r=-.201$) was observed. However, there was a positive correlation ($r=.159$), although it was not significant in leaving workers.Since this result shows the same tendency as that shown in the model of the previous study, the content validity is considered to have been shown (see Table 3).

In addition, there was a significant increase in the sources of stress, job satisfaction and the stress responses in the comparison of the mental health for the resigned and current employees. Especially, the stress tolerance capacity is considerably low. It is anticipated that the stress relaxation is also difficult in this condition by their self-help (Byron et al., 2015). And it is assumed that mental health had already deteriorated before leaving work. Since this research is limited to the first step analysis in terms of statistical analysis with t-test approach, it is necessary to take further in-depth research to the cause of the stress related disorders for the whole employee in the future. In this survey we estimate the existence of non-clinical depression. From recent epidemiological studies in Japan, the economic loss of mild depression is large and future risks can not be ignored. This is also the same at the enterprise level, and the importance of intervention is discussed for avoidance of that. However, while mortality is treated as

a healthy person in mental health, it tends to be distant from the existing private service industry. As a so-called gray zone, the opportunity for service users to receive correspondence based on evidence was not sufficient.

In the future it is important for us to explore the possibility of promoting intervention mental health services for depressive employees by introducing stress releasing program. This psychological survey showed valuable psychological data results in considering those countermeasures.   It is also important for management to take effective stress prevention measures (Frone, 2018; Lanza, Roysircar, & Rodgers, 2018; Schulte-Korne, 2017) and lower the workplace stress among the employees to retain good work-life status (Turk, Davas, Tanik, & Montgomery, 2014; Wada et al., 2013) and to prevent unnecessary resignation from the employment. In Japan, there are predictions that psychological pressure and departure due to depressed state are often included in the "Other" category and "To find jobs of better conditions" in many cases. However, the empirical research has hardly any academic achievement due to strong law protecting personal information. For this reason, this research is a valuable opportunity to verify psychological factors in leaving workers by stress data.

5 Conclusion

Workplace stress is a common problem with broad effects in workers life (Stasila-Sieradzka, Chudzicka-Czupala, Grabowski, & Dobrowolska, 2018). So it is important to gain a better understanding of work-related stress and its effects on employee job turnover.

Based on the labor force survey announced in May 2018 by the Statistics Bureau of the Ministry of Internal Affairs and Communications of Japan, the survey was conducted on the trends by reasons for job separation for the previous job during the past 6 years from 2012 to 2017. In this survey, the total number of unemployed who left off was 2.5 million in 2012. This has declined to 1.35 million in 2017. Next, when looking at the share in terms of the reasons for the job separation reasons, except for "others", "the year of retirement or expiration of employment contracts" was the largest at 17% in 2012. However in comparison in 2017, "to find jobs with better conditions" was 13% in 2012, but in 2017 it is the largest in 19%. Reasons such as "for corporate bankruptcy / business closure", "due to personnel sorting and recommendation retirement", "due to business slowdown and concern about the future" have decreased in the past seven years. "Because of the expiration of retirement age or employment contract" is decreasing in the total number, but it remains unchanged in proportion, "for marriage / childbirth / nursing" "for nursing care and nursing" "for domestic affairs / school / health reasons" "others" Although the number of people is flat, the ratio tends to decrease. Surveys on reasons for job separation by the government are being implemented as such stated, but statistical surveys taking into consideration psychological aspects are rare in Japan.

This paper providedan entry stage of statisticalanalyses on workplace stressors and their effects on the job turnover at afactory. The factors among perceived stress sources, tolerance ability, stress reaction, job satisfaction had the effect on the level of job turnover. The findings of this study helped to establish a baseline to measure the work mental health condition and corresponding job turnover within the organization studied. This may assist management in identifying ways to improve employee job turnover. Firstly,according to the findings, the stress sources for intermediate managers were significantly higher than other job positions. Therefore, it is necessary to focus on intermediate managers and pay close attention to them. Secondly, the results show that the sources of stress, job satisfaction and the stress responses will increase before employeeturnover. Meanwhile, the stress tolerance capacity is considerably low, however they cannot control it by themselves. Thus, when the increases of the sources of stress are found, job satisfaction and the stress responses, intervention strategies should be adopted to decrease them, so as to prevent them from turnover.

Thus, it is recommended to further verify the findings of this study in real situations, and continue to monitor in longitudinal studies. In addition, increased sample size are needed to further elucidate the predictors for job turnover. This was an early stage study due to such limitations, however, it serves a baseline to measure the working stress and its effect at this particular setting under study.

As recommendations for the workplace stress and risk issues, Big Data and AI utilization on worker health management are currently being planned by researcher teams in Japan and China. E-Learning based on psychological cognitive therapy approach using the Internet is being regarded promising and academic papers were published by the authors. Based on the future continuous data sampling from this-time used automotive manufacturing factory, we plan to make academic paper on this application and results in the future.

Acknowledgements

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Relationship Between Organizational Engagement Climate and Employee Resilience: Mediating Role of Employee Engagement

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Abstract: Resilience mechanism is a paradigm for organizational as well as employees' wellbeing. The purpose of this investigation is an attempt to estimate how organizational engagement climate impacts, directly and indirectly, employees' resilience. Based on the questionnaires survey on Ready-made Garment in Bangladesh, this empirical study, via structural equation modeling, revealed that all the predictor variables significantly influence the endogenous variables. In addition, it is observed that employee engagement partially mediates the relationship between organizational engagement climate and employee resilience. Usage of cross-sectional data limits the generalization of the findings. Managerial implication and further research directions have also been discussed.
Key words: Employee resilience; Employee engagement; Engagement climate; Ready-made garments

1 Introduction

Today's organizations need to become progressively polygonal to keep pace with the challenging environments to reap the sustainable objectives. To endure and compete successfully in a lively environment, organizations require preemptive human resources (Majeed, 2011). Keeping these exclusive resources aligned with innovations, firms must look for competitive employees who can keep them abreast of any change in the external dynamics for making the organizations resilient. Perceived organizational supports, in the sense of prevailing engagement climate, occupy a significant role to substantiate the employee engagement (EE). Engagement climate persists and nurses the engaged employees which make them resilient (Zhong et al., 2016).   The definition of employee resilience builds on the definition of organizational resilience (OR). For the sake of generalization and operationalization, this research uses the definition of resilience as "the maintenance of positive adjustment under challenging conditions" (Sutcliffe and Vogus, 2003). To address this, recently an emergent curiosity is observed in employees' resilience (ER) in the organizational context and its contribution to resilient organization or organizational performance. Therefore, the organizational climate remains a fundamental construct which is an important determinant of attitudinal, behavioral, and performance-related outcomes. Schneider (Schneider, 2000) argued that climate is constituted of employees' perceptions of the events, practices, and the kinds of behaviors that get rewarded and supported in an organizational context (Schneider, 1975). Hence, the purpose of this study is to investigate the effect of organizational engagement climate (OEC) on ER in small and medium-sized companies, wherein EE is proposed as a mediator.

2 Theoretical Foundations and Hypothesis Formulation

2.1 Impact of organizational engagement climate on employee resilience

Over the years, the value of a supportive organizational climate has been recognized. There is a need for better understanding of its association with ER. Extrapolating from existing definitions in the engagement literature, Albrecht (Albrecht, 2014) demarcated OEC as collective perceptions about the energy and involvement keenly focused by employees toward the achievement of organizational goals. Kuntz et al. (Kuntz et al., 2016) conceptualized ER in an endeavor to focus on the realistic inquiry of resilience away from inner pointers of coping with strain. Extant literature presents that highly resilient individuals have better coping and adaptive capabilities when faced with hardship, such as work-related disturbance which is strongly related to OEC (Schneider and Reichers, 1983). However, as previously noted, research on the antecedents of organizational climate and their influences on ER are limited and, hence, further research is need. In view of this review, the hypothesis below was formulated:

H1. There is a significant association between organizational engagement climate and employee resilience

2.2 Influence of organizational engagement climate on employee engagement

OEC is one of the most significant determinants of individual and group attitudes and behaviors in institutions (Garcia‐Garcia et al., 2011). To date the definition of engagement is not universally agreed, but most refer to Kahn (Kahn, 1990) definition, which denotes that EE as "the connecting of organization members' selves to their work roles". Studies have indicated that employees, who are engaged with their work, play a vital role in establishing an excellent and effective work performance (Eldor and Harpaz, 2016). Moreover, the superiority of emotional incentives over tangible ones is perceived among engaged employees, as opposed to satisfied or involved employees (Eldor and Harpaz, 2016). Following that, OEC is likely to greatly affect　employee work engagement (Albrecht et al., 2018). It would increase trust between employees and the organizational management, and it promotes their engagement to their organization and work. The relationship between climate and employee engagement is based on (Blau, 2017) social exchange theory, and the equity theory. Therefore, EE has emerged as a significant concept within the field of EEC. In this regard, in order to bridge this gap, we hypothesize:

H2. Organizational engagement climate is positively associated with employee engagement

2.3 Relationship between employee engagement and employee resilience

A wide range of studies have shown EE as a significant resource pool which helps individuals to cope up with the changes experienced in life. In line with the ecological perspective , employee resilience can be enabled by the organization and is defined as "employee capability, facilitated and supported by the organization, to utilize resources to continually adapt and flourish at work, even when faced with challenging circumstances" (Kuntz et al., 2016). Xanthopoulou et al. (Xanthopoulou et al., 2008) analyzed the role of self-efficacy, organization based self-esteem and positivity as individual personal resources in prediction of EE. Following the job demand-resource (JD-R) model, it has been argued that engaged employees are better performers than non-engaged employees because engaged employees are more capable to cope up with the changing conditions in organization by using their personal resources, which empower them to effectively control their workplace environment (Bakker and Demerouti, 2008). Therefore, we propose the following hypothesis:

H3. Employee engagement is positively associated with employee resilience

This above discussion explores that OEC has direct impact on ER (Schneider, 1975, Schneider and Reichers, 1983). It is also observed that OEC influences the EE (Albrecht et al., 2018) and, in effect, EE stimulates to the development of resilient employee (Gupta and Sharma, 2018). Thus it is revealed that OEC not only directly influences the ER but also indirectly drives the ER through the indirect influence of EE. Therefore, we propose as follows:

H4. Employee engagement mediates the relationship between organizational engagement climate and employee resilience

To mirror a clear demonstration of the current investigation, the researchers developed a conceptual framework (Figure 1) based on insights gained from the earlier literature review research.
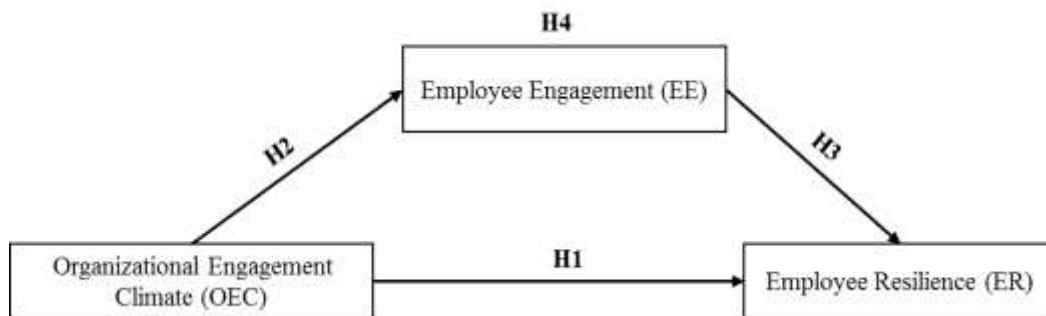
Figure 1　Conceptual Research Framework

3 Research Methods and Data Collection Approach
3.1 Respondents' demographic characteristics

Simple random sampling method has been used which appears to be more appropriate for the generalization of the findings and drawing any inference on the causality on the result. Self-administered questionnaires were sent to RMGs using random sampling technique in the capital City of Dhaka, Bangladesh.

Table 1 Respondents' demographic profile (N=258)

Variables	Categories	Frequency	%	Variables	Categories	Frequency	%
Gender	Male	213	82.6	**Education**	Master	93	36.0
	Female	45	17.4		Bachelor and Others	165	64.0
Age	Below 35 Years	131	50.7	**Tenure**	Below 10 Years	147	57.0
	Above 35 Years	127	49.3		Above 10 Years	111	43.0

Out of 258 respondents 82.6 percent were male and the balance 17.4 percent were female. Their age's group consists of 50.7 and 49.3 percent belonging to above 18 and 35 years respectively. Respondents' educational profile shows that 36.0 percent, and 28.7 percent have completed their master, and others, i.e. doctorate or diploma certificate. Finally, the majority of the respondents' job experience reports that 57.0 and 43.0 percent fitting to above 5 and 10 years.

3.2 Survey instruments

The survey instruments, such as employee resilience (Näswall et al., 2015), employee engagement (Schaufeli, 2006) and and organizational engagement climate (Albrecht, 2014), were adopted from prior studies with the obligatory changes made to them for making it respondents' friendly in the given context, Items in a measure were arranged on a 5-point Likert scale from 1 (strongly agree) to 5 (strongly disagree). Microsoft Excel 2016 was used for the cleansing of the data and SmartPLS version-2 and IBM SPSS version-23 software packages were used for producing the results.

4 Models Evaluation

4.1 Measurement model evaluation

Table 1 reports that all constructs pass through the validity tests. Discriminant validity analysis (Table 1) exhibits a very good result which shows that the square root of the average variance extracted (AVE) of each construct is higher than the construct's highest correlation with any other construct (Hair Jr et al., 2016). Table 1 and figure 2 delineate that the factor loadings (all > 0.50), average variance extracted (AVE> 0.50) and composite reliability (>0.851) are within the rule of thumb (Hair Jr et al., 2016). Therefore, both validity and reliability analyses suggest that these constructs are valid and reliable for further advance.

Table 1 Latent Variables Correlation Matrix for Discriminant Validity Testing

	AVE	CR	CA	1	2	3	4	5	6	7	8
1. Age	-	-	-	1							
2. Gender	-	-	-	-.102	1						
3.Education	-	-	-	.144*	.051	1					
4. Firms' Size	-	-	-	.276**	-.219**	.082	1				
5. Tenure	-	-	-	.838**	-.105	.241**	.318**	1			
6. EE	0.564	0.901	0.872	-.091	-.061	-.092	-.164**	-.164**	**.751**		
7. ER	0.534	0.851	0.786	-.063	-.046	.033	-.109	-.109	0.325**	**.731**	
8. OEC	0.634	0.896	0.856	.034	.072	.096	-.029	-.029	0.287**	0.309**	**.796**
Mean	-	-	-	2.589	1.174	1.938	2.419	2.5	3.825	3.98	3.971
SD	-	-	-	1.052	0.38	0.806	0.781	1.223	0.549	0.51	0.619

**. Correlation is significant at the 0.01 level (2-tailed); and *. Correlation is significant at the 0.05 level (2-tailed).
AVE. Average Variance Extracted, CR. Composite Reliability, CA. Cronbach's Alpha

4.2 Structural (Path) Model

Standardized coefficient (β), percentage of variance explained (R^2), and significance levels of the path model relationships is demonstrated in figure 2 Path coefficients (βs) are above 0.10 which is above the minimum threshold. Findings have shown that standardized coefficients (βs) of OEC→EE is 0.287 (p<.01), OEC→ER is 0.236 (p<.05), and EE→ER is 0.258 (p<.05), which are found significant at different levels. As a matter of fact, OEC, and EE are describing 15.70% variance (R^2) in ER while OEC explains 8.2% variance (R^2) in EE.
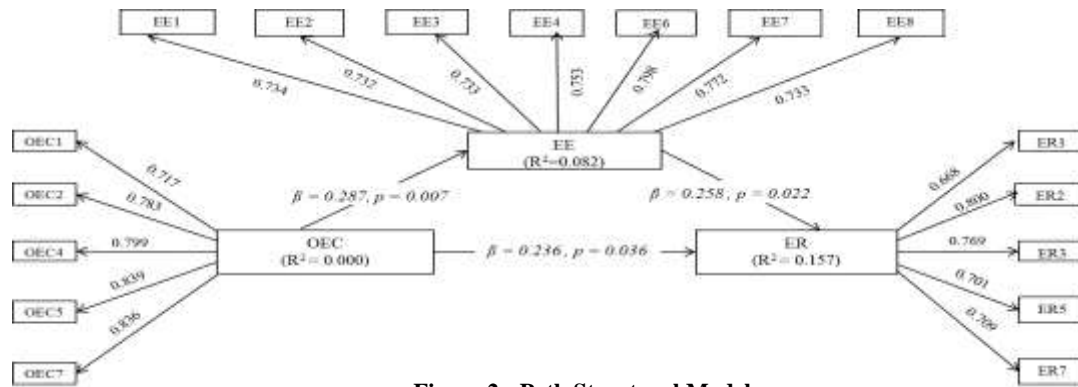
Figure 2   Path Structural Model

5 Results and Discussion

The following table 2 represents the findings in the structural model. In H1, we hypothesize that organizational engagement climate is significantly linked with the employees' resilience. The estimated result (β=0.236, p<0.05) supported the hypothesis. This result is found consistent with the findings of Schneider and Reichers (Schneider and Reichers, 1983).The H2 reported that the organizational engagement climate reserves a significant influence on employees' engagement. In line with the hypothesis, the calculated results (β=0.229, p<0.01) strengthen the proposition. Prior research results also supported the studied findings (Albrecht et al., 2018). The H3 proposes that employees' engagement significantly predicts employees' resilience. The observed results unearthed that employees' engagement has a significant influence, β =0.258; p<0.05, on employees' resilience. The current findings is also found similar with the rest of the findings worldwide (Gupta and Sharma, 2018).

Table 2   Estimates in the Structured Path Relationships

	Paths	Beta-Coefficient	Standard Error	T Statistics	p-Value	Results
H1	OEC -> ER	0.236	0.1114	2.111	0.036	Supported
H2	OEC -> EE	0.287	0.103	2.786	0.006	Supported
H3	EE -> ER	0.258	0.1093	2.358	0.019	Supported

The mediating effect is measured by the ratio of indirect effect of the constructs with direct effect of the construct. For this purpose, both indirect and direct effects of OEC and ER have been computed. The table 3 estimated impact of OEC on ER before and after using mediator variable EE. The direct effect (c) before running the mediating variable (EE) was significant. After linking through mediator variable, the direct effect (c') is still significant. Thus we checked the variance account for (VAF) and the estimates showed that there is a partial mediation effect of using EE since VAF scores are more than 0.20 (Hair Jr et al., 2014). Therefore, H4 is supported to the fact that EE partially mediates the hypothesized relationship. The influence of the indirect effect of EE is also supported by the previous studies (Gupta and Sharma, 2018, Truss et al., 2013).

Table 3   Estimates of the Mediating Effect

	Path	β	Standard error	t	p	IE*	TE**	VAF
	OEC→ER (c)	0.315	0.104	3.029	0.003			
H4	OEC→EE (a)	0.287	0.103	2.786	0.006	0.074	0.310	0.239[FM]
	EE→ER (b)	0.258	0.109	2.358	0.019			
	OEC→ER (c')	0.236	0.111	2.111	0.036			

IE (Indirect effect) = a*b, TE (Total effect) = c' + indirect effect, VAF=Indirect effect/Total effect

6 Conclusion

This study, firstly, aims at finding the potential impact of OEC and EE on ER of the RMGs in Bangladesh. It has been proved that all of them have a significantly influence on ER. Secondly, OEC has influence on EE level at the work place. When employees find harmonious relationship with their boss in the organization they feel encouragement to do more work for organization. Additionally,

OEC have significant positive influence on EE. Moreover, EE partially mediates the relationship of OEC and ER. Thus, the findings of this study are expected to work as guidance for the policy makers and practitioners to enhance the employee resilience of the RMGs industries in Bangladesh. The current study uses cross-sectional data with a small number of respondents which limits the causal inference. The respondents from Dhaka city alone also prevent generalization of the findings. Further research might be benefited with relatively large sample size from longitudinal survey from different geographical arena.

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Inclusive Human Resource Practice and Innovative Behavior: The Moderating Effect of Homesickness and Emotional Exhaustion

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Abstract: Based on the theory of resource conservation, this study considers that inclusive human resource practices have an impact on individual innovation behavior, which is moderated by homesickness. In addition, this study clarifies that emotional exhaustion can exacerbate the destructive effects of homesickness. By collecting 292 sample data, the study found that inclusive human resource practices have a positive impact on individual innovation behavior, and homesickness moderates the impact of inclusive human resource practices on innovation behavior. When the level of homesickness is high, the impact of inclusive human resource practices on innovation behavior will be weakened. Emotional exhaustion moderates the moderating effect of homesickness. When the level of emotional exhaustion is high, the weakening effect of homesickness will be stronger. Based on this, this study provides theoretical and practical reference for the study of inclusive human resource practice, and further enriches the homesickness literature.
Key words: Inclusive human resource practice (I-HRP); Homesickness; Emotional exhaustion (EE); Innovative behavior (IB)

1 Introduction

The complexity of the external environment and organizational competition and the development of science and technology make more and more practitioners and managers realize the importance of innovation. Innovation has become the motive force and source of the survival and development of the enterprise. A large number of studies show that innovation is conducive to the improvement of organizational performance, while organizational innovation depends on individual innovation behavior (Gong et al., 2013). Therefore, how to effectively motivate the individual's innovative behavior is an important question to think about in the organization management, especially for the employees of different backgrounds, cultures, nationalities, sexes, regions and so on, in the context of globalization.

Formal organizational support influences individual innovation behavior. The research shows that human resource practice is conducive to promoting individual innovation (Chang et al., 2014). However, the previous research on human resources practice emphasizes the universality of the employees, and the past diversification management emphasizes the equal treatment of the differentiated employees. This management practice and management method could not solve the contradictions and conflicts caused by diversification (Nishii, 2013). In order to make diversity employees feel fair, while develop the potential of diversified employees, managers put forward inclusive management which has a positive impact on employees' behaviors, attitudes and performance (Carmeli et al., 2010). Previous studies on the impact of inclusive management on individuals mainly focus on the role of inclusive leadership, and little knowledge about how I-HRPs affect individual behavior (Yinhua G U, Tao Q, Yang F, et al., 2017). Based on this, this study aims to explore the impact of I-HRPs on individual innovation behavior and its boundary conditions.

There are more and more employees coexist with different backgrounds, cultures, nationalities, gender and regions who face with homesickness. In work, homesickness and negative emotions may consume employees' attention, emotion and energy. Based on the conservation of resource theory, if the resources of one area are exhausted (attention, emotion, energy), it may make it impossible to work in the best way in another field, so homesickness may reduce individual performance (ten Brummelhuis, Bakker A B, 2012). Therefore, in this study, we examined whether homesickness can disrupt the impact of I-HRPs on individual innovation behavior. Besides, due to emotional exhaustion could affect homesickness, we further explore whether emotional exhaustion can affect the weakening effect of homesickness.

2 Hypotheses Development

2.1 I-HRP and innovation behavior

The individual's innovation behavior refers to the production, promotion and practice of creative

ideas, which individuals can participate in innovation activities at any stage (Yuan and Woodman, 2010). Based on the conservation of resource theory, individuals not only try to maintain and protect their existing resources, but also try their best to acquire and develop new resources. I-HRPs, such as diversified recruitment and selection, diversified training and development, can increase the stock of employees' resources and bring diversified knowledge and skills to employees (Gardner et al., 2011). Research shows that diversification of knowledge communication can effectively promote innovation behavior (Milliken F J, Martins L, 1996). The full flow of knowledge among members is easy to form informal brainstorming, resulting in many creative ideas and inspiring employees' innovative behavior. In addition, inclusion of errors is a specific implication of inclusive human resources practice, and tolerance of innovation failure promotes individual innovation motivation (Tang et al., 2015). Based on this, we hypothesize:

Hypothesis 1: I-HRP is positive related to individual innovation behavior.

2.2 Homesickness as a moderator

For the variety of employees, there are great differences between their colleagues and themselves, which makes it easier for employees to feel lonely and insecure e (Du D, Derks D, Bakker A B, et al., 2018). In order to eliminate these negative emotions, individuals consume considerable mental resources, such as time, energy, and emotions. The individual of homesickness tends to see the negative side of the work so that it lacks the physical strength to work and reduces the effective use of social resources in the field of work (Shaffer et al., 2012). It may hinder the benefit of the staff from the social support, thus reducing the effect of the I-HRP on the individual innovation behavior (Nohe et al., 2014). Therefore, we hypothesize:

Hypothesis 2: Homesickness moderates the relationship between I-HRP and individual innovation behavior. When the level of homesickness is high, the impact of I-HRPs on individual innovation behavior is weaker.

2.3 Emotional exhaustionas a moderator

Emotional exhaustion refers to the fatigue state caused by excessive use of psychological and emotional resources(Shantz A, Arevshatian L, Alfes K, et al., 2016), which is a result of stress reaction caused by stressors in the workplace (Maslach et al., 2001). Emotional exhaustion is the state of exhaustion of emotional and physiological resources, which will reduce employees' investment in work and reduce employees' work performance (Aryee et al., 2008). According to the conservation of resource theory, when the individual is in the state of emotional exhaustion, the individual takes a defensive state to reduce the loss of resources. That is, the individual could not have enough resources to manage the consumption of psychological resources brought by the homesickness, which may aggravate the individual's homesickness and further weak the role of inclusive human resources practice in promoting individual innovation behavior (Hobfoll, 1989). Therefore, we hypothesize:

Hypothesis 3: Emotional exhaustion moderates the weakening effect of homesickness on the relationship between I-HRP and individual innovative behavior.
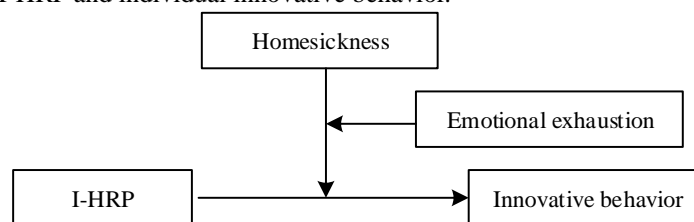
Figure 1   Theoretical Hypothesis Model

3 Data and Results

3.1 Data sample

We used questionnaires to collect data and distributed 367 questionnaires. It recovered 315 questionnaires, of which removing 23 invalid questionnaires and the remaining 292 were valid.Among the respondents, 61.0% were male and 39.0% were female; 15.4% were younger than 25, 32.5% were 26-35, 50.7% were 36-55, 1.4% were above 55; 75.0% were married, 25.0 % unmarried.

3.2 Measures

Inclusive human resources practices. Referring to studies by Nishii L.H. (2013), and Tang N (2015), based on expert opinion and survey respondents' feedback, we developed a 22-item scale. We used 207 sample data for exploratory factor analysis. Removing two items with a load less than 0.5, it formed a

20-item 5-dimension measurement scale. We also carried out confirmatory factor analysis, and the five-factor model fit index was the following: χ^2 /df =3.475, NFI = 0.917, CFI = 0.939, IFI = 0.939, TLI = 0.927, RMSEA = 0.075. In this study, we used 5-point score to measured variables. The Cronbach 's alpha value of the scale is 0.944.

Homesickness. We adapted the 20-item scale of Stroebe M, Vliet T V, Hewstone M, et al (2002). The Cronbach 's alpha value of the scale is 0.913.

Emotional exhaustion. We adapted the 9-item scale of Maslach C, Jackson S E. (1981). The Cronbach 's alpha value of the scale is 0.939.

Innovative behavior. We adapted the 6-item scale of G. S S, Bruce R A (1994). The Cronbach 's alpha value of the scale is 0.944.

3.3 Results

From the descriptive statistical analysis results in Table 1, we could see that I-HRP and individual innovation behavior have significant correlation (r= 0.30, $p < 0.01$).

Table 1   Descriptive Statistical Analysis Results

Variables	M	SD	1	2	3	4	5	6	7
1.Gender	1.39	.489	1						
2. Age	2.38	.757	-.337**	1					
3.Marriage	1.25	.434	.186**	-.594**	1				
4.I-HRP	3.50	.748	.061	-.114	.031	1			
5.Homesickness	3.03	.559	-.090	.018	.026	.026	1		
6.EE	3.68	.753	-.055	-.059	.100	-.187**	.375**	1	
7.IB	3.87	.693	-.134*	.093	-.058	.301**	.129*	-.175**	1

In this study, we used SPSS 22 to do regression test, the result shown in Table 1. According to model 2, the inclusive human resources practice is significantly positive correlated with individual innovative behavior (β = 0.319, $p < 0.001$), so hypothesis 1 was supported. From model 3, the interaction of I-HRP and homesickness has a significant negative impact on individual innovation behavior (β = -0.133, $p < 0.05$), that is, homesickness moderates the role of I-HRP in promoting individual innovation behavior, and results support hypothesis 2. The simple slope test showed in Figure 1. From model 4, the interaction of I-HRP, homesickness and emotional exhaustion has a significant correlation with innovation behavior (β = 0.273, $p < 0.001$),that is, emotional exhaustion moderates the weakening effect of homesickness.In short, results support hypothesis 3.

Table 2   Regression Analysis Results

Variables	Innovative behavior			
	Model 1	Model 2	Model 3	Model 4
1.Gender	-.116	-.124*	-.115*	-.102
2. Age	.050	.095	.074	.094
3.Marriage	-.006	.012	.002	.018
4.I-HRP		.319***	.331***	.212***
5.Homesickness			.122*	.200**
6.I-HRP* Homesickness			-.133*	-.049
7.Emotional Exhaustion				-.199**
8.I-HRP*EE				-.056
9.I-HRP* Homesickness*EE				.273***
R^2	.021	.121	.150	.233
ΔR^2		.100***	.129*	.212***
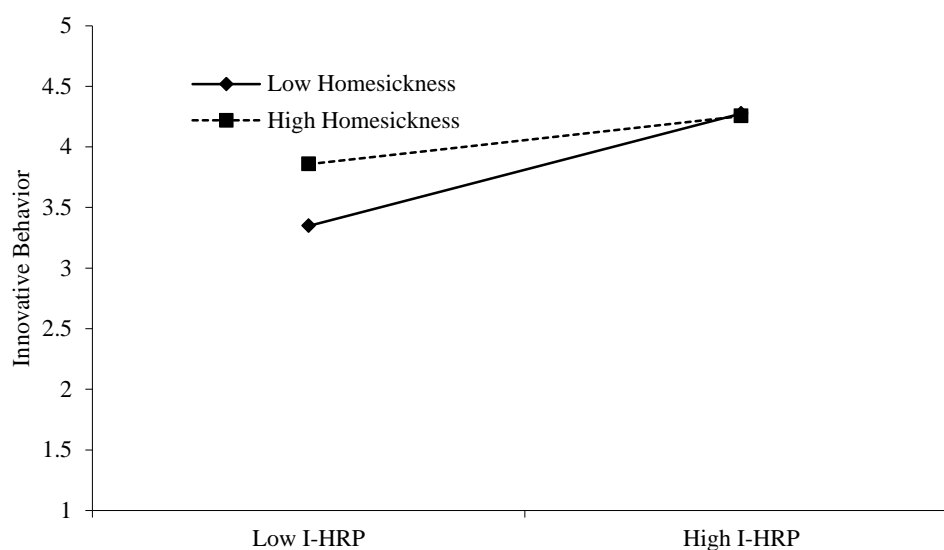
Figure 2   The Interaction Effect of I-HRP and Homesickness on Individual Innovation Behavior

4 Conclusion

This study explores the impact of I-HRPs on innovative behavior and its boundary conditions. It found that I-HRP has a significant positive impact on innovation behavior. This study also proves the moderating effect of homesickness on the relationship between I-HRP and individual innovation behavior. When the level of homesickness is high, the effect of I-HRP on individual innovation behavior is weaker. Besides, this study further found that emotional exhaustion moderates the weakening effect of homesickness. When the level of emotional exhaustion is high, homesickness plays a more powerful role.

Although this research enriches the literature of I-HRP and individual creativity, there are still some shortcomings. First, the data of this study are cross-sectional data, which could not explain causality. Future research can further explain it by longitudinal research. Second, this study uses self - reported data to collect data. There may be a common method deviation problem. Future research can collect data in a variety of ways to reduce the problem of common method deviation. Finally, this study only discusses the boundary conditions of inclusive human resources practice on individual innovation behavior, and future research can further explore its internal mechanism.

Acknowledgement

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Cross-lagged Regression Analysis of Work Engagement and Turnover Intention

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Abstract: This study takes 893 employees of a large state-owned communication company as the study sample. Based on the perspective of social exchange theory and conservation of resource (COR), it is suggested that there may be mutual prediction between work engagement and turnover intention. Using the cross-lag regression analysis method, this study draws the conclusion that the work engagement can negatively predict the turnover intention, and the turnover intention can also negatively predict the work engagement. It has practical guiding significance for increasing employee input and reducing turnover intention.

Key words: Work engagement; Turnover intention; Social exchange theory; Conservation of resource

1 Introduction

Work engagement is a kind of behavior and manner that the individual displays in the work which gathers vigor, dedication and concentration, and it is the positive response of the staff to the organization (Schaufeli & Bakker, 2004). By contrast, not engaging in work can mean negative feedback to the organization.A large number of previous studies have shown that negative attitude towards the organization is an important variable leading to turnover intention (Zhao, Liu, & Zhang, 2003; Li & Ling, 2007). Therefore, it can be speculated that employees with lowwork engagement may have higher turnover intention than those with high work engagement.From the perspective of empirical research, some studies do prove that work engagement can predict turnover intention negatively (Schaufeli & Bakker, 2004;Saks, 2006; Plooy & Roodt, 2010; Alarcon & Edwards, 2011; Bhatnagar, 2012; Bothma & Roodt, 2012; Takawira, 2014).Unfortunately, these studies are generally deficient in the following two aspects.First, the lack of theoretical support.As pointed out by Schaufeli (Schaufeli,2004), work engagement is essentially a positive psychological response to work, its effectiveness depends to a great extent on the possession and preservation of individual working resources. Therefore, the theory of conservation of resources (COR) is an important theoretical basis for explaining the mechanism of work engagement.In view of this, this paper argues that COR theory can effectively discuss the negative predictive effect of work engagement on turnover intention. From the point of view of gain spiral and loss spiral, through the positive and perfect response to work (Schaufeli, 2002) employees can not only protect their existing resources from loss, but also create more resources. When employees continue to use the resources in the personal resource pool to create new resources, bring greater resource growth, and enter into the value-added spiral state, employees will be full of hope for the future. Greater enjoyment of the satisfaction of this sense of self-efficacy resulting from work engagement, and therefore less likely to result in a tendency to quit (Hobfoll, 1989; Schaufeli & Bakker, 2004). What's more, from the stress perspective of COR theory, when employees are in the value-added spiral state, they already have a lot of resources, and there is a greater possibility to create more resources. Once separated, these resources may suffer losses or even disappear. When an individual assesses the risk of a significant loss of resources, it creates a sense of stress and unease, and then tries to avoid it (Hobfoll, 1989). Apart from that, adopt cross-sectional research and design.Up to now, domestic and foreign studies on the negative prediction of turnover intention of work engagement generally use cross-sectional research design (Schaufeli & Bakker, 2004; Saks, 2006), but due to cross-sectional research cannot accurately derive the causal relationship between variables. Previous studies are not sufficient to confirm that work engagement is a predictor of turnover intention.

In real life, however, there is a common phenomenon that employees with a tendency to quit tend to think that they will leave the organization sooner or later, and there is no need to invest a lot of time and energy in their work.Their specific performance in the daily work is to take the attitude of

coping with the work, and deliberately reduce the work engagement.Therefore, there may be another mechanism between work engagement and turnover intention, that is, turnover intention predicts work engagement. And on the basis of the social exchange theory, the relationship between employees and organizations is essentially a kind of social exchange relationship (Blau, 1986).In a good social exchange relationship, the employees who work strenuously often get the reward feedback from the organization, and thus produce a sense of obligation to repay the organization, and then maintain or improve the current work engagement status. Create better performance for the organization (Li & Mei, 2012). On the contrary, when the employee has the idea of leaving the organization, it shows that his social exchange relationship with the organization has been destroyed, and the he no longer considers himself to be the beneficiary of the exchange process. Naturally, there is no obligation to return to the organization, let alone work to help the organization to create more value (Li & Tang, 2010). In addition, in the satisfaction of the sense of reward, because the previous work commitment did not allow employees to obtain the expected organizational reward, it has led to a lower sense of return. In subsequent jobs, employees balance their social exchange with the organization by reducing their work engagement and make it fair (Blau, 1986). If the employee has a turnover intention in this process, it is very likely that the employee has not received the expected reward response in the process of social exchange with the organization, resulting in the idea of terminating the social exchange with the organization (Blau, 1986). According to the reciprocity principle of social exchange theory, when organizations do not provide employees with the expected "favor", employees will not generate a sense of obligation to return to the organization, and will not engage in work to help the organization grow better (Su Zhongxing, Yang Jiaozheng 2016).All of the above studies indicate that turnover intention may have the same predictive effect on work engagement, but previous studies have been lack of empirical test on this perspective.

In conclusion, it is necessary to further explore the causal relationship between work engagement and turnover intention by adopting longitudinal cross-lag research design.

2 Method
2.1 The sample of study
In this study, 1115 employees were randomly selected from a large state-owned communications company with the help of the human resources manager of the company.Prior to the formal investigation, 1,115 target employees were invited by internal mail to explain that the purpose of the questionnaire was academic research only, and promised to keep the results confidential.Then we provide the personal network test account number and password for the employees who are finally confirmed to participate in the investigation, the employee will log in and fill in the form.Two questionnaires were conducted in this study, with an interval of 8 months.A total of 1115 questionnaires were sent out in T1 time, 1017 valid questionnaires were collected, and 8 employees were lost at T2 due to post changes and separations (the wastage rate was 0.79 and 1009). After eliminating the questions with missing answers and regular answers, 893 subjects filled in the valid questionnaires after T1 and T2 were filled out. 80.09% of them were involved in the questionnaire.For the team supervisors, 28.44% were male and 71.66% were female. 54.65% were married and 45.35% were unmarried.As for the team members, 20.27% was college degree, 51.18% was undergraduate degree, master degree or above is 20.17%.Their average age was 29.49 years old (SD = 4.31), the average organizational tenure was 6.11 years (SD = 3.86).

2.2 Measurement
Work engagement. The UWES-9 questionnaire was used to measure the level of work engagement of employees (Schaufeli et al., 2006). The questionnaire contained three dimensions, including vigor, dedication and absorption. There were nine entries in three dimensions. Sample items are "When I get up in the morning, I want to go to work."(Vigor), "I am proud of what I am doing." (Dedication), "I feel happy when I am immersed in my work." (Absorption). The participants were asked to respond on a 7-point Likert scale ranging from 0 (not at all true of me) to 6 (totally true of me).The final result was obtained by taking the average of the nine items, and the final score ranged from 0 to 6. The higher the score, the higher the level of work engagement. Relevant studies have shown that UWES-9 has a good inter-scorer's reliability in the measurement of job input of Chinese knowledge workers (Li, 2011). In this study, the internal consistency α

values of T1 vigor, dedication and absorption subscale were 0.797, 0.940 and 0.849, respectively, and the internal consistency α values of the total scale were 0.938. The internal consistency α values of T2 vigor, dedication and absorption subscale were 0.812, 0.933 and 0.829, respectively, and the internal consistency α values of the total scale were 0.936.

Turnover intention.This study uses a four-item questionnaire of turnover intention used by Chen & Francesco.Sample items is "I often want to stop my present job."The participants were asked to respond on a 7-point Likert scale ranging from 1 (not at all true of me) to 7 (totally true of me).The final score ranges from 1 to 7. The higher the score, the higher the turnover intention.In this study, the internal consistency α values of T1 and T2 were 0.782 and 0.789, respectively.

3 Results
3.1 Descriptive statistics on work engagement and turnover intention

As shown in Table 1, the work engagement of the sample in the same year is significantly correlated with the turnover intention. The correlation coefficients of the two persons at T1 and T2 are -0.58 and -0.59.T1 respectively.

Table 1　Descriptive Statistics and Correlation Between Total Samples

	T1 Work Engagement	T2Work Engagement	T1turnover intention	T2turnover intention
M±SD	3.75±1.16	3.79±1.14	2.48±0.81	2.52±0.85
1. T1 Work Engagement	1			
2. T2 Work Engagement	0.51**	1		
3. T1turnover intention	-0.58**	-0.37**	1	
4. T2turnover intention	-0.44**	-0.59**	0.51**	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, similarly hereinafter.

3.2 Cross-lagged Regression Analysis of Work Engagement and Turnover Intention

In order to further explore the bidirectional prediction effect of work engagement and turnover intention, this study takes T1 and T2 as pre-and post-test time points, collects data at intervals of 8 months, and carries out cross-lag regression analysis on the results of pre-and post-test.The final result is shown in figure 1.At T1 and T2, both work engagement and turnover intention were stable to an advanced degree, $\beta=0.51$ and p less than 0.001.There was high negative correlation between job commitment and turnover intention at T1 and T2 (-0.58, -0.59). The above results show that the stability correlation and synchronization correlation of this study are consistent and meet the basic assumptions of cross-hysteresis analysis.

Assuming that H1 infers that work engagement can predict turnover intention negatively, according to the result of regression analysis shown in figure 1, work engagement can predict turnover intention at T2 significantly ($\beta = -0.44$, $p < 0.001$).Assuming that H2 infers that turnover intention can predict work engagement negatively, according to the result of regression analysis shown in figure 1, turnover intention can predict work engagement at T2 significantly ($\beta = -0.37$, $p < 0.001$).In summary, the relationship between work engagement and turnover intention can be proved.
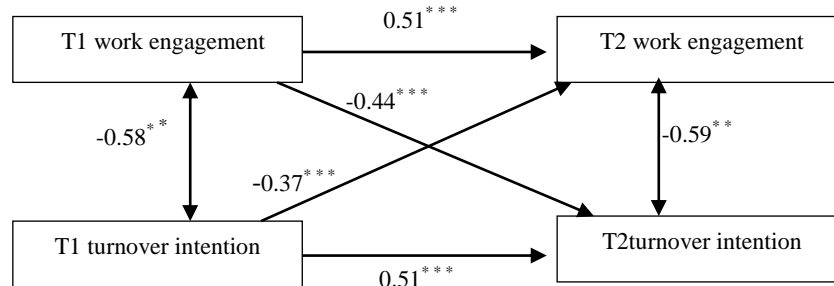
Figure 1　Cross-lag Regression Analysis of Work Input and Turnover Intention

Note:The double arrowheads in the diagram represent the results of the correlation analysis (correlation coefficient r); the single arrow represents the result of the forced entry variable method (standardized regression coefficient β).

4 Conclusion

First of all, the two-way predictive relationship between work engagement and turnover intention is confirmed, which provides a new perspective for the study of causality between work engagement and turnover intention.So far, in the study of causality between turnover intention and work engagement, only some scholars have paid attention to the predictive effect of work engagement on turnover intention, and few studies have explored the negative prediction of turnover intention.The discovery of this research result not only enriches the research of causality between them, but also brings new enlightenment to practical management.

Secondly, it makes up for the lack of theoretical support in previous studies.Although some empirical studies have proved that work engagement can play a negative role in predicting turnover intention, there has been a lack of corresponding theory to support its view (Schaufeli & Bakker, 2004).This paper is based on the basic hypothesis of COR theory, three basic propositions: "the primacy of resource protection", "secondary nature of resource acquisition", "creating resource surplus", and the angle of gain spiral and loss spiral. The negative predictive effect of work engagement on turnover intention is explained in depth.In addition, based on the reciprocity principle and the sense of return of social exchange theory, this paper explains the predictive effect of turnover intention on work engagement, which enriches the macro application scope of social exchange theory.

Thirdly, this paper uses cross-lag analysis to explore the relationship between turnover intention and work engagement, further validates and extends the relevant research, and deepens the previous cross-sectional research.Most of the previous studies used cross-sectional data to analyze, but the cross-section research design cannot be very good to clarify the causal relationship between the two. The cross-lag analysis provides more powerful evidence to explain the causal relationship between work engagement and turnover intention.

Last but not least, this study brings some practical enlightenment to organizational management.HR authorities should regularly use the professional scale to assess employee turnover intention. For employees with high turnover tendency, the organization should pay enough attention to find out the root of the problem, solve the problem in time, and provide psychological counseling to reduce the negative emotion of the staff. Repair the social exchange relationship between employee and organization. If the overall turnover intention of the organization is high, we should conduct a thorough investigation, analyze and summarize the reasons, redeploy the human resources strategy, expand the scope of rectification and reform, deepen the reform, and thoroughly reduce the turnover rate of the organization. To promote their work engagement, to create more value, and to promote the development of the organization. For employees who are engaged in work, the organization should give timely and appropriate reward to the spirit or material. In this way, it not only increases the accumulation of resources in his resource pool, helps to enhance his ability to create new resources and creates more value for the organization, but also makes it in a value-added spiral state, so it is not easy to produce turnover intention. However, organizations should also be careful not to reward their employees too much, which may lead to rising expectations and it will be more difficult for the organization to maintain a social exchange relationship with them in the future. Therefore, only by accurately grasping the degree, can the organization help the staff to engage in the work, accumulate more resources in the organization, and achieve the goal of reducing the turnover of the staff.

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Research on the Structural Optimization of Enterprise Teachers of Human Resources Management Based on Fuzzy Entropy[1]

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Abstract: In order to improve the construction of teachers, many colleges and universities invite some professional talents or skilled craftsmen to participate in the cultivation of school talents. Optimizing the structure of enterprise teachers is of great significance to the development of composite applied talents that meet the needs of society. Based on the sample data of Human Resource Management, this paper quantitatively analyzes the structure of enterprise teachers from four aspects: age, educational background, major, and graduation school. It uses fuzzy entropy to predict and analyze the enterprise teachers as well as proposes an optimization model and corresponding measures.
Key words: Enterprise teacher; Team structure optimization; Department of human resource management; Fuzzy entropy

1 Introduction

The former president of Tsinghua University, Mr. Mei Yiqi, once said: "University is not only a building but also has masters." It can be seen that the foundation of the school lies in the construction and optimization of the teaching team. At present, college students are faced with many difficulties in the process of finding a job. When employers recruit college students, they not only examine the theoretical knowledge of students, but also value the practical knowledge and ability. The difficult situation has become increasingly prominent. According to the Outline of the National Medium and Long-term Education Reform and Development Plan (2010-2020), the personnel training model of integrating work with learning, school-enterprise cooperation should be implemented. This study analyzes and optimize the structure of enterprise teachers to improve the quality of teaching, and cultivate complex application talents adapted to the needs of society, which has great practical significance.

At present, scholars at home and abroad research on the construction and structural optimization of enterprise teachers are mostly aimed at the theoretical research of higher vocational colleges. There is a lack of research and analysis on the optimization of enterprise teachers of colleges and universities. In addition, in related research at home and abroad, it has not been found that some scholars have conducted an in-depth analysis of the construction of enterprise teachers who major in Human Resource Management. The research results in this area are very few. Therefore, this study takes enterprise teachers that major in Human Resource Management as the object, carries on the quantitative analysis to its structural optimization, further enriches the research in this field.

The enterprise teacher is part-time teacher who has solid professional skill and the rich practical experience, participates in the cultivation of applied talents in universities, and undertakes certain teaching task. Enterprise teachers can effectively guide students to have an in-depth understanding of the company's positions; And can help students deepen the understanding of professional knowledge, learn to use the theoretical knowledge to find and solve problems; And can effectively help schools in the construction of teaching activities, teaching content, etc. It is of great significance to school development and student cultivation.

In order to improve the quality of teaching, the proportion of professional talents or skilled craftsmen hired form enterprises has been continuously increasing (Luo Xiaoqiu, 2010), and the part-time teachers form a growing proportion of the global Higher Education workforce (Beaton F, 2017). One scholar assessed the extent of use of part-time teachers in British higher education, the number is much more than the registered (Husbands C T, 2010). During the development process, some problems are gradually emerging. In response to the professional characteristics of enterprise teachers, many scholars have conducted relevant research on the appointment of enterprise teachers (Shao Jiandong, 2015), team building (Jia Wensheng and Liang Ningsen, 2015), and management mechanisms (Luo Xiaoqiu, 2010; Wang Lihua and Zou Jiquan, 2010). As a scholar put forward a new approach of developing effective part-time teachers in higher education (Beaton, Fran, Gilbert, et al., 2012).

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However, there are few studies on the optimization of its structure, especially quantitative analysis. Relying on the reform of Central China Normal University, He Zhankui et al. (He Zhankui et al., 2014) summarized the practical exploration of full-time and part-time teacher's structural optimization and put forward the "5+4+1" structure model. Take Wuhan University of Technology as an example，This paper optimizes the construction of enterprise teachers major in Human Resource Management, and proposes corresponding optimization models and suggestions.

2 The Present Situation of Enterprise Teachers

In order to optimize the structure of enterprise teachers, the paper analyzes the status quo of the structure of enterprise teachers, including age structure, educational background structure, major structure, and graduation school structure. And in order to realize the quantitative analysis of the target, this paper takes 78 enterprise teachers in the Human Resource Management Department of Wuhan University of Technology as an example, to conduct quantitative analysis.

2.1 Age structure

The age structure refers to the proportion of teachers' age in the same period, that is, the ratio of old, medium and young people. A reasonable age structure means that the team can flow normally and continuously, and it is generally distributed normally. There will be no obvious peaks or troughs appear in all age groups, resulting in discontinuities (Lily Liu, 2010). Therefore, the faculty not only needs the constant injection of fresh blood by young teachers, but also need middle-aged teachers who are the backbones. And as well as need older teachers to enrich the teaching experience. At present, the average age of enterprise teachers major in Human Resource Management is about 38, and only 8.97% of them are over the age of 50. Most of them are middle-aged and young teachers, among whom 35-50 are the most, accounting for 56.41%, and those under 35 are 34.62%. As shown in Figure 1.
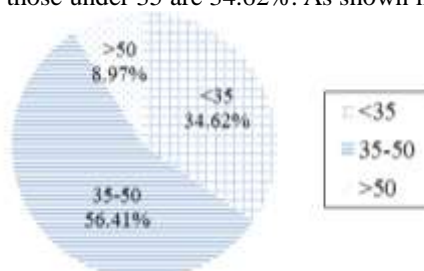
Figure 1   The Age Distribution of Enterprise Teachers

2.2 Educational background structure

The educational background structure is the proportion of teachers who have different degrees. The educational background structure can embody the theoretical foundation and professional qualities of the teachers and guarantee the quality of teaching and research. At present, there are doctor, master, and bachelor in the enterprise teacher talent pool. Among them, the number of enterprise teachers with a master's degree is the highest, accounting for 79.22%, and the number of them with a bachelor's degree account for 15.58%, and the proportion of doctorates with only 5.19%. As shown in Figure 2.

In the enterprise teacher talent pool, there are no specialist qualifications staffs. However, students need teachers who can actually guide them according to their actual situation，especially for undergraduates majoring in Human Resource Management. Therefore, the level of academic qualifications of enterprise teachers should constitute a certain gradient to meet student needs.
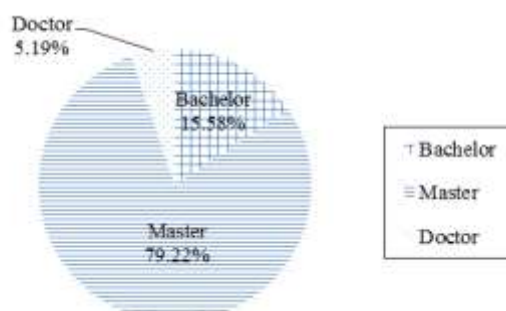
Figure 2   The Distribution of Enterprises Teachers' Educational Background

2.3 Major structure

The major structure is the ratio of the professional composition of the enterprise teachers. The enterprise teachers on the basis of their professional background, combine the practical experience and the actual research demand to apply the scientific research results to teaching and production practice, and better teach the knowledge to the students so as to improve the students' scientific research ability and popularization and application ability. In view of the weakness of students' practical application ability, enterprise teachers with different professional backgrounds are conducive to the intersection of disciplines, and their reasonable major structure is conducive to the cultivation of composite applied talents that meet the needs of society. At present, there are only 12.82% of enterprise teachers with human resource management background. Most of them are business administration and enterprise management teachers, accounting for 48.72% and 20.51% respectively, followed by a small number of management sciences and engineering major. As shown in Figure 3.
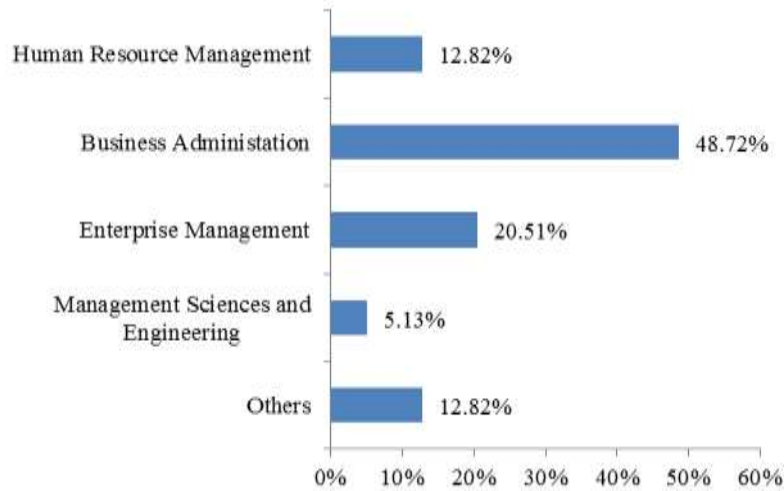
Figure 3   The Distribution of Enterprises Teachers' Major Structure

2.4 Graduation school structure

The graduation school structure refers to the proportion of the graduates from alma mater and other schools. The graduation school structure of the teaching team can influence the teaching idea and the academic thought of a school, and also has a great influence on the choice of teaching methods and contents. As shown in Figure 4, at present the enterprise teachers of Human Resource Management are mainly graduates from alma mater, which is as high as 84.62%, and most of them are tutored by the same tutor. There are very few enterprise teachers graduated from other colleges and universities. Although the selection and employment of teachers by tutors as a link to a certain extent facilitate the maintenance of the relationship between teachers and students, but in the long run, it may also cause "inbreeding" phenomenon, leading to a single academic thinking, lack of a variety of teaching ideas and academic ideas interchange.
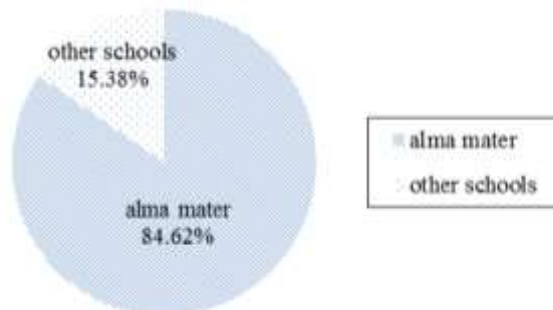
Figure 4   The Distribution of Enterprises Teachers' Graduation School

3 The Establishment of Optimization Model

The ultimate goal of the construction of the enterprise teachers is to build a stable, professional and

sustainable teachers team, to make up for the shortcomings of traditional teaching practice, to improve the students' ability to use knowledge and to enhance their comprehensive competitiveness. Therefore, it is necessary to reasonably predict and optimize the age, educational background, major, and graduation school structure of enterprise teachers so as to better meet the needs of teaching development and improve the professional competence of students.

In order to forecast and optimize the structure demand rationally, it's necessary to use the human resource structure optimization model to analyze, in which the commonly used models include fuzzy entropy model, structure optimization model based on work utility maximization, and coupling model based on personnel and task matching. Based on the fuzzy characteristics of enterprise teacher evaluation, fuzzy entropy can be used to measure; and the data needed by the model is relatively easy to obtain. The design and data source of the scoring table also covers expert opinions, which is more comprehensive. At the same time, the optimal solution of the model calculation is the proportional values of each structure optimization and does not require further calculation (Junfei Mei et al., 2013). This model is actually a multi-objective programming problem, considering the close relationship among many substructures, it is a more scientific structure optimization model.

The Zade fuzzy entropy $H(A)$ defined by Zadeh is used to measure the information of the enterprise teachers' structure, namely:

$$H(A) = -\sum_{i=1}^{n} U_A(x_i) p_i \ln(p_i) \tag{1}$$

Where $U_A(x_i)$ is the membership degree of x_i for a fuzzy set A, and p_i is an independent probability distribution of the possible state of the fuzzy event, and satisfies $\sum p_i = 1$.

Taking the age structure as an example, define the fuzzy set N to represent different age levels, the number of subsets is m, and the membership degree of element x_i is $U_N(x_i)$, so the fuzzy entropy of the age structure is:

$$H(N) = -\sum_{i=1}^{m} U_N(x_i) p_i \ln(p_i) \tag{2}$$

In the presence of constraint conditions, when the fuzzy entropy reaches its maximum value, the probability distribution of each element is the proportional parameter optimized for each subsystem.

4 Solution of the Model

In order to calculate the reasonable proportion of the enterprise teachers, the expert consultation method is used to obtain the degree of membership of various personnel. In this paper, through the questionnaire survey of full-time teachers of the Department of Human Resources Management of Wuhan University of Technology, the contribution degree of various types of enterprise teachers in the Human Resources Management professional is obtained. The specific results are shown in Table 1.

Table 1   Contributions of Enterprise Teachers

Age	Young(<35)	Mid-aged(35-50)	Old(>50)		
Contribution Degree	0.2182	0.5045	0.2773		
Educational Background	Junior College	Bachelor	Master	Doctor	
Contribution Degree	0.0909	0.3818	0.3955	0.1318	
Major	Human Resource Management	Enterprise Management	Business Administration	Management Sciences and Engineering	Others
Contribution Degree	0.4091	0.1773	0.2455	0.0845	0.0836
Graduation School	Alma Mater	Other Schools			
Contribution Degree	0.5636	0.4364			

The degree of contribution is taken as the degree of membership in the model (Junfei Mei et al., 2013). The reasonable age distribution of enterprise teachers is: young teachers account for p_{11}, middle-aged teachers account for p_{12}, elderly teachers account for p_{13}, and the fuzzy entropy of the age structure is as follows:

$$H(N) = -0.2182\, p_{11} - 0.5045\, p_{12} \ln p_{12} - 0.2773\, p_{13} \ln p_{13}$$

According to Janeys maximum entropy principle, build the target model:

$$\begin{cases} MaxH(N) \\ p_{11} + p_{12} + p_{13} = 1 \end{cases}$$

Using Lingo software to solve the nonlinear programming model:

$$p_{11} = 0.3218,\ p_{12} = 0.3472,\ p_{13} = 0.3311$$

The reasonably age structure of enterprise teachers is as 32.18% for young people, 34.72% for middle age, and 33.11% for old age, as shown in table 2.

Table 2 The Optimization of Enterprise Teachers' Age Structure

Age	Young (<35)	Mid-aged (35-50)	Old (>50)
Currently	34.62%	56.41%	8.97%
Reasonably	32.18%	34.72%	33.11%

Similarly, using the expert scoring table to construct the corresponding target model can solve the reasonable distribution of the educational background structure, major structure and graduation school structure of the enterprise teachers, as shown in table 3 to table 5.

Table 3 The Optimization of Enterprise Teachers' Educational Background Structure

Educational Background	Junior College	Bachelor	Master	Doctor
Currently	0	15.58%	79.22%	5.19%
Reasonably	17.00%	30.61%	30.80%	21.59%

Due to the limited number of samples, the proportion of enterprise teachers with doctoral degrees calculated based on the expert's score is high. In the future, we can absorb enterprise teachers with doctoral degrees as much as possible, but it will be difficult to achieve in a short period of time.

Table 4 The Optimization of Enterprise Teachers' Major Structure

Major	Human Resource Management	Enterprise Management	Business Administration	Management Sciences and Engineering	Others
Currently	12.82%	20.51%	48.72%	5.13%	12.82%
Reasonably	29.23%	21.65%	25.08%	12.09%	11.95%

Table 5 The Optimization of Enterprise Teachers' Graduation School Structure

Graduation School	Alma Mater	Other Schools
Currently	84.62%	15.38%
Reasonably	48.05%	51.95%

5 Conclusion

In terms of age structure, it can be seen that the enterprise teachers aged 35-50 in the majority, and there are fewer teachers over 50 years old. The enterprise teacher's talent pool established with the tutor as the link leads to its age distribution concentrated in a certain area. We can appropriately expand the attraction channels and establish a scientific talent introduction and withdrawal mechanism, constantly optimize the age structure of enterprise teachers, and maintain a reasonable age gradient.

In respect of the educational background structure, in view of the current over-concentration of the enterprise teachers' academic levels, it is necessary to expand the number of teachers with specific work experience and skills who are bachelor degree or junior college, and to recruit some well-known corporate managers and senior managers with master' degree. Enterprise teachers with different experiences and levels should form a certain echelon to ensure the gradual development of the team.

In terms of major structure, at present the profession of enterprise teachers is mostly enterprise management or business administration, which have a great effect on the auxiliary teaching of undergraduate Human Resource Management, and broaden the students' knowledge interface. However, there is a lack of teachers in Human Resource Management, and there are some deficiencies in the professional integration degree of the students majoring in Human Resource Management. Secondly, in order to cultivate applied talents, it is necessary to introduce appropriate amount of enterprise teachers major in management science and engineering so that students are not limited to theoretical knowledge,

but also have a corresponding technical background and promote the overall development of students. In order to continuously optimize the major structure, the number and quality of the teaching staff are adapted to the requirements of its teaching reform and professional development. In the follow-up of the introduction of policies, we must proceed from reality and treat differently. For Human Resources Management, we must "add the quantity as soon as possible, and gradually improve the quality"; for the related professions, we must "combine with the actual situation, taking into account the quantity and quality"; for individual profession, we must adhere to "rather go without than have something shoddy".

In the graduation school, due to the fact that the enterprise teacher talent pool is basically tied to the tutor, it leads to a simplification of the graduation school and the lack of communication between various teaching thoughts and academic ideas. In order to avoid the phenomenon of "inbreeding", on the one hand, we persist in the internal the strategy of combining with external attraction has been introduced to expand the sources of teacher resources and increase the introduction of other college graduates. On the other hand, we encourage and guide enterprise teachers of our school to participate in academic exchanges so as to continuously expand thinking and enrich academic ideas.

Acknowledgement

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Research on the Impact of Network Construction-oriented Human Resource Practice and Organization Duality on Organizational Performance

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Abstract: Based on the theory of dynamic capabilities, this paper explores the role of organizational ambidexterity as a dynamic capability in the construction of network-building human resource practice and organizational performance. Inconjunction with the theory of upper echelons, this paper argues that behavioral integration plays regulatory role on network-building human resource practice and organizational ambidexterity. The study found that: (1) network-building human resource practice have a significant positive impact on organizational performance, organizational ambidexterity plays a part in mediating role; (2) behavioral integrationplay regulatory role on the network-building human resource practice and organization ambidexterity.
Key words: Network-building human resource practice; Organizationalambidexterity; Firmperformance; Behavioral integration

1 Introduction

As the Chinese economy enters the "new normal", the business environment of companies is increasingly turbulent and complex. How companies obtain dynamic capabilities to maintain their sustainable competitive advantages is an eternal topic. Scholars believe that organizational duality can be used as a strategic choice of an organization to improve organizational performance (Benner M J & Tushman M L, 2003). It can be said that organizational ambidexterity is a dynamic capability and provides a new research perspective for the organization's innovation and development.

With the development of economy, the traditional practice of human resources has become increasingly unable to adapt to changes in the market environment. Scholars have begun to conduct research and discussion from the perspective of social networks. The existing research results show that NBHRP (network-building human resource practice) can positively influence organizational performance. This article will study its impact mechanism from the perspective of organizational ambidexterity.

In view of this, based on the dynamic capability theory, this paper studies the impact of NBHRP and organizational ambidexterity on organizational performance, and uses TMT (top management team)behavioral integration as a regulated variable between NBHRP and organizational ambidexterity. The significance of this paper lies in: First of all, NBHRP is still in the initial stage of research. This article combines China's background and based on the theory of dynamic capabilities, and studies it from the perspective of organizational ambidexterity, enriching the research on NBHRP and providing it with a new perspective；Second, under the background of the era of innovation in China, Chinese enterprises still have unclear cognition of organizational ambidexterity, and the impact of innovative management models on organizational performance is not significant. Therefore, it is of great practical significance for Chinese enterprises to explore how to obtain dynamic capabilities and enhance sustainable competitiveness.

2 Literature Review and Research Hypothesis

2.1 NBHRP and organizational performance

The network of relations has a special status and important influence on the social actions of the Chinese. Compared with Western countries, the network of Chinese social relations is more complicated. Clollins and Clark started from the top management team and proposed NBHRP. They pointed out that NBHRP aims to build and develop social networks of top management teams and internal stakeholders and external stakeholders of organizations and discover specific network constructions (Collins C J & Clark K D, 2003). Human resource practice has a significant relationship with the organizational resources of the TMT social network, and will enable to achieve higher performance through the role of social networks within and outside the organization's members.

This paper believes that the construction of network-oriented human resource practice can provide enterprises with a non-simulated social relationship network, and through a series of encouragement and support staff to establish human resources management measures to maintain social relations, such as training, performance assessment, salary incentives, etc. More conducive to corporate resource information and ultimately improve organizational performance.So this article proposes:

Hypothesis 1: NBHRP have a positive effect on organizational performance

2.2 NBHRP and organizational ambidexterity

According to the research results of Tushman (Tushman M & Smith W, 2004), this paper defines organizational ambidexterity as the organization's commitment to achieve two types of disparate or even contradictory goals. In a complex and dynamic environment, a successful company can effectively operate its current business and have the ability to adapt to the characteristics required for future development.NBHRP is the establishment of social relationships between top management team members and internal and external stakeholders.

From the perspective of social networks, it can be found that the establishment of social networks is conducive to the acquisition of enterprise knowledge, information and resources.From the perspective of exploratory innovation, we can use the internal and external social networks to obtain the market's future demand trends, and be able to learn about environmental change information, so that the organization can have dynamic capabilities to adapt the changes in the environment and the market.From the point of view of exploitation innovation, the establishment of exchanges and relationships with internal and external personnel can enable the organization to clearly understand the current status and future potential of existing products, consolidate the market position of existing products or services, and achieve better short-term goals aims.So this article proposes:

Hypothesis 2: NBHRP have a positive effect on organizational duality

2.3 Organizational ambidexterity and organizational performance

Ambidexterity can simultaneously achieve the organization's short-term goals and long-term goals. Scholars believes that combining exploratory innovations with exploitative innovations will create a more favorable development environment for the company, which in turn will lead to good corporate performance (Birkinshaw J & Gibson C, 2004). From the point of view of dynamic capabilities, the dynamic capabilities of enterprises need the cooperation of exploratory innovation and exploitation of innovative two strategic ways, and this dynamic capability can help enterprises to obtain higher corporate performance (Eisenhardt K M & Martin J, 2000).

For enterprise exploratory innovation, itfocusses on the unknown areas. Explore new products or services to better meet the needs of consumers or new markets, so that enterprises can obtain unique competitive advantages in the short term, and then improve short-term financial performance. The innovation of exploitation focuses on the existing products or services of the company, improves and perfects it, and develops its potential competitive advantages, so that the company can maintain its long-term performance. From the perspective of dynamic capabilities, organizational ambidexterity is the ability of an organization to adapt to the environment and meet the survival and development of the organization, and it can bring a competitive advantage to the organization. So this article proposes:

Assumption 3: Organizationalambidexterity has a positive effect on organizational performance

2.4 The mediating role of organizational ambidexterity

Based on the perspective of resource-based theory and dynamic capability theory, organizing ambidexterity capability as a dynamic capability is the key to the organization's ability to maintain lasting competitiveness. The company encourages its employees to actively build a social network, and uses the social network to learn information resources that are beneficial to the organization to help enterprises form social networks that are difficult to imitate. In the process of their construction, they form an organization's sense of innovation and make the organization adapt to its dynamics, which helps performance grow (Patel P C, 2013). As a result, the practice of building human resources through network construction can form a unique social network relationship for the organization, and in the process of resource and information acquisition, it forms a dynamic capability that adapts to the changing environment in which the organization is located, namely the formation of exploratory and exploitation innovation capabilities help companies maintain their continued competitiveness to boost organizational performance.So this article proposes:

Hypothesis 4: Organizational duality has an intermediary role between NBHRP and organizational performance. The greater the degree of organizational ambidexterity innovation, the greater the positive impact of NBHRP on organizational performance.

2.5 The regulatory role of behavioral integration

Behavior integration will affect the formation of organizational dynamic capabilities. The main reason is that TMT members will create a learning behavior to promote the formation of dynamic capabilities in the process of joint decision-making and information sharing, which is beneficial for insight into the current environment, strategy, and to ensure that opportunity to ensure the implementation of the strategy. Coleman believes that cooperative behavior in the process of behavioral integration and mutual communication and joint decision-making will help the organization to solve the problem of duality. Therefore, from the perspective of dynamic capabilities (Tushman M, 2004), the TMT behavioral integration process can create dynamic capabilities and promote collaborative organizational ambidexterity in exploration and exploitation.

For NBHRP, the magnitude of the TMT's behavioral integration is also critical to the size of its internal and external networks. Because in the process of establishing social relations, information related to the organization will be learned from its network of relationships, and TMT members will better share, exchange, and cooperate information resources to make decisions that are more suitable for the organization. So this article proposes:

Hypothesis 5: Behavioral Integration Can Positively Regulate the Role of NBHRP on Organizational ambidexterity.

3 Model

In summary, the research model can be summarized as shown in Figure 1.
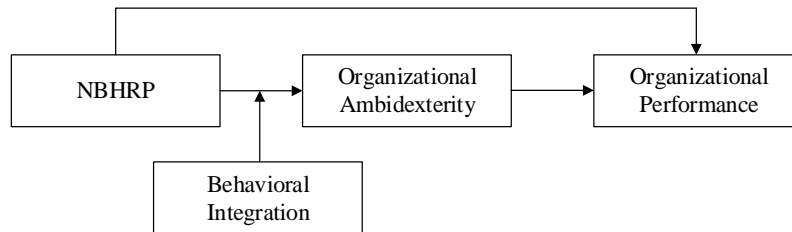
Figure 1　Logical Framework

4 Research

This article mainly uses online questionnaires to conduct research. The source of the research sample is domestic enterprises, mainly including the central regions (Hunan, Hubei and Henan) and the southeastern regions (Shanghai, Zhejiang, Jiangsu, and Guangdong), etc.The number of questionnaires collected was 251.After 22 invalid questionnaires were removed, 229 valid questionnaires were finally obtained, with an effective rate of 91.2%.

According to the sample data collected, the proportion of senior managers is only 7%, the proportion of middle managers is 35.8%, and the ratio of grassroots managers and ordinary employees is 23.6% and 33.6% respectively.

The questionnaire designed in this study includes five aspects: basic information, network construction-oriented human resource practices, organizational ambidexterity, organizational performance, and behavioral integration. Likert5 point scale was used to measure the acceptability of subjects to the description of questions.

This study will use SPSS 20.0 software to perform reliability test, descriptive statistical analysis, correlation analysis, regression analysis, etc. on the recovered data. First, a descriptive statistical analysis of the basic distribution of sample features is performed, mainly based on the background information of the companies in the sample and the frequency of the personal information of the individual. Second, a descriptive statistical analysis of the mean and standard deviation of each variable was performed. Correlation analysis was used to test the correlation between variables. Finally, hierarchical regression analysis was used to further examine the relationship between variables.

This paper uses Spearman correlation coefficient analysis in SPSS. Mean values, standard deviations, and correlation coefficients between variables for the main variables are shown in Table 2. The data shows that there is a significant correlation between variables ($P<0.05$).

Table 1   Mean, Standard Deviation, Correlation Coefficients of Major Variables

variable	mean	standard deviation	1	2	3	4
NBHRP	4.00	0.57	1.00			
Organizational ambidexterity	4.01	0.60	0.62**	1.00		
organizational performance	3.73	0.62	0.47**	0.51**	1.00	
behavioral integration	3.83	0.53	0.59**	0.59**	0.79**	1.00

Baron and Kenny (1986) used the method of research to examine the mediating effect of organizational ambidexterity on NBHRP and organizational performance and behavioral integration on the regulatory effects of NBHRP and organizational ambidexterity.And this paper mainly uses the analytic hierarchy process to conduct hypothesis testing.After controlling related variables in Model 2, NBHRP has a significant positive effect on organizational performance ($P=0.001$). Hypothesis 1 is established.In Model 3, organizational ambidexterity also had a significant positive effect on organizational performance ($P < 0.001$). Hypothesis 3 was established.In model 6, NBHRP has a significant positive effect on organizational ambidexterity ($P<0.05$). Hypothesis 2 holds,and it can be explained that organizational ambidexterity has some mediating effects between NBHRP and organizational performance. Assumption 4 is established.In the model 7, the hypothesis is validated by adding NBHRP interaction terms with behavioral integration on the basis of model 6. NBHRP interaction with the integration of behavior has a significant positive effect on organizational ambidexterity ($P < 0.05$), suggesting that behavioral integration regulates the positive impact of NBHRP on organizational ambidexterity. Hypothesis 5 holds.

Table 2   Hierarchical Regression Analysis of Each Hypothesis

variable	organizational performance				organizational ambidexterity		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Control variable							
pos	-.044	-.070	-.12	-.11	.12	.08	.010
CT	-.038	-.077	-.02	-.04	-.04	-.09	.008
Ind	.036	.015	-.01	-.01	.07	.04	.092
CS	.011	.020	-.03	-.01	.06	.07	-.029
Explanatory variables							
NBHRP		.544***		.22**		.73**	
organizational ambidexterity			.61***	.44***			
NBHRP*BI							0.20**
Observations							
R^2	.004	.298	.37	.39	.03	.56	.743
ΔR^2		.282*	.35***	.37***		.546***	.659
F	.244	18.912**	25.27***	23.09***	1.77	55.79***	39.98**

Pos indicates job level; CT indicates company type; Ind indicates industry; CS indicates company size
NBHRP*BI indicates NBHRP and behavioral integration interaction items

5 Conclusion

Under the background of China's relationship society, human resources practice needs to use the internal human resources of the organization to actively establish a social network with the relevant internal and external personnel to obtain information and resources that are beneficial to the organization, and then promote the improvement of organizational performance. NBHRPhelps employees to understand and understands existing products or services, and discovers potential market opportunities in the existing market based on the information they have learned, improve the organization's use of innovative capabilities. Organizational ambidexterity can weigh the innovation approach according to the external environment and its own conditions. This ability can significantly

promote the improvement of organizational performance. The results of this study, in practical terms, should continue to develop and improve the organization's sense of innovation and strengthen organizational ambidexterity.

This article has some limitations, mainly reflected in:It will have a certain impact on the results of data analysis, and the questionnaires cannot be guaranteed to be completed in a single form through online questionnaires;The scale of this study is the adoption of the existing maturity scale, but the scale of NBHRP and behavioral integration is the scale of the Western scholars applied, and the difference between Eastern and Western cultures and the degree of innovation will affect domestic companies. The investigation will also have an impact.

Future research prospects:The focus of its innovation method will not be different for different industries. Therefore, in the future research, it can be applied to the industry. Analysis of differences in the impact of characteristics on organizational duality and a deeper study of the mediating role of organizational ambidexterity; in the further study, the influence of various variables can be considered to improve the research.

Acknowledgement

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Research on the Relationship Between Employee Involvement and Innovation Behavior of Science and Technology Employees

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Abstract: This paper conducts a questionnaire survey of 260 highly-educated employees in science and technology enterprises or innovative companies in Wuhan, and discusses the relationship between employee involvement, job involvement, and innovation behavior of science and technology employees. The results found: (1) Employee involvement has a positive impact on the innovation behavior of science and technology employees. (2) Employee involvement has a positive impact on job involvement. (3) Job involvement has a positive impact on the innovation behavior of science and technology employees. (4) Job involvement plays a mediating role between employee involvement and innovation behavior of science and technology employees. This study not only enriched the research on the mechanism of the impact of innovation behaviors of science and technology employees, but also provided guidance for enterprises to inspire the innovation behavior of science and technology employees.

Key words: Employee involvement; Job involvement; Employee innovation behavior; Science and technology employees

1 Introduction

In today's complex business environment, innovation is the key to an organization's survival and development (Sacramento, Fay & West, 2013). Organizational innovation depends on employee innovation, and employee innovation is an important source of organizational innovation (Yuan F, Woodman R W, 2010). Technological employees are the backbone of corporate human resources (Yao Liping, Jin Jin, 2008). In the age of knowledge economy, science and technology employees engage in production and create knowledge activities that can bring value-added knowledge capital to companies or organizations (Cui Xiangmin,Yang Dongtao, 2015).Therefore, in-depth research on the factors affecting the innovation behavior of science and technology employees is particularly important for promoting employees to create innovative ideas, implement innovative ideas, and enhance organizational innovation capabilities. In past, most of the literature on the factors affecting employees' innovative behaviors focused on individual-level variables, such as the impact of cognitive and attitude on employee innovation behavior (Cao Keyan, Dou Zhiming, 2015). In recent years, researches on the influence of organizational variables on employee innovation behaviors have emerged. For example, studies have shown that work complexity, work environment and other factors have a significant impact on employee innovation behavior, specially, more and more attention has been paid to the research on the influence of human resource practices on innovation behavior. Mansouris' research shows that effective human resource management practices help promote employees to exhibit more innovative behaviors (Nazanin Mansouri, 2016). Human resource management practice is a relatively large concept, and its subdivision is conducive to the in-depth study of the mechanism that affects the scientific and technological employees' innovative behavior. However, existing research is lacking in this aspect. Human resource management practices include employee involvemnt. Liu Songbo (Liu Songbo, 2013) found that employees' perceived level of participatory decision-making has a positive effect on their own innovation through empirical analysis. Chen Xiaoping (Chen Xiaoping, 2012) found that Employee involvement will increase their job satisfaction thus promote employees to work more. Zhang Ruijuan (Zhang Ruijuan, 2014) found that employee job involvemnt has a positive impact on employee innovation behavior. However, there is currently no study that combines employee involvement with job involvement and the innovation behavior of science and technology employees. There is little research on the innovative behavior of science and technology employees. Therefore, this article will use job involvement as a mediator variable to deeply discuss the mechanism of employee involvement in the innovation behavior of science and technology employees. It aims to enrich the research on the impact mechanism of the scientific and technological employees' innovative behaviors and at the same time provide guidance for the enterprises to inspire the innovative behaviors of the science and technology employees.

2 Theory and Hypothesis

2.1 Related concepts

Science and technology employee. Peter Drucker, the management guru, first proposed the concept of knowledge workers, "the person who masters and uses symbols and concepts and works with knowledge or information." In particular, knowledge workers include professionals, assistant professionals with deep professional skills, senior manager, etc. Their areas of work include research and development, product development, engineering design, etc. It can be seen that science and technology employees belong to the category of knowledge workers. Zhang Ming (Zhang Ming, 2016) found that most of the employees of science and technology are well-educated, have a good education background and qualifications, have business advantages in a certain professional field, have a keen insight into new knowledge and new technologies in a constantly changing competitive environment and have good learning ability.

Employee involvement. The earliest ideas of employee involvement dates back to the "Employee Advice System" written by Esatman in 1898. Afterwards, the American psychologist Mayo put forward the hypothesis of "social people". Managers who hold this hypothesis of human nature put forward the form of "employee participation management", so that employees can participate in research and discussion of corporate decision-making in varying degrees. Some scholars defined employee participation from the perspective of employees as the process of employee involvement in the formulation and implementation of management decisions, and through the interaction with management, the process of participating in and influencing management behavior (Chen Wansi, Yu Yanru, 2010) (Wang Limin, Yuan Qinghong, 2011). This article examines employee participation from an employee perspective.

Employee innovation behavior. Ambile (Ambile, 1998) believes that the individual's innovative behavior is a process in which people generate new ideas and implement new ideas, or new ideas to solve problems [10]. At present, most scholars support the definition of personal innovation behavior from a process perspective. Scott and Bruce (Scott and Bruce, 1994) divided individual innovation behavior into three phases: the generation of new ideas or solutions, the search for supporters of individual ideas, and the conversion of new ideas into products [11]. This study draws on Scott and Bruce's definition of innovative behavior.

2.2 Employee involvement and innovation behavior of science and technology employees

The social exchange theory believes that employees pay special attention to the resources and social interactions that are obtained from the organization. When the organization implements employee involvement and is perceived by the science and technology employees as the appreciation, recognition, and investment of the organization, a social exchange relationship is formed between the organization and the scientific and technical employees, rather than a pure economic relationship. Under this relationship, technology employees feel that they are needed by the organization and they are the masters of the company. Therefore, they will be more willing to cooperate, help each other, and share knowledge. They are willing to provide advice and suggestions for the development of the enterprise, which will inspire science and technology employees' creative behavior. The expectancy-valence theory holds that the motivation for people to take a certain action depends on their value evaluation of the action result and the estimation of the expected probability of the result(Zhang Hao, Fan Wei, Yu Weina,2014).The knowledge workers involvement incentive can satisfy self-fulfillment of the spiritual level needs of knowledge workers, promote them to contribute to the development of the enterprise to reward the enterprise, effectively strengthen the knowledge workers' expectations of innovation performance, and the development of innovation desire and sense of innovation can promote knowledge workers to adopt more innovative action(Liu Songbo, Dai Lingling, Li Yurong,2013). At the same time, the participation of science and technology employees in organizational management and business decision-making is conducive to strengthening organizational learning, which has a positive significance in improving innovative ability of science and technology employees and promoting their innovation behaviors. Therefore, this study proposes Hypothesis 1:

Hypothesis 1: Employee involvement has a positive impact on innovation behavior of science and technology employees.

2.3 Employee involvement and job involvement

Through combing existing literature, it is found that employee involvement can affect individual employee behavior and performance. The more employees participate in the organizational decision-making process, the more they can strengthen the trust between employees and managers.

Likert (1961) found that the higher the degree of job satisfaction, the greater the satisfaction of employees' self-fulfillment, the improvement of their work enthusiasm and the improvement of their performance. From the perspective of social exchange theory, the employee-organization relationship is the exchange relationship between the organization's input to employees and the employees' returns to the organization. In this kind of exchange relationship, when the enterprise provides employees with sufficient opportunities for employee involvement, the employees will feel the support and trust of the organization and generate a sense of responsibility that rewards the organization for its own interests and opportunities. It will drive employees to work hard to reward the organization's affirmation and support and show a high job involvement attitude. When the employee's participation opportunities provided by the organization do not meet the employee's expectations, they are deemed to have violated the reciprocal obligation. The employees will develop dissatisfaction and lack enthusiasm and enthusiasm for the work, thereby they will reduce their work commitment. In addition, Lawler et al. found that the participation of employees can improve the effectiveness of the organization. The performance of employee involvement can improve the morale, job satisfaction, and reduction of absenteeism and turnover intention of the employees .The higher the employee participation, the stronger the organizational commitment, the lower the turnover tendency (Zopiatis A, Constanti P, Theocharous A L,2014).In corporate management, managers should appropriately decentralize their rights, motivate new generations of employees to participate more in corporate management, make new generation employees feel that they are the masters of the enterprise, enhance their sense of participation, and reduce their turnover intentions, thus retain excellent talents and reduce business costs(Zhang Hao, Li Zeying,2017). Chen Xiaoping (Chen Xiaoping, 2012) found that Employee involvement can effectively reduce employees' willingness to leave and improve their job satisfaction, to a certain extent, increase job involvement. Therefore, this study proposes Hypothesis 2:

Hypothesis 2: Employee involvement has a positive impact on job involvement.

2.4 Job involvement and innovation behavior of science and technology employee

Dorenbosch (Dorenbosch, 2005) found that job involvement is a positive psychological state of work characterized by vigor, dedication and absorption. It is mainly represented by the following behaviors: the employees are fully absorbed in their work, are tirelessly willing to work hard for their own work and are courageous to accept the challenges in their work. These performances of science and technology employees contribute to the formation of their innovative behavior. At the same time, job involvement can motivate employees' enthusiasm and initiative, and employees' enthusiasm and initiative can help employees' innovative behaviors. According to Schaufeli et al.'s points, employees who are engaged in high levels of work are always persistent in pursuing challenges in their work and help stimulate their internal creative motives. In this highly motivated state, the possibility of individuals continuing to explore innovations has greatly increased. Shalley et al. found that in the state of high job involvement, employees always look for new ideas to promote new ideas and work hard to find ways to make new ideas work. Therefore, employees who are engaged in high levels of work are more likely to show strong work creativity. Huang Jun and Jia Yu (Huang Jun and Jia Yu,2016) also found through empirical research that job involvement contributes to the improvement of individual employee innovation behavior. Therefore, this study proposes assumptions:

Hypothesis 3: Job involvement has a positive impact on innovation behavior of science and technology employees.

2.5 The mediating role of job involvement

According to the above discussion, from the perspective of social exchange theory, employee-organizational relationship is the exchange relationship between the organization's input to employees and the employee's return to the organization. In this kind of exchange relationship, when the enterprise provides technology employees with full employee participation opportunities, the science and technology employees will feel the support and trust of the organization and generate a sense of responsibility that rewards the organizations for their own interests and opportunities. This translates into motivation to work harder and shows a high investment attitude. In the state of high work engagement, the scientific and technological employees always look for new ideas to sell new ideas and work hard to find ways to make new ideas work. Therefore, science and technology employees who are highly engaged in work are more likely to show strong work creativity. Therefore, this study proposes assumptions:

Hypothesis 4: Job involvement plays a mediating role between employee involvement and innovation behavior of science and technology employees. Hypothetical model diagram is shown in Figure 1:
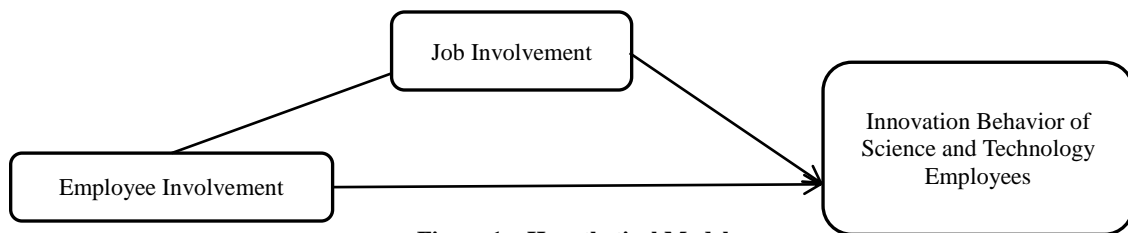
Figure 1   Hypothetical Model

3 Methodology
3.1 Data collection and instrument
In this study, a questionnaire survey method was used to select employees of higher education in a number of science and technology enterprises or innovative companies in Wuhan as the survey objects. 260 questionnaires were distributed and 245 questionnaires were returned. After screening, 210 questionnaires were valid. The recovery rate was 94.2%, and the effective questionnaire rate was 80.7%.

3.2 Measures
Employee involvement scale. The employee involvement scale was derived from a scale compiled and edited by Pare et al. and compiled by Huang Jian. The scale includes 15 items. After testing, the scale's Cronbach's α coefficient is 0.898, and the reliability is good.

Job involvement scale. A short job involvement scale (UWES-9) developed by Schaufeli was adopted. The scale includes three parts: vigor, dedication and absorption. Each part has 3 questions and a total of 9 items. After testing, the Cronbach's α coefficient of the vigor part is 0.711, the Cronbach's α coefficient of the dedication part is 0.848, the Cronbach's α coefficient of the absorption part is 0.918, and the Cronbach's α coefficient of the scale is 0.931, and the reliability is good.

Employee innovation behavior Scale. The Innovation Behavior Scale uses 8 questionnaires that were revised by Zhang Zhengang et al. (Zhang Zhengang et al., 2016) on the basis of Zhou (Zhou, 2003) and Wang Yanfei et al. (Wang Yanfei et al., 2012) viewpoints combined with the actual situation of Chinese enterprises. After testing, the scale's Cronbach's α coefficient is 0.915, and the reliability is good.

The above scales are all based on Likert's five-point scoring method, which is based on "very inconsistent" to "very consistent" and is given 1-5 points.

Control variables. This study controls the science and technology employees' gender (male = 1, female = 2), age (22-25 years = 1, 26-35 years = 2, 36-45 years = 3, 46 and over = 4) and educated degrees (specialties and below=1, undergraduate=2, masters and above=3).

Table 1   Correlation Coefficient Matrix

Variables	Mean	standard	1	2	3	4	5	6
1 Gender	1.30	0.462	1					
2 Age	2.18	0.922	0.512	1				
3Educated Degree	2.36	0.650	0.254	-0.112	1			
4Employee Involvement	3.17	0.383	0.112	0.132	0.341*	1		
5Job Involvement	3.20	0.429	0.087	-0.271	0.332*	0.659**	1	
6Employee Innovation Behavior	3.17	0.506	0.075	-0.025	0.263	0.721**	0.658**	1

Notes: ***$p<0.01$; **$p<0.05$; *$p<0.1$. N=210.

4 Results
4.1 Correlation analysis
The mean, standard deviation, and correlation coefficients for all variables are shown in Table 1. From the correlation coefficient matrix table, we can find that employee involvement and job involvement are significantly related (0.695), job involvement and innovation behavior of science and technology employees are significantly related (0.658), and employee involvement is significantly related to innovation behavior of science and technology employees (0.721).

4.2 Hypothetical test

For hypothesis testing, SPSS 22.0 was used for multiple regression analysis in this study. This study assumes that employee involvement has a positive impact on innovation behavior of science and technology employees. Models 3 and 4 in Table 2 show the test results of this hypothesis. In Model 3, we examined the effect of control variables on the innovation behavior of science and technology employees. Model 4 shows that after controlling the control variables, there is a significant positive correlation between employee involvement and the innovation behavior of the science and technology employees. Hypothesis 1 is verified. This study assumes that employee involvement has a positive impact on job involvement. Model 1 of Table 2 examines the effect of control variables on job involvement. Model 2 shows that there is a significant positive correlation between employee involvement and job involvement after controlling for gender, age, and level of education. Hypothesis 2 is verified. The hypothesis 3 in this study assumes that job involvement has a positive impact on innovation behavior of science and technology employees. The model 5 in Table 2 shows that after controlling the control variables, there is a significant positive correlation between job involvement and innovation behavior of science and technology employees. Hypothesis 3 is verified.

Next, we test the hypothesis 4. This study uses the method of Baron and Kenny [16] to test the role of mediation. The model 6 in Table 2 shows that compared with model 4, after joining the job involvement variable, the correlation coefficient of employee involvement becomes 0.512, and the correlation with the innovation behavior of science and technology employees is reduced, and the significance is also reduced. At the same time, the regression coefficient of job involvement is 0.316, which is significant. This shows that after joining the job involvement variable, employee involvement has a lesser impact on innovation behavior of science and technology employees, and job involvement has partially replaced the effect of employee involvement on innovation behavior of science and technology employees. Therefore, job involvement plays a partial intermediary role between employee involvement and the innovation behavior of science and technology employees. Hypothesis 4 is verified.

Table 2   Regression Analysis Table

Variables	Job Involvement		Employee Innovation Behavior			
	Model1	Model2	Model3	Model4	Model5	Model6
Gender	0.346	0.357	0.158	0.170	0.085	0.057
Age	-0.353	-0.338	-0.015	0.001	0.233	0.108
Educated Degree	0.312	0.095	0.299	0.061	0.080	0.031
Employee Involvement		0.658***		0.720***		0.512**
Job Involvement					0.701***	0.316*
R^2	0.229	0.611	0.091	0.548	0.470	0.587
Adjusted R^2	0.171	0.571	0.083	0.502	0.416	0.533

Notes: ***$p<0.01$; **$p<0.05$; *$p<0.1$. N=210.

5 Conclusion

This paper studied the relationship between employee involvement, job involvement and innovation behavior of science and technology employees and drew the following conclusions: (1) Employee involvement has a positive effect on innovation behavior of science and technology employees. (2) Employee involvement has a positive impact on job involvement. (3) job involvement has a positive impact on innovation behavior of science and technology employees. (4) Job involvement plays an intermediary role between employee involvement and innovation behavior of science and technology employees. Therefore, in order to promote the innovation behavior of science and technology employees, the organization must pay attention to the employee involvement in the institution building, and at the same time, it must also play an intermediary role in the job involvement. This study not only enriches the research on the mechanism of innovation behavior of technology-based employees, but also provides guidance for companies to inspire the innovation behavior of technology-based employees. There are also deficiencies in this study, the sample selection area is not large enough, the selection of control variables is not deep enough, and future research can be improved in these areas.

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Total Factor Productivity Growth in China's Hotel Industry under Environmental Constraints

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Abstract: This paper incorporates environmental factors into the measurement framework of productivity in hotel industry. The Malmquist-Luenberger index is used to measure the green total factor productivity (TFP) of the hotel industry in 30 provinces of China from 2001 to 2015, and it is compared with the traditional TFP without considering environmental factors. The results show that the measurements of TFP in China's hotel industry will be influenced by environmental factors. Neglecting environmental factors will significantly overestimate the TFP level of the hotel industry, and technical progress of the hotel industry is the dominant factor for the green TFP growth. The green TFP in China's hotel industry presents a regional characteristic that are successively decreasing from east to west, and it shows large inter-provincial differences as well.
Key words: Hotel industry; Green total factor productivity; Environmental constraints; Regional difference

1 Introduction

Since the new century, China's hotel industry has achieved rapid development. From 2001 to 2015, the revenue of China's hotel industry has increased from 76.332 billion yuan in 2001 to 210.675 billion yuan in 2015, with an average annual growth rate of 7.52%. However, environmental issues such as carbon emissions caused by the rapid development of the hotel industry has become increasingly serious (Gastellani & Sala, 2010; Tsai et al., 2014; Huang Ying, 2015). Protecting the environment and reducing carbon emissions have become a rigid constraint on the economic growth in China's hotel industry, and an effective way to achieve the goals mentioned above is to improve the green total factor productivity(hereafter, TFP) in the hotel industry.

The previous literature mainly focused on measuring the traditional productivity of the hotel industry. Barros (Barros, 2005) used the DEA-Malmquist index method to estimate the TFP changes and its decomposition of 42 hotel companies in Portugal from 1999 to 2001. The results show that the TFP of hotel companies decreased by 15% annually, which is mainly attributed to the decline in the technology advancement index in most hotel companies. Sheng & Zhong (Sheng & Zhong, 2010) also used the DEA-Malmquist index to measure the traditional TFP index in China's inter-provincial hotel industry from 1997 to 2007. The study found that the TFP of hotel industry increased by 0.3% annually, and technical progress is the dominant factor driving its growth. Recently, researchers used the dynamic two state approach (Huang et al.,2012), the non-parametric technique of DEA (Oliveira & Pedro, 2013), the revenue function(Oliveira, 2013) and the modified two-stage DEA model(Huang et al., 2014) to estimate the traditional TFP changes in the hotel industry. However, such measuring methods neglect resource and environmental factors, and they could not effectively measure the real growth performance of the hotel industry. Based on this, we incorporate CO_2 emissions into the measurement framework of the TFP in hotel industry, and uses Malmquist-Luenberger index (hereafter, ML index) to re-calculate the TFP of hotel industry in China from 2001 to 2015, which is not only an effective expansion of the existing TFP estimation method of hotel industry, but also a more accurate measurement of the real growth performance in China's hotel industry.

2 Method and Data

2.1 Modeling an environmental technology

We assume that at every period $t(t = 1,..., T)$, the hotel industry in every province $k(k = 1,..., K)$ employs N inputs $x = (x_1,..., x_N) \in R_N^+$ to produce M desirable outputs, $y = (y_1,..., y_M) \in R_M^+$ and I undesirable outputs, $b = (b_1,..., b_I) \in R_I^+$. The environmental technology can be expressed as follows:

$$P^t(x^t) = \{(y^t, b^t) : \sum_{k=1}^{K} z_k^t y_{km}^t \geq y_{km}^t, m = 1, ..., M ; \sum_{k=1}^{K} z_k^t b_{ki}^t = b_i^t, i = 1, ..., I$$

$$\sum_{k=1}^{K} z_k^t x_{kn}^t \leq x_n^t, n = 1, ..., N ; z_k^t \geq 0, k = 1, ..., K\} \tag{1}$$

2.2 Directional distance functions

On the basis of environmental technology, the directional distance function can be defined as:

$$\vec{D}_0^t(x^t, y^t, b^t; g) = \sup\{\beta : (y^t, b^t) + \beta g \in P^t(x^t)\} \tag{2}$$

Where g is the direction vector, β is the maximum possible amounts of the desirable outputs' proportionate increase and the undesirable outputs' proportionate decrease with established input.

To solve the directional distance functions, a linear programming needs to be solved:

$$\vec{D}_0^t(x^{t,k'}, y^{t,k'}, b^{t,k'}; y^{t,k'}, -b^{t,k'}) = Max\beta \quad s.t. \sum_{k=1}^{K} z_k^t y_{km}^t \geq (1+\beta) y_{k'm}^t, m = 1, ..., M$$

$$\sum_{k=1}^{K} z_k^t b_{ki}^t = (1-\beta) b_{k'i}^t, i = 1, ..., I ; \sum_{k=1}^{K} z_k^t x_{kn}^t \leq x_{k'n}^t, n = 1, ..., N ; z_k^t \geq 0, k = 1, ..., K \tag{3}$$

2.3 The ML productivity index

Following Chung et al.(1997), the ML index is defined as the following:

$$ML_t^{t+1} = \left\{ \frac{\left[1 + \vec{D}_0^t(x^t, y^t, b^t; g^t)\right]}{\left[1 + \vec{D}_0^t(x^{t+1}, y^{t+1}, b^{t+1}; g^{t+1})\right]} \times \frac{\left[1 + \vec{D}_0^{t+1}(x^t, y^t, b^t; g^t)\right]}{\left[1 + \vec{D}_0^{t+1}(x^{t+1}, y^{t+1}, b^{t+1}; g^{t+1})\right]} \right\}^{1/2} \tag{4}$$

The ML productivity index can be decomposed into two components, namely efficiency change (EC) and technical change (TC):

$$EC_t^{t+1} = \frac{1 + \vec{D}_0^t(x^t, y^t, b^t; g^t)}{1 + \vec{D}_0^{t+1}(x^{t+1}, y^{t+1}, b^{t+1}; g^{t+1})} \tag{5}$$

$$TC_t^{t+1} = \left\{ \frac{\left[1 + \vec{D}_0^{t+1}(x^t, y^t, b^t; g^t)\right]}{\left[1 + \vec{D}_0^t(x^t, y^t, b^t; g^t)\right]} \times \frac{\left[1 + \vec{D}_0^{t+1}(x^{t+1}, y^{t+1}, b^{t+1}; g^{t+1})\right]}{\left[1 + \vec{D}_0^t(x^{t+1}, y^{t+1}, b^{t+1}; g^{t+1})\right]} \right\} \tag{6}$$

If $ML_t^{t+1} > 1$, $EC_t^{t+1} > 1$, $TC_t^{t+1} > 1$, it means the green TFP, efficiency change and technical change is on the rise. If $ML_t^{t+1} = 1$, $EC_t^{t+1} = 1$, $TC_t^{t+1} = 1$, it means there have been no changes in these three indexes. If $ML_t^{t+1} < 1$, $EC_t^{t+1} < 1$, $TC_t^{t+1} < 1$, it indicates that there have been decreases in these three indexes.

2.4 The malmquist productivity index

We also computed the Malmquist productivity index to measure the traditional TFP. The M index is defined as follows:

$$M(y^{t+1}, x^{t+1}, y^t, x^t) = \left[\left(\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \times \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^t, y^t)} \right) \right]^{1/2} \tag{7}$$

$$= EC \times TC$$

2.5 Data processing and resources

We obtained the input-output data on four variables for 30 Chinese province-level regions over the period 2001-2015 to measure the TFP of hotel industry.

The operating income of star-rated hotels is chosen as a proxy of the desirable output.

CO_2 is considered as the proxy of undesirable output in the hotel industry. Referring to the study of Patterson (2004), the CO_2 emissions of the hotel industry are calculated by using the following formula:

$$C_i^t = N_i^t \cdot l_i^t \cdot \alpha \tag{8}$$

Where, C_i^t represents the CO_2 emissions of the hotel industry of province i in year t; N_i^t represents the room bed number of star-rated hotels of province i in year t; α represents the CO_2 emission factor per bed per night. Following Patterson (2004), we set α to 2.458g/p visitor-night.

The number of employees in the hotel industry is chosen as the proxy of labor force.

The original value of fixed assets in the hotel industry is treated as the proxy of capital input.

Relevant data are collected from the Yearbook of China Tourism Statistics and its supplements.

3 Empirical Study

3.1 General characteristics of TFP change in China's hotel industry

Based on the ML index and M index specified above, the green TFP and traditional TFP index and their components are presented in table 1. As can be seen from Table 1, when the environmental factors are ignored, the average annual growth rate of TFP in China's hotel industry from 2001 to 2015 was 6.2%. In terms of the components of TFP (M), the growth rate of efficiency change (EC) and technical change (TC) were 1.5% and 4.6% respectively, which means that technical change contributes more to the growth of TFP than efficiency change, and technical change was the main source of the TFP change.

Table 1　The ML and M Productivity Indexes and Their Components in the Hotel Industry

Region	Ignore the environmental factors			Incorporate the environmental factors		
	EC	TC	M	EC	TC	ML
Total	1.015	1.046	1.062	1.018	1.029	1.047
East	1.012	1.066	1.079	1.014	1.036	1.050
Central	1.018	1.036	1.055	1.022	1.023	1.046
West	1.017	1.033	1.050	1.018	1.027	1.045

Notes: EC: Efficiency Change; TC: Technical Change; M: Malmquist index; ML: Malmquist –Luenberger index.

After considering the environmental factors, the average annual change of green TFP (ML) in China's hotel industry from 2001 to 2015 was 4.7%. The decomposition results indicate that the growth rate of efficiency change was 1.8%, and the growth rate of technical change decreased to 2.9%. It can be seen that if environmental factors are neglected, the average annual growth rate of TFP and technical change in China's hotel industry will be overestimated.

3.2 Regional characteristics of TFP changes in China's hotel industry

In the meantime, there exists significant regional differences in the growth rate of TFP in the hotel industry(see Table 1). When the environmental factors are neglected, only the hotel industry in the eastern region (East) witnessed a TFP growth rate (7.9%) that exceeds the national average (6.2%), and the TFP growth rate of the hotel industry in the central (5.5%) and the western region (5.0%) are below the national average. After considering environmental factors, the eastern region's TFP growth rate (5.0%) exceeds the national average TFP growth rate (4.7%). The TFP growth rate in the hotel industry of the central region (4.6%) and the western region (4.5%) are still below that of the national average.

3.3 Provincial characteristics of TFP changes in China's hotel industry

The calculation results of TFP in the hotel industry in 30 provinces of China from 2001 to 2015 are shown in Table 2. It shows that in both cases, the average growth rates of TFP index are greater than(or equal to) 0. From the perspectives of efficiency change and technical change, the technical change is the leading factor contributing to TFP growth in most provinces. In addition, in both cases, the growth rate of TFP in China's hotel industry showed large inter-provincial differences. When ignoring environmental factors, the hotel industry in Hainan experienced the highest TFP change of 13.3%, and the hotel industry in Qinghai witnessed the lowest TFP change of 0.1%. After taking into account of environmental factors, Hainan still witnessed the highest growth rate of TFP (10.2%), and Qinghai saw the lowest TFP growth (0.4%) again.

Table 2　The ML and M Productivity Indexes and Their Components in the Hotel Industry by Region

Region	Ignore the environmental factors			Incorporate the environmental factors		
	EC	TC	M	TC	EC	ML
Beijing	1.016	1.078	1.096	1.020	1.042	1.064
Tianjin	1.015	1.078	1.094	1.010	1.035	1.046
Hebei	0.986	1.034	1.019	0.984	1.032	1.016
Shanxi	1.023	1.013	1.036	1.025	1.024	1.050
Inner Mongolia	1.016	1.017	1.033	1.029	1.009	1.037
Liaoning	1.000	1.078	1.078	0.991	1.042	1.033
Jilin	1.039	1.063	1.104	1.012	1.047	1.060
Heilongjiang	0.996	1.078	1.074	0.998	1.040	1.038
Shanghai	1.025	1.078	1.105	1.021	1.036	1.058
Jiangsu	1.016	1.070	1.087	1.018	1.036	1.055
Zhejiang	1.003	1.073	1.076	1.010	1.035	1.045
Anhui	1.022	1.000	1.022	1.038	0.995	1.032

Continual Table 2

Region	Ignore the environmental factors			Incorporate the environmental factors		
	EC	TC	M	TC	EC	ML
Fujian	1.035	1.021	1.056	1.049	1.010	1.059
Jiangxi	0.999	1.073	1.071	1.004	1.052	1.057
Shandong	1.009	1.061	1.070	1.008	1.037	1.045
Henan	1.013	1.018	1.032	1.030	1.006	1.036
Hubei	1.003	1.046	1.049	1.027	1.027	1.055
Hunan	1.049	0.999	1.048	1.046	0.995	1.041
Guangdong	0.976	1.078	1.052	0.997	1.032	1.029
Guangxi	0.979	1.047	1.025	1.009	1.040	1.050
Hainan	1.053	1.076	1.133	1.047	1.053	1.102
Chongqing	1.011	1.056	1.068	1.004	1.034	1.039
Sichuan	1.038	1.045	1.085	1.033	1.037	1.072
Guizhou	1.007	1.012	1.019	1.009	1.009	1.019
Yunnan	1.008	1.057	1.066	1.010	1.045	1.056
Shaanxi	1.013	1.047	1.061	1.010	1.048	1.059
Gansu	1.018	1.033	1.053	1.016	1.022	1.038
Qinghai	1.000	1.000	1.000	1.000	1.004	1.004
Ningxia	1.071	1.019	1.092	1.055	1.022	1.078
Xinjiang	1.023	1.025	1.048	1.021	1.023	1.045

4 Conclusion

Based on the panel data of 30 provinces in China over the period from 2001 to 2015, this paper employed the Malmquist-Luenberger index to measure the green TFP of hotel industry in China and compared it with the traditional TFP without considering environmental factors. The conclusions obtained are as follows: The measurement of China's hotel industry TFP would be influenced by environmental factors, and neglecting environmental factors would lead to an overestimation of the TFP in China's hotel industry. The leading factor contributing to the green TFP growth in the hotel industry is technical change rather than efficiency change. The green TFP in China's hotel industry presents a regional characteristic that are successively decreasing from east to west, and it demonstrates large inter-provincial differences.

In summary, this paper suggests that China should attach greater importance to the pollution emission problems in the hotel industry. In the future, the government can monitor the green growth performance of the hotel industry by constructing an evaluation system in which the core index is the green TFP. Meanwhile, the regional differences in the green TFP of the hotel industry in China can be gradually reduced by promoting exchanges and cooperation of the clean technology and management experience among different regions.

It is to be noted that there still exist several issues in this paper: 1) Limited by the availability of data, this paper does not consider other waste emissions, which may influence the accuracy of the measurement results. 2) This paper uses data at the provincial level, which is difficult to reflect micro-level tourism activities. After relevant data is available, the study on productivity in the hotel industry can be extended to the micro level.

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Group Dynamics and Leadership: A Collective Process Construction

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Abstract: The human being is the true source of a competitive advantage. If so understood, it is necessary to break with some paradigms that guide the traditional management models. The current posture requires aptitude and willingness for change, whether in the forms of vision, action or thought. The objective of this study was to score some of these variables that should be perceived by the leader who wants to do a good job and aims to improve their skills to work with and for the groups. The research was based on productions that address this issue and what possible changes we may have in organizational environments. Everything is moving so that we have a scenario different from what we find today in organizational contexts. There will be a change in the conception of work, and with this there will be a need to review organizational practices, including the dynamics of groups and the relationship with the leadership process. This discussion calls into question the very concept of a group, and of course it is not exhausted here and, judging by the changes and future scenarios, it would not be audacious or reckless to say that they will never be exhausted. It is a continuous and uninterrupted path of discussion.
Key words: Leadership; Groups; Organization; Collective.

1 Introduction

The groups propose explicitly and implicitly to the consummation of a task that constitutes its purpose, interacting through structures of adjudication and assumption of roles. Massmann (2011) explores the central idea that it is necessary always to defend a point of view, so we cannot think about the individual without taking into account their different circumstances, their different moments and their influence in the construction of the roles assumed in their lives. Since our birth we are inserted in some group, the family is the first one and, among others, the organizations and their agents, in this study, leaders and leaders.

In companies, human interaction occurs at two distinct but concomitant and interdependent levels: that of task and the social-emotional (MOSCOVICI, 1994). The first is characterized by being that of the activities defined in a rational way and that allows its measurement by means of the evaluation of the agreed results. The socio-emotional level permeated by multiple sensations and feelings is determined by the coexistence and activities of the group or even influenced by the constant dynamics of the inclusion of new members or changes in the rules with which the group operates. Thus, it is a level that determines some basic knowledge of psychology, philosophy, sociology, as well as all the knowledge that cast glances on the complex task of living.

We live in constant relation, for it is precisely in the relation and conception of our ties to the people that we structure our thinking, we choose or inherit our values and we constitute ourselves as people. The procedure of interaction between human beings is present in all human organization and is what implies in the direction of the activities and their results (Nunes, Hoyos Guevara, 2018).

But to what extent are organizations, through their leaders, prepared and organized to understand group work with a source of competitiveness and as a process that feeds organizational culture? The objective of this article is to explore the processes of integration between leaders and leaders leading to the construction of a dynamic and participative collective work.

Carnielli and Epstein (2011) argue that we need to have good reasons for the accepted premises to be accepted, and these, in turn, should be more plausible than their own conclusions, seeking to defend the importance of collective work and what differences that each person has. It is understood that organizations, through their leadership, have to understand and be responsible for the variables that influence human interactions in order to, minimally, enable the individuals who are part of their teams to understand the functioning of the intricate intra and interpersonal dimension, that is, of the constant internal communication, the relations of alterity and the group dynamics. All these aspects constantly influence the groups, compromise all their members and delimit the possibilities of the organization.

2 Interdependence: Leaders and Teams

The relationship between leaders and leaders is a form of coexistence that more than a surrounded relation of rules, policies and other elements externalizes values that can be abstract or concrete. Perelman & Olbrechts-Tyteca (2014) define as concrete values those that are linked to a being, a group or even an object, when observed the singularity of these. Already the abstract value is presented in the contraposition of this absolute reality.

The relationship between leaders and leaders should be understood as a social process built on these values and personal characteristics, in accordance with institutional policies. This thought leads us to the idea of the authors mentioned when they suggest that when establishing links, it is possible to include also differentiated publics. The universal character is thus characterized so that the individual characteristics gain naturalness and can also feed the collective yearnings. Therefore, individual needs and desires are valued and the result of this process feeds the group concept.

Human coexistence is inherent in all of its existence, so we are affected by our ability to relate to others, individually or with groups. It is understood by interpersonal relations the relationship between people, understanding them and respecting their personalities. Within the business system, it can be said that there is technical organization and human organization, which are interrelated and interdependent.

Bergamini (2009) believes that the most accepted leaders, therefore more positively considered by the leaders, have previously chosen a model of leadership. One cannot improvise from one moment to another, the best way to direct people of a certain group. Good leadership requires understanding of the world in which the leaders live. When people work in an organizational community, it is necessary to feel that this community cares for them, and likewise expects their employees to be interested in their corporate destiny as well.

Human organization is not just a group, a team, a set of individuals, for each one has its own feelings, interests, desires, frustrations, physical and social needs related to its own life history. True human relationships are useful and important to practice, because they avoid misconduct, which were generated by dissatisfaction, maintaining individual and collective well-being.

Modern educational and management theories show a tendency to ascribe increasing importance to emotional factors and creativity in learning, leadership, and group participation. Emotions and feelings are now considered as essential as ideas and knowledge in any human situations and are constituted in facts or variables of a situation, no more neglected accessory elements. There is also a need to focus on the preparation to deal effectively with the role of the "social man" in the organization, that is, to respect and recognize its need for growth, autonomy and participation and achievement.

Human beings and companies are, in their daily lives, interdependent and therefore need to be willing to cooperate with each other constantly. The ideal of integration is to ensure that there are not two distinct entities but only two parts of the same whole. This awareness makes possible the existence of conflicts and ideas, beneficial and enriching, and not the existence of conflicts between people, evil and impoverishing. Thus, the need for a deeper understanding of these relationships and how power can construct or deconstruct these environments, that is, the extent to which the roles of leaders and leaders or dominant and dominated are configured.

3 Culture as a Factor in the Formation of Groups and Their Relation to the Leadership Process

Dias (2012) states that the issue of change is present in the discussions that involve organizational culture. Culture is seen as a process and, as such, is constantly changing. What has to be discussed is what variables should be changed or included so that the process goes by the expected path.

But there is always a blockage when we come across some organizational structures.

For example, the current trend is the disappearance of organizations with more cast structures, to give place to organizations with more flexible models. There is no formula for developing an ideal organizational culture under any circumstances, but in general there are some procedures that can be followed in business organizations that will favor their development.

The author supports some actions, among them: giving autonomy and increasing the decision-making power of leaders in order to encourage the emergence of innovative leadership in the organization.

But how can we define innovative leadership? We may not have a standard answer to this question, nor can we have it, but this study goes on to validate that the dynamics of collective work tend to create a strong relationship with culture and, therefore, aims to strengthen the leadership process thus

legitimizing the decisions of its leaders.

Schein (2009) states that when we examine culture and leadership, we realize that they are two sides of the same coin, so neither could be understood just by itself. It also emphasizes that if we could use a single argument to explain the role of leaders, it would be based on the ability to understand and work with culture. Reinforcing this concept establishes that the difference between leadership and management lies in the fact that the former creates and changes, the latter acts on culture, so culture is the result of a complex process of group learning, covering the emotional, behavioral elements, cognitive of the psychological functioning of its members, being partially influenced by the behavior of the leader.

Perhaps we will better understand this concept if we analyze how culture can emerge when forming groups.

Schein (2009) states that cultural formation occurs around efforts to deal with the anxieties characterized by shared basic assumptions that emerge at each stage of formation of a group that divides it:

Table 1   Stages of Evolution of a Group

Stage	Assumption	Socioemotional Focus
Formation of the group	Dependence: the leader knows what we should do	Self-orientation: focus on inclusion; power and influence; acceptance and intimacy; and identity and role
Construction of the group	Fusion: we form a large group, we like each other	Group as an idealized object: harmony; conformity and pursuit of intimacy. Members' differences are not valued
Group work	Work: we can play because we know each other and accept each other	Mission and tasks of the group: achievement; teamwork and order. Differences between members are valued
Maturity of the group	Maturity: we know who we are and what we want. We are successful, so we must be right.	Survival and comfort of the group: preservation of the group and its culture. Differences are seen as threats.

Source: prepared by the authors, adapted from Shein, 2009, p.63

We realize that in the first stage the members of a group are more concerned with their intrinsic looks, each taking care of their own feelings as if that were possible. In the second stage there is an apparent escape from the interpersonal conflicts, where the members seek an approximation between themselves and the slogan becomes solidarity. In the third stage there is an emotional change, where the union of efforts and experience leads to a degree of mutual learning. Already in the fourth and last stage is the preservation of culture and Shein feeds the thesis that culture, being a set of learned responses, will be as strong as the learning history that has arisen and accumulated, so the culture is fed by the solutions found by the groups as regards their identity.

Santos (2000) reinforces this tendency by affirming that culture represents the characteristic dilemmas of organizational systems from values that compete with each other and alternate in a coexistence typical of complex phenomena.

The organizational context is collective, with culture being a preponderant factor to delineate the existing relationships between leaders and leaders. These relationships are favored when the members of a group share similar values, converge with the understanding of the needs of the rules for social order, and practice practices that are legitimized in the group (MUZZIO, 2017).

The culture derived from the outstanding characteristics of the members of a group can highlight organizational differences. In this context it can be affirmed that culture is not something universal and previously determined (HOFSTEDE, 2001), therefore it must and must be considered when the concern of collective process construction is observed, observing the dynamics of the work groups and their members.

4 Value and Identity in the Formation of Groups and Leaderships: Perspectives and Scenarios

Several paths lead us to understand what can happen to the course of work, and consequently the interference in the structure and behavior of groups in these almost certain transformations. Redefining group involves redefining leadership models.

Nunes et al (2008) discuss that every individual has a cultural past that defines their habits and their identification within a socialization process. Starting from the premise that an organization is a large and complex social group, it seeks to understand the process of construction of the collective personality, not based on the descriptions and concepts attributed to it, but from the perspective of different experiences and experiences of the people, referring directly to the construction of the identity of the collective work developed.

There are several models in which these authors support this theory and one, specifically, seems to have a direct connection with the proposal of this study: the model of selective affinities. In it, the idea is that groups should have greater flexibility within organizations, as people seek an individual strategy of action, identifying with the other components of the group in different degrees of hierarchy. Perhaps this approach will lead us to a great reflection of how and what should be the relationships between leaders and leaders, since people, seeking to maintain their individual mobilities, begin to reject the idea that the impositions and restrictions that traditional models manifest can, in a way, slow down your personal goals. The conflict is generated and taken care of, it can be dysfunctional.

Organizational functions, when defining strategies aimed at autonomy, capacity for action and skill development, provide, perhaps without intention, but indirectly, means of affirmation and unequal identity, when the supposed treatment of equality between people prevails, emphasizing that human theories consistently assert that there are behavioral differences between people.

Individuals need self-identification, that is, to have access to the perception of their results, creating their own autonomous rationality. It is the set of individual particularities that leads us to construct the meaning of group work. It can then be said that the construction of collective work necessarily involves the understanding of the need to strengthen individual work. However, how to understand, accept and practice this?

One way is to understand the transformations that exist in the formation of the labor market. Barbosa Filho (2012) affirms that young people in Brazil are taking longer to start work, as it suggests that they are dedicating more time to study, so when they arrive they already do so with a greater range of knowledge, even if theoretical, one of the great challenges of Brazilian education.

Based on the study of Schwartz (1992), the author shows that the values of individuals in different contexts, which refers us to the different organizational profiles, must be analyzed taking into consideration three fundamental aspects: how the priority values of people are affected by their social experiences, how these same values affect their behaviors and their choices and, finally, how social structures can contribute or influence the definition of these values, due to different cultures. Evidence that the knowledge of these aspects helps us to understand the bases that structure the formation of a group, thus allows us to better analyze the different strategies that support the organization of collective work.

Schwartz (1992), in a research carried out with university students, contributes to the understanding of the formation of contemporary groups, establishing some values that young people take into account when they construct the identity of the work. The first is concern for self-improvement and self-fulfillment. In this item the motivational value of achievement is evidenced when success and personal self-realization are portrayed through the demonstration of competencies according to established social norms. The second value is the openness to change and the valorization of self-sufficiency, evidencing, among others, the sense of freedom, creativity and independence to choose one's goals. The third value is security emphasizing harmony, social stability and interpersonal and intrapersonal relationships. Finally, universalism when seeking identity with nature and its systems and, above all, the practice of social justice.

It should be noted that Nunes et al. (2008) affirm that individuals with more knowledge and more politicized tend to commit to organizational changes more effectively, if compared with people deprived of autonomy and critical sense. This assertion drives us to the continuing need to revise management models and the role of leadership is key to this.

5 Creating Group Value by Generating Competitive Advantage in the Leadership Process

The aim of this study was to approach the variables that a leader must realize in order to perform a good job and to improve his / her skills in order to know how to work in groups. It reinforces the idea that the relationship between leaders and leaders should be understood as a process of social interaction.

Based on these guidelines and understanding that value creation for the group tends to be one of

these variables; the discussion of how this practice can interfere in the expected results.

Value creation and competitive advantage are broad concepts, so it seems to us possible to associate with the concept of human capital.

Therefore, the measurement of human capital as a proposal to create value for the group can lead us to an understanding that this practice will generate a competitive advantage for the organization, if associated or even incorporated into the leadership model. Human capital refers to the competence, attitude and intellectual capacity of employees (Ross, 1998).

Brito & Brito (2012), in exploring the study by Drnevich et al, 2010, have already expressed some concern about the fact that several questions about the study of competitive advantage and what they generate remain unanswered: how can we effectively portray, model and measure it? How do organizational, competitive and environmental dynamics affect it? How does it develop?

The creation of values must be seen in different perspectives, especially by the perception of the company's stakeholders (LEPAK, SMITH, TAYLOR, 2007), since human capital covers the level of knowledge of each employee and is the main factor in the creation of intellectual capital of a company, being this source of innovation and strategic renewal (BONTIS, 1999).

The measurement of human capital as a value strategy, incorporated into the leadership model, generates or can generate competitive advantage. Brandenburger and Stuart (1996) argue that value creation is associated with the opportunity cost ratio, which allows us to incorporate various perspectives of strategic business approaches, and why not, make use of human capital measurement as one of them.

In current literature, it is not difficult to perceive a significant growth of interest in its measurement. Many companies have joined and made available to their investors managerial reports such as integrated report, annual sustainability report, social report and others. Today, the releases of these reports happen on a voluntary basis, since there is no legal requirement for their mandatory delivery. Regardless of the being compulsory, the companies started to show interest in these demonstrations sometimes due to the requirement of the stakeholders and to recognize the benefit to the brand through the intangible assets.

According to Mayo (2003), the way in which companies are evaluated has been undergoing progressive changes since 1990, when a greater value was assigned to the so-called intangible assets, which are knowledge, skills and the brand itself. According to the author, these assets are also called intellectual capital. Human capital, which is part of intellectual capital, is constituted by the people who construct this value.

Human capital is recognized as a pillar of the creation of intellectual capital and its main characteristic is that it can disappear with the exit of the employees of the companies, being thus a constant source of strategic renewal (Bontis, 1999).

In addition, through the valuation of intangible assets, human capital is seen as a new perspective, is no longer considered only as a cost and is now seen as an investment, since it is possible to measure and measure it.

The big question is how to measure intangible assets? Unlike the tangible assets that can be measured by consolidated accounting instruments, it was necessary to develop new means to measure intangible assets.

At first glance, there was a growing volume of research aimed at studying the measurement of these assets and many consultancies created their evaluation systems. Mayo, in his book "The Human Value of the Company", presents several approaches to measuring this type of asset.

The concern with this phenomenon is justified, therefore, determining the value of companies based on human capital is a recurring challenge in an economy that is growing based on knowledge and services.

Brito & Brito (2012) reinforce this idea when they argue that the concept of competitive advantage is not restricted only to the relation between competitor / competition, but that it is directly related to the creation of value.

It is a future challenge for these authors: to investigate which methods may be most effective in measuring human capital.

6 Leaders and Groups: How to Face the New Challenges for Collective Work

Based on the Sustainable Development Objectives (ODS), a program created by the United Nations in September 2015, which establishes 17 objectives anchored in three major divisions of sustainable

development: economic, social and environmental, Ernst et Samaan (2016)[1] developed a study on the Future of Work, seeking a more effective direction for the 169 goals established in Agenda 2030, a document constructed, guided and guided by the purposes and principles of the Charter of the United Nations. The main problem addressed is how the world of work will be in 2030 and as a reflection, what we are doing in our companies from the perspective of this very near future.

They say that the greatest challenges ahead are: rising demographic imbalances, the search for healthy environments, political uncertainties and growing inequality, and the great promises of technology.

Is it unlikely that the extrapolation of current trends is insufficient to meet the growing demand from leaders, or are we prepared to understand the direction of the changes that are taking place?

Everything is moving so that we have a scenario different from what we find today in organizational contexts. If there is a change in the conception of the work, there will be a need to review the organizational practices, including the dynamics of the groups and the relationship with the leadership process. Researchers are working on scenarios to reduce labor supply and increase the working population at working age, a new group profile is set up and the dynamics applied to them tend to be strengthened in this context. Some goals set out in Agenda 2030 strengthen this idea, as three of them establish the creation of sustainable economic growth and social inclusion, the construction of dynamic, sustainable, innovative and people-centered economies, as well as equal access to jobs, leaders and decision makers at all levels (emphasis added).

In a perspective of greater impact, Brown (2012) radicalizes and proposes three models for effective social change: the Pearl Harbor model, termed as catastrophic, when a dramatic fact fundamentally changes our way of acting and thinking (it refers to the Japanese attack , unexpected, on 06.12.41, during the Second World War); model of the Berlin wall when society begins to change in relation to some theme, usually after a long period of slow and gradual changes in thinking and attitudes, and the model of a sandwich when a strong movement of activist sectors presses a certain cause that is also backed by strong political leadership. According to the author, the former presents a greater risk, the second is slower and the third is the more attractive.

Dowbor (2017) reinforces the need to incorporate into the decision-making process of organizations the vision of a possible balanced, economically viable and socially just development (emphasis ours), could   find interorganizational barriers, because the leaders reduce their success, and why not say, from their teams, to a single criterion of success, the result purely and simply financially. This, by a natural inheritance, continues being the main instrument of power. It also emphasizes that, in order for us to have in fact a corporate governance, an indispensable premise in the construction of the collective, and the most effective and perhaps the safest route is transparency.

7 Conclusion

Revisiting the organizational history and theories discussed in this study, it is possible to affirm that the current trend is the disappearance of organizations with more cast structures, to give place to organizations with more flexible models. The great challenge is to learn to deal with some of the emerging blocks of this transition process. The interaction and integration between leaders and, consequently, the construction or reconstruction of the identity of the working groups is one of them.

It was sought to show that the construction of collective work necessarily involves the understanding of the need to strengthen individual work and one of the ways to achieve success is to give autonomy and increase the decision-making power of the leaders with the objective of encouraging the emergence of leaderships the organization.

Impossible to define emphatically what is innovative leadership, but the proposal is that we take a more focused look at the validation of group work, since it tends to create a strong relationship with culture and, therefore, strengthen the leadership process by legitimizing the decisions of their leaders.

But there is a great reflection: and now leaders, how to react (or act) so that their attitudes legitimize their power? And the leaders, how should they behave or react (or act) to such received stimuli? This discussion calls into question the very concept of a group, and of course it is not exhausted here and, judging by the changes and future scenarios, it would not be audacious or reckless to say that they will never be exhausted. It is a continuous and uninterrupted path of discussion.

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Impacts of Corruption on Innovation and Well-being on Countries Represented in the ICIM by OECD Members

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Abstract: Corruption is a treat to well-being, as showed in this article. The study compares statistically the OECD member states and cross check with the countries where the universities that contribute to the ICIM (International Conference on Innovation and Management) are located. A statistically analyses of 39 countries using 13 selected indicators, some from the UNSDGs and others from the Observatory ORIBER[2], was applied seeking areas of the ICIM Proceedings that may be developing and deepening their research in order to contribute for a better global future.
Key words: Corruption; Well-being; Co-operation

1 Introduction

We are now living at an Age where things are becoming more instable, and where geopolitical problems increase threats in many areas, particularly concerning inappropriate use of accelerated technological breakthroughs, so timing for actions are becoming shorter and shorter, and Trust has being imploding (Trustbarometer, 2017)[3]. An example of this, are the everyday more common cyberattacks, as the one related to the Trump and Putin hidden alliances; as well as the problems related to climate change and ecosystem biodiversity, as the is the case of the 17% of Amazon Forest lost in the last 50 yrs. Fortunately, nowadays, it may be possible in this case to use drones to monitor the process as suggested by the WWF[4], and start thinking on Sustainable Recovery Goals (SRGs).

Considering 132 Countries that includes the ones we are interested one could see that Controlling Corruption may help to improve Innovation Conditions (Fig 1), something that reinforces the importance of the Worldwide Governance Indicators (WGI), World Bank (2017)[5].
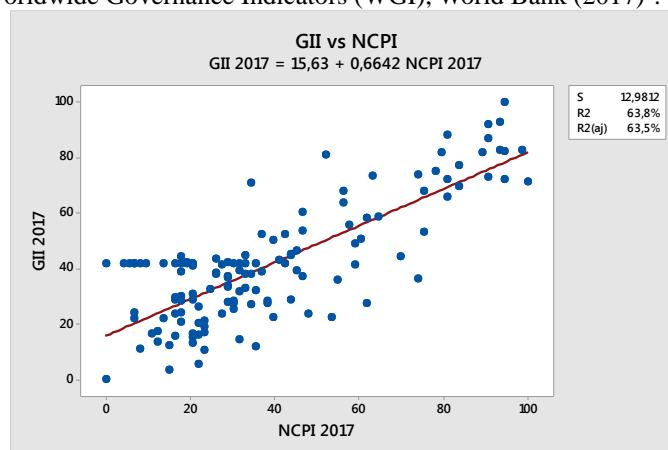
**Figure 1   Global Innovation Index (GII) vs. Non-Corruption Perception Index (NCPI)
Normalized (0 -100), and the Higher the Better**
Source: Prepared by authors

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[2] Oriber – Observatory Of The Iberoamerican Foresight Network – Riber, Available In: Http://Www.Pucsp.Br/ Catedraignacysachs /Oriber.Html
[3] Edelman Trustbarometer 2018 - Https://Www.Edelman.Com/Trust-Barometer
[4] Conservationdrones.Org - How Drones Can Aid Wildlife Conservation Efforts Available In:Http://Www.Planetexperts. Com/Drones-Can-Aid-Wildlife-Conservation-Efforts/ Https://Www.Worldwildlife.Org
[5] World Bank – The Worldwide Governance Indicators (WGI) Project, 2017. Available In: http://Info.Worldbank.Org /Governance/Wgi/#Home

Moreover, a higher concern, particularly in this Digital Age, is the Increasing Concentration of (Wealth Stirati, 2016) and the Inequality Growing again; as indicated by the recent World Inequality Report (WIR, 2018). This is important since it may impact Innovation Development as may be seen in Fig 2.
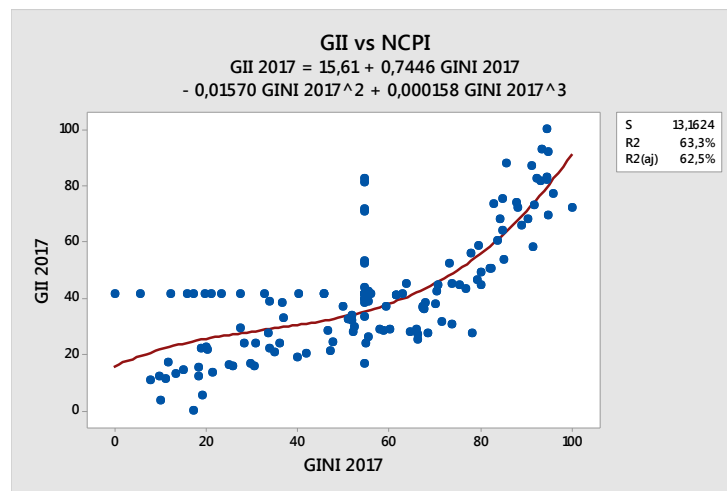
Figure 2 Global Innovation Index (GII) vs GINI inequality Index (GINI)
Normalized (0 -100), and the Higher the Better
Source: Prepared by author*s*

What is most interesting to observe in this graph is the accelerated growth in Innovation starting at about 50 in the GINI Index, which is de case of Developing countries like Brazil and Colombia. What may be needed is new Economic Policy Framework that may foster a more Inclusive Development as recommended by the WEF[1].

Actually, It ś possible to analyse corruption from many points of view, as pointed by (Brei, 1996) with this topic usually focus on: Market, public interest, public opinion or even on regulation. In a wide form it is related to the violation of the moral, or the quest for advantage in disregard with the common well-being or others private life (Rogow&Lasswell, 1970). Corruption taint in many spheres of our daily lives, such as ethics, morals, business, relations to the law, corporates, governments and politics, that's why when unfolded any corruption, it generally causes an uproar trough the society. One of the thinking leaders on the area of Corruption and Culture is Richard Sennett from The London School of Economics who wrote the classical The Corrosion of Character where he already foresees thata regime "which provides human beings no deep reasons to care about one another cannot long preserve its legitimacy".

Corruption is deeply related to how it is perceived in its society, and as any social value, it changes geographically and chronologically, as the people that make up the society change and redefines what is acceptable or not. As (Granovetter, 2006) pointed the corruption concept emerges from the society, and its understanding should be not compared lightly trough communities. As a good example of how some countries with the same culture basis could approach differently was a paper presented in last year ICIM, Yunanda, Tareq, (Mahdzir, & Rahman, 2017, p. 1422)[2], in this short paper it ś show how the Islamic Banks interprets its social impact and how they disclose information following the Shariah.

Is noted by (David, 1986, pp. 19-34) that the laws and definitions, as the source of Power that drives the order in society is very complicated, and thus, when comparing the same aspect of a society it should be done by understanding the context and history of that aspect and how it is perceived in its society. As (Granovetter, 2006) described the corruption common understanding is very occidental oriented, this should be noted when analysing the indicators being used at the UN and other international organisations.

The OECD is an organisation that is focused on developing countries through an economic framework, the 37 current members are:

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[1] World Economic Forum, 2018 - Available In: Http://Www3.Weforum.Org/Docs/Wef_Forum_Incgrwth_2018.Pdf
[2] The last ICIM Conference Proceedings are available In: http://www.pucsp.br/icim/Ingles/Downloads/icim2017 -Proceedings.Pdf

Table 1   Member of OECD. Colombia and Lithuania are Members Since 2018

Australia	Austria	Belgium	Canada	Chile	Colombia	Czech Republic
Denmark	Estonia	Finland	France	Germany	Greece	Hungary
Iceland	Ireland	Israel	Italy	Japan	Republic of Korea (South)	Luxembourg
Mexico	Netherlands	New Zealand	Norway	Poland	Portugal	Slovak Republic
Slovenia	Spain	Sweden	Switzerland	Turkey	United Kingdom	United States
Lithuania	Latvia					

Source: Prepared by authors.

ICIM is jointly organized by the Wuhan University of Technology (China), the Yamaguchi University (Japan), the Tilburg University (The Netherland), the Pontifical Catholic University of Sao Paulo (Brazil)the University of Vaasa and Vaasa University of Applied Sciences (Finland), the UniversitiTeknologi Malaysia (Malaysia), and the University of Wales Trinity Saint David (United Kingdom). Its purpose is to provide opportunities for researchers to present their findings based on innovation and management as well as to create opportunity for the exchange and synthesis of new knowledge on innovation and technology management (ICIM, 2016)[1].

We use the definition of well-being, as the principles that guides a welfare state, which the following basic attributes: access to education, non-violent, healthy and economically sustainable. (Stiglitz, 2012, p. 193). These are the minimum requisites to the UNSDGs as well as the ORIBER (2013)[2]Guide(GPS). Correspond in fact to a bottom line for the development of other targets such as the UN SDG[3] 5.A.1 – "(a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure".

To women have access to being owners of agricultural land, and having the ways to keep it, it is needed an equal footing, and that can be achieved in educating girls, so they can manage land, reducing crimes and creating a economic background that helps everyone to thrive. Actually, this beside the Inequality problem are the basic challenges according to the WEF.

2 Theoretical Reference

A corrupt act is an attack of destruction of the common Rogow&Lasswell (1970), but such thing is not easily determined. In the United States bribery is illegal, but it was replaced by political campaign contributions (Stiglitz, 2007) that are legal, and the donating companies are investing in their candidates. Recently (Brazil, 2017) changed it laws, no. 13.488/17, to forbid that kind of contributions, but that only after public opinion was strong in the subject after to big corruption scandals (*Mensalão*, big monthly, and *Lava-jato,* car wash).

Nowadays, after the 2008 financial crisis, many governments adopted and austerity approach of regulation of public expenditure, but in many ways that contradicts public opinion that perceive governments as corrupt. (Piketty, 2014) point out that is needed a global regulation and a better distribution of wealth and tax, given the example of progressive tax laws and highly taxed heirdom. The main goal is to create more equal people, and thus strengthen democracy and the government efficiency. If the government is more efficient, the capital flow is directed to a productive motor, and is capable of effectively do a better world (Dowbor, 2017).

In this paper, we seeking in particular possible relationships between well-being and the lack of corruption, for this work were selected the following indicators:

1. Corruption (Cor)
2. Water and Sanitation (WaS)
3. Electric power consumption (kWh per capita) (EPC/pc)
4. Internet users (IU)

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[1] ICIM Page, informations about the 2016 Conference - https://www.pucsp.br/icim/ingles/icims/index.html

[2] Gps – A Guide For Public Sustainable Development Management, Available In : Http://Www.Pucsp.Br /Catedraignacysachs /Guia-Gps.Html

[3] United Nations – Sustainable Development Goals (SDG)– The SDGs are the blueprint to achieve a better and more sustainable future for all people. https://www.un.org/sustainabledevelopment/sustainable-development-goals/

5. Level of violent crime (LvlVC)
6. Political terror (PT)
7. Press Freedom Index (PFI)
8. Access to Basic Knowledge (ABK)
9. Democracy Index (DI)
10. Global Innovation (GI)
11. Innovation Efficiency Ratio(IER)
12. Input Sub-Index(IIS)
13. Innovation Output Sub-Index (IOS)

The Corruption (Cor) deal with the perceived level of public sector corruption based on expert opinion. Water and Sanitation (WaS) is an indicator that considers 3 dimensions: access to piped water; rural access to improved water source and access to improved sanitation facilities.   The Electric power consumption (ECP/cp) measures the production of power plants and combined heat and power plants. The indicator of Internet users (IU) estimated number of internet users out of the total population, using the Internet from any device, last 12 months. The level of violent crime (LclVC) measures the impact of crime in government and/or business.   Political terror (PT) refers to the level of political violence and terror in a country. The Press Freedom Index (PFI) measures the degree of freedom that journalists, news organizations, and netizens enjoy in each country, and the efforts made by the authorities to respect and ensure respect for this freedom. Access to Basic Knowledge (ABK) refers to some dimensions: adult literacy rate, primary school enrolment, secondary school enrolment and gender parity in secondary enrolment. Democracy Index (DI) provides a context of the state of democracy worldwide. The Global Innovation (GI) provides metrics about the innovation performance of 127 countries and economies around the world, considering: Innovation Efficiency Ratio (IER) what shows how much innovation output a given country is getting for is inputs; Innovation Input Sub-Index (IIS) what is comprised of five components that enable innovative activities (institutions, human capital and research, infrastructure, market sophistication and business sophistication); and Innovation Output Sub-Index (IOS) provides information about outputs that are the results of innovative activities within the economy : knowledge and technology outputs and creative outputs.

3 Methodology

For the study were considered 39 countries including members of OECD and ICIM. Three Groups of countries were organized as follow:

•   **Members of OECD only:** Latvia, Belgium, Switzerland, Austria, Spain, Chile, Germany, Portugal, Estonia, Denmark, Norway, Canada, France, Australia, United Sates, Poland, Hungary, Greece, Turkey, Luxemburg, Czech Republic, Korea Republic of, Sweden, Colombia, New Zealand, Iceland, Israel, Mexico, Slovakia, Slovenia and Italy.

•   **Members of ICIM only:** Malaysia, China and Brazil

•   **Members OECD and ICIM:** Japan, Netherlands, United Kingdom and Finland.

Using *Minitab* as software data collected by ORIBER from many databases like the UN Data were analysed particularly concerning corruption indicators and well-being in the three mentioned groups. The selection of these 13 variables came through the development of the yearly studies analysis of ORIBER developed at the PUC/SP. It ś important to mention that for this study all the indicators considered were Normalized (0 – 100) and Positivized - the higher the better. For Luxembourg was used regression to estimate some missing values, for the case of: Electric power consumption, Level of violent crime, Political terror and Democracy index.

4 Results and Discussion

ANOVA analysis is a statistical method applied on this study to explore characteristics and relationship of the representative variables for the 39 countries considering the 3 Groups (OECD, ICIM and ICM+OECD). To apply this statistical technique - ANOVA the following steps were used: **(1)** Defining the 3 Categories concerning the 39 countries, **(2)** Analyses of the 13 variables for the model.

Figure 3 reinforces the idea regarding different levels of Corruption on the 3 Groups, and shows as well, that Innovation follows the same pattern, which may indicate differences on Level of Development.
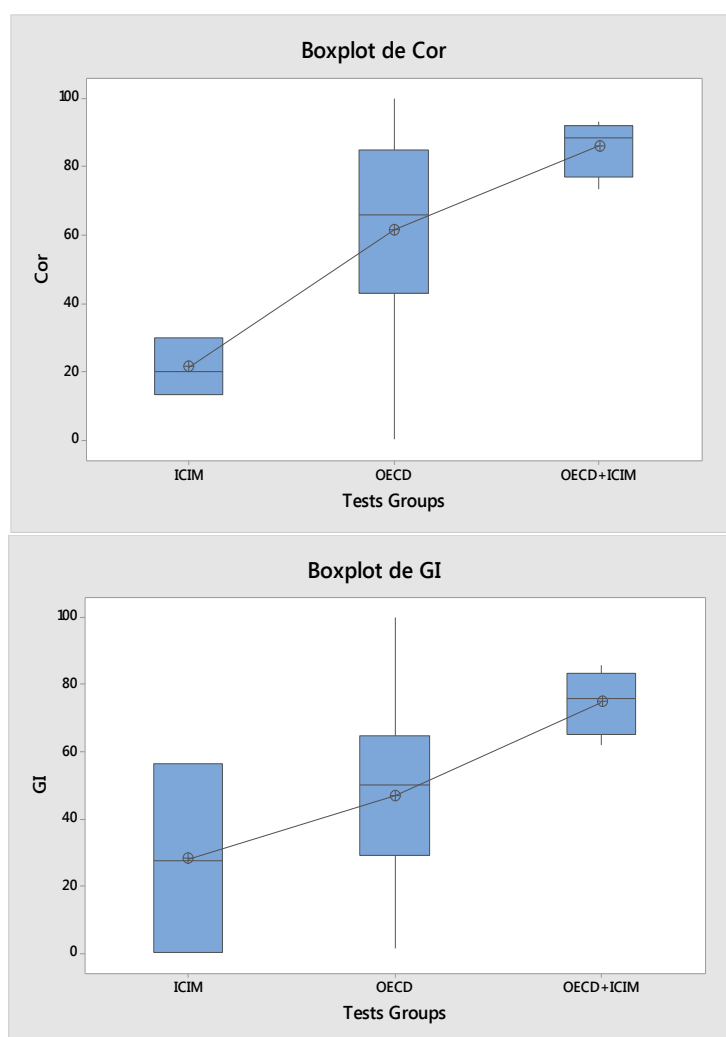
Figure 3   ANOVA Analysis of Corruption and Global Innovation
Source: Prepared by authors

In the ANOVA analysis the outliers found were:
- WaS (Water and Sanitation) Latvia, Republic of Korea, Mexico and Colombia;
- EPC/pc (Electric power consumption (kWh per capita)) Iceland and Norway;
- LvLVC (Level of violent crime) Mexico and Colombia;
- PT (Political terror) Mexico;
- PFI (Press Freedom Index) Turkey,
- ABK (Access to basic knowledge) Latvia;
- DI (Democracy Index) Chile and Latvia.

Colombia, Latvia entered recent as members of OECD but were always in the bottom quartile, Mexico is struggling with drug cartels and has problems with water resources. Iceland and Norway are positive outliers with a much bigger EPC/pc than any other country; Iceland output per capita is more than double of the Finland. In Turkey, after the attempt of a *coup d'état,* were passed many laws restricting Press. Chile recently is struggling with its reforms of labour and education, but in general is going much better than the others; particularly regarding Governance.

The OECD+ICIM member are closes to achieve an effective battle against corruption, the OECD member usually are highlighted by resolving infrastructure problems like Water and Sanitation (WaS) and Electric Power (EPC), more than their access to basic knowledge strengths its democratic systems. Access to basic needs are linked to surviving, member that only are on ICIM are fighting against Political Terror (PT) and Press Freedom (PFI) and Violent Crime (LvIVC).

Broadly speaking the members of OECD+ICIM seem to be doing better in Corruption combat

(Cor). The countries doing worst are the Ibero-american Mexico, Brazil and Colombia plus Turkey and China. Australia, Canada, New Zealand, Sweden and Finland are the countries with better economies, strong infra-structure and well developed as well as many indicators related to wellbeing; a good example for all. On the other hand, some countries of the ICIM group (Malaysia, China and Brazil) stand out in the Innovation Efficiency Ratio (IER) that shows how much innovation output these countries is getting for its inputs.
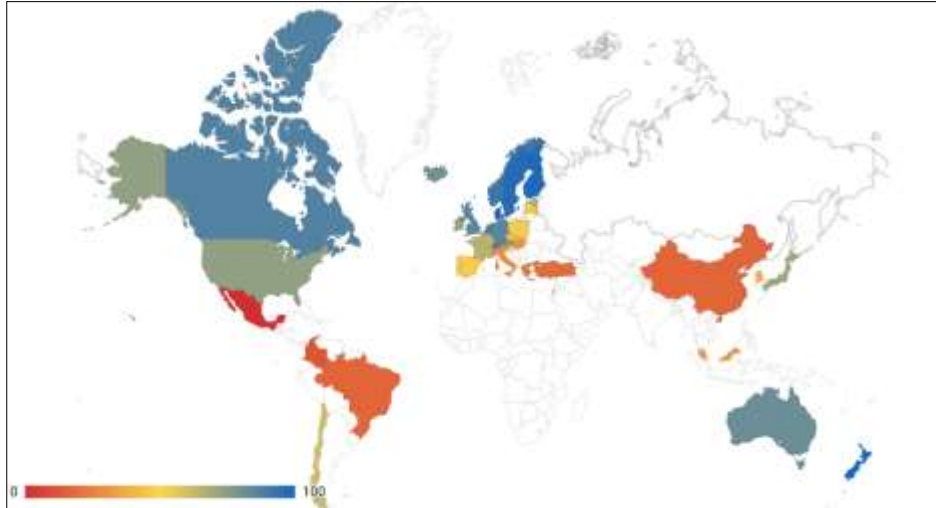
Figure 4   Corruption Map–levels of the Corruption Indicator for the 39 Countries of this Study
Source: Prepared by author.

When comparing the before analysed data with the map of where corruption is found, the countries that have the best performance in wellbeing are the same that effectively combat corruption. These results were the expected of the post 2008 crisis, since countries like Australia, Canada, New Zealand, Sweden and Finland have a more equalitarian society (Stiglitz, 2012, pp. 22-24), mostly concerning 3 drive forces: equality of education, equality of health and equality of opportunity. At the present stage of capitalism is hard to found balance, and we should do everything to close the gap between the many inequalities of the world. (Schwab, 2016) point out that no equality could be achieved if there are people that are still not touched by the first industrial revolution, without access to tapped water, and therefore, without a trustworthy source of clean water. There is no equality in education between people with access to electric power and people without, people with electricity can beyond light have more channels of information (radio, TV, digital stored encyclopaedias), and when we factor access to internet (and the quality of it), all these "basic needs" are still a greater challenge that deepens the inequality.

In the best performing countries, all of them have little inner inequality, that ends up minimizing external inequality, obviously these do not eliminate individual differences, but in a more equally field context where the fact that individual gains more by cooperating generates a positive feedback loop, creating a more generous horizon (the Sharing Society, the Circular Economy). As noted in the Iterated Prisoner's Dilemma (Stewart & Plotkin, 2013), as the populations grows, and the gains remains equal, strategies that are aligned to generosity and good behaviour thrive; and the Principle of Fraternity becomes alive.

(Schwab, 2016, pp. 6-7) points that at each industrial revolution some new basic things are needed, that helps develop not only the industry, but the society as whole as it happens since 1760 with the first industrial revolution, and access to water. On the second industrial revolution, electricity and liquid combustible were distributed as sources of power to engines, and more recently semiconductors and internet are the door to the third industrial revolution.   The lack of water, power and internet could be easily linked to corruption, mostly because they need public infrastructure, mainly hard infrastructure like aqueducts, water treatments, power grid and internet fibers; and the Infrastructure and Urban Development industry unfortunately involves a lot of money and end up having strong ties with corruption (WEF, 2017)[1], as was the case of Brazil lately.

Moreover since access to meet human needs and transparency are basic in the development of

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[1] WEF Report - Available In: Http://Www3.Weforum.Org/Docs/Wef_Paci_Iu_Report_2017.Pdf

innovations, it is essential to invest in people, technology and mostly in Ethical Governance as mentioned recently in an Interview the Brazilian Political Scientist Ruben Ricci "Corruption occurs in countries that have high social inequality and in a state that is appropriated by elites" (Ricci, 2018)[1].

To reinforce these ideas figure 5 shows the overall relationship among the 13 variables.　So for example, the behaviour similarity between LvlVC and PT, on the extreme right of the graph(on red), seems to indicate that violence tends to happen together, being against individuals and/or institutions; and on the right hand of the graph(on blue), one could also see that there is a behaviour similarity among the well-being indicators (WaS, ABK, EPC/pc) on the one hand; and even more strongly similarity among Innovation (IIS), Corruption (Cor), and Internet Users (IU) on the other hand. All these seems to suggest the need for a more Systemic and Ethical Governance Framework that may foster Transparency, Press Freedom and Free Flow of Information that jointly could lead up to a more solid structure, enabling improving innovation in institutions, human capital, research, infrastructure, market and business sophistication.
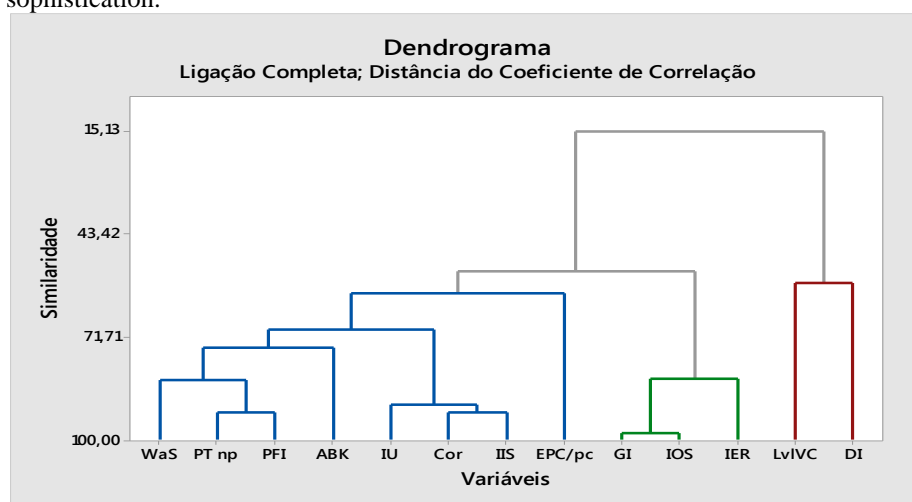
Figure 5　Dendrogram of 13 variables
Source: Prepared by author.

5 Conclusion

As noted in this article, control of corruption and infrastructure that creates a welfare state are deeply connected, but in a world of the post 2008 crisis an alternative to reducing the state is combating corruption and using the recovered resources to invest in strengthen a more Transparent and Democratic context that fosters development in Infrastructure, Knowledge and Liberty. Innovation is an important aspect in the search for solutions and development of new more Organic Ecossystemic paths.

Thinking in something like the Maslow Pyramid of Needs, one could start first by thinking on Access to Basic Needs such as Water, Sanitation, Electric Power and Internet that may help to reduce inequality, if associated with education and an organized society as recommended by Amartya Sen on his contributions to welfare economics, social choice theory and economics and social justice. Actually the steps needed for a more stable and resilient country passes by these factors too, and we could actually by comparing and learn from what other countries are doing or have done before as benchmarks.

In the best performing countries, they have very different sizes of the worst performing countries, especially China, Brazil, Mexico and Turkey. In all these countries many cultures with specific needs, in a vast geographic region that have very specific subset of its own difficulties. Maybe for these kind of countries the best approach could be a more decentralized approach, learning from countries that share similarities, and establishing cooperation agreements like the BRICS, but that may really work; although eventually some problems may arise as is the case nowadays with the EU with the BREXIT and in the

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[1] Ricci is a brazilian political scientist, in an interview in 2018 is pointed that corruption is not the main problem, but iniqualities in society - Ricci, R. O Principal Problema Do Brasil Não　É A Corrupção, Mas A Desigualdade, The Main Problem In Brazil Is Not Corruption But Inequality, Ihu, 2016 Available In: Http://Www.Ihu.Unisinos.B r/159-Noticias/Entrevistas/561362-O-Principal-Problema-Do-Brasil-Nao-E-A-Corrupcao-Mas-A-Desigualdade-Ent revista-Especial-Com-Ruda-Ricci

US with Trump. As matter of fact as it was mentioned recently BRICS meet but the US is protagonist because of the Commercial war with China.

Nonetheless there are signs that things may be changing at our region. Colombia was accepted at the OECD and the agenda of the elected new President of Mexico Lopez Obrador includes a strong fight against Corruption plus strict Austerity Policies at the Public Level.

Innovation, Wellbeing and Control of Corruption could really help to foster sustainable development of the countries. Besides Climate Change, concentration of Wealth and Growing Inequality are today some of the greatest threats for the future of society. Moreover the solutions like the problems need to think in a   more Holistic approach and deal with many levels at the same time; so that we could tackle great inequalities starting with neighbourhood or villages, passing to cities and counties until we have a globally common landscape as a starting point, and the going down again. This equality is what make the societies in the better performing countries more resilient to crisis, but if there is not established a cooperation and a balanced playfield, today resilience will be tomorrow inequality; moreover we could not forget that Equality is just one of the Three Basic Principles the other ones are Freedom and Fraternity; and should also go along in the process. We all could help to build a better the future, the ones that got there first must signalize to the ones that are looking for their way, and the ones that are trying to get there should not lose hope, and keep trying.

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The Impact of Inclusive Human Resource Practice on Performance: The Role of Emotional Exhaustion and Homesickness

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Abstract: In this study, faced up with employee diversification,in order to maximize the benefits of employee diversification and reduce its disadvantages, we propose ahuman resource practice that recognizes, respects and includes differences - Inclusive human resource practice(IHRP). In the conflict of diversification, with consumption of emotions and energy, it will inevitably lead to emotional exhaustion. Through the empirical study of 537 valid samples collected from multiple companies, drawing the following conclusions based on conservation of resource (COR): IHRP can improve job performance and reduce emotional exhaustion; homesicknessnegativelyregulates the relationship between emotional exhaustion and job performance.

Key words: Inclusive human resource practice; Emotional exhaustion; Job performance; Homesickness

1 Introduction

In recent years, with the continuous changes in the demographic structure, the diversification of values, the diversification of work`s waysand the continuous advancement of economic globalization, diversification of employees in the workplace has become an inevitable trend. Among diversified employees, owing to differences in one aspect or more aspects, misunderstandings and conflicts may arise during the process of their contact. These misunderstandings and conflicts consume the emotional resources of employees and cause certain emotional exhaustion. From the perspective of COR, emotional exhaustion can reduce employee job performance (Zhang Ruoyong, Niu Wanjing, 2015).

Although faced with the diversification of employees, there have been lots of studies that have proposed relevant studies on inclusiveness. However, at present, research literature on IHRP is almost none, scholars focused more on inclusive leadership (Nembhard, Edmondson, 2006; Shi Guanfeng, Liang Peng, 2015), Inclusive growth (Li Gang, 2011; Zhao Yuexian, 2011), inclusive innovation (Xing Xiaoqiang, Zhou Jianghua, 2015), inclusive human resources management (Midtsundstad, 2011; Gao Hong, 2012; Liu Jianping, 2015), etc. However, theseare all at the informal organization level, and as a formalized institutionalized organization, the existing research on IHRP has not yet been discovered. Therefore, this study proposes IHRP.

Although many existing studies relate to homesickness, it is not yet common to associate them with emotional exhaustion.Thus, the study has added homesickness to the research framework.

Theresearch aims to explore the mechanism of the impact of IHRP on performance through emotional exhaustion as a mediating variable and examine the boundary of the black box mechanism of homesickness as a moderator variable.The contributions of this study are mainly reflected in the following aspects: first, enrich and complement the theoretical research on oriented human resource practice, emotional exhaustion and homesickness; second, to promote the study of the black box mechanism and boundary conditions of employee performance in IHRP.

Based on the above analysis, this study proposes the following theoretical model:
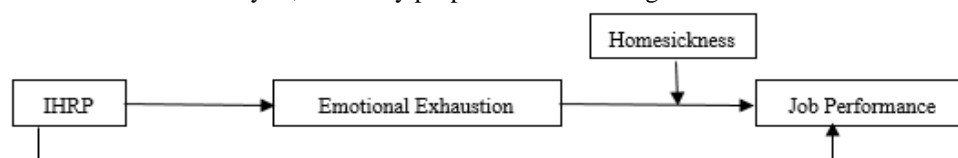
Figure 1   Theoretical Model

2 Theory andHypothesis

In the study, the definition of IHRP byIntegrating previous literature on inclusive management is: a kind of human resource practice that recognizes, toleratesand respects differences. Concretely, which is to accommodate the differences in religion, culture etc., to fully consider the needs of different employees, to be fair and equitable; to recognize differences, tolerate differences, to stimulate and

maximize the value of differences and to pay attention to the sense of belonging and happiness of employees in the work process.

Emotional exhaustion is a state of fatigue that results from the overuse of individual emotional resources and their associated physiological resources and is an important component of job burnout (Maslach C., et al., 2001). Once emotional exhaustion occurs, employees often suffer from impaired self-esteem, nervousness and temperament, depression and anxiety (Chen Ruijun, Qin Qiwen, 2011), which in turn reduces employee job satisfaction, increases employee anti-productive behavior and turnover tendencies, and ultimately affects job performance (Zhang Ruoyong, Niu Wanjing, 2015).

According to COR, emotional exhaustion can reduce the job performance of employees. The consumption of such emotional resources needs to be supplemented in a timely manner, such as the support of organizations, the approval of leaders, positive feedback from customers, toget new resources such as self-esteem and sense of accomplishment (Wang M., Liao H., Zhan Y. et al., 2011).

IHRP insists on equal opportunities, fair distribution and development sharing among employees, and acknowledges the diversity, maximizes the value of diversification (Roberson, 2006), and pays more attention to employees' sense of belonging and happiness in their work process (Qiu Guobin, 2013), which promotes harmonious relationships between employees by shaping a good atmosphere of mutual cooperation and fairness (Havin, 2009), which provides employees with organizational support. Organizational support and approval can improve job performance and reduce emotional exhaustion. Based on this, hypotheses 1, 2, 3 are presented:

Hypothesis 1: IHRP is positively related to job performance.

Hypothesis 2: IHRP is negatively related to emotional exhaustion.

Hypothesis 3: IHRP improves job performance by reducing emotional exhaustion.

Individuals who experience homesickness is more likely to experience negative emotions and is more likely to suffer from affection (Van Tilburg, 1997). When individuals experience homesickness, they need to consume considerable resources to ease the pain and pressure caused by homesickness. (Shaffer, et al., 2012). For homesick individuals, emotional exhaustion is further aggravated, hypothesis 4 is presented:

Hypothesis 4: homesickness is positively adjusting the negative correlation between emotional exhaustion and job performance, making the negative relationship stronger when homesickness is high (than homesickness is low).

3 Research Design

3.1 Data collection

The study selectsmultiple regional companies as survey objects and covers numbers of industries such as information and communications. The data collection was achieved through the online distribution and recovery of questionnaires. The survey lasted for more than three months from November 2017 to February 2018. 552 questionnaires were retrieved. Effective samples were 537, effective rate: 97.2%, of which 56.6%were male.

3.2 Measurement of variables

We studied Lisa H.Nishii. (2013) and other studies. Based on the opinions of experts and respondents, a scale of 17 items was eventually formed. The three-factor model fits the following criteria: $\chi2/df=4.381$, NFI=0.935, CFI=0.936, IFI=0.949, TLI=0.940and RMSEA=0.079. In this study, Cronbach's alpha was 0.953.

Table 1   Rotated Factor Loads

Dimension	Title Item	Factor load
Job Allocation and Performance Compensation	The company uses flexible working hours and other more agile office methods	.634
	Employees can participate in the development of their salary structure and level	.824
	The company will adopt flexible salary incentive according to the requirements of post	.645
	I can choose the type of salary and the form of payment according to my own demand	.851
	The company will adjust salary level, structure according to employeefeedback	.729
	The recruitment of the company does not discriminate on the grounds of gender etc.	.763
Job Selection	Recruitment and selection will not affect the employment and promotion due to different personalities and professional backgrounds	.737
	Company recruitment selection will be based on specific job requirements and the use of flexible recruitment selection method	.741
	The company's recruitment and selection system is scientific and rigorous, the process is standardized and transparent, and the results are fair	.692
	Company recruitment and selection will be based on employee feedback to optimize and improve the recruitment program	.597

Continual Table 1

Dimension	Title Item	Factor load
Employee Development and Participation	The company provides employees with more opportunities for fair promotion	.630
	The company encourages employees to ask questions and make reasonable suggestions, even if they are wrong	.776
	The company encourages employees to mention work ideas and innovative ideas, and to tolerate innovation failure	.798
	The company provides a variety of communication feedback channels to encourage employees to participate in corporate governance	.785
	The company will empower employees to deal flexibly with their work within the scope of their work	.755
	The company will allow different stakeholders to participate in policies and voice.	.751
	The company encourages employees to participate in system development and issue complaints and feedback	.808

Emotional exhaustion: using Maslach and Jackson's scales (e.g., "My job makes me feel emotional exhaustion"). In this study, Cronbach's alpha was 0.963.

Job performance: job performance scales compiled by Zhao Fuqiang, Yang Shuyuan (2017) (e.g., "I often work overtime to ensure that the task is completed on time"). In this study, Cronbach's alpha was 0.956.

Homesickness: scales compiled by Stroebe, M., van Vliet, T., Hewstone, M., & Willis, H. et al. (2002) (e.g., "Missing your families"). In this study, Cronbach's alpha was 0.933.

In this study, our control variables: gender, age, native place, workplace, folk, religion, marriage, education.

3.3 Deviation test

Because questionnaires are filled out using the self-reporting method, homologous errors may occur, and common method deviations need to be tested. In this study, Harman's single factor test was used, that is, exploratory factor analysis was performed on all items together, and nine factors with eigenvalues greater than 1 were extracted from the unrotated factor analysis results. The cumulative interpretation explained 72.825% of the total variance, and the explanation of the largest factor to variance is 25.825%. There is no a serious problem of common method deviation.

3.3 Statistical analysis

The statistical analysis of this study uses SPSS20.2 and AMOS21.0. The specific statistical analysis includes: firstly, the reliability and validity of the questionnaire are tested by α reliability analysis and confirmatory factor analysis, and using factor model method to test the validity of differentiation between variables; secondly, through the descriptive statistics and correlation analysis of the main research variables, the direct effects between variables were tested; finally, the mediating effects of the variables and themoderator effects were tested by the hierarchical regression analysis of the variables.

4 Statistical Analysis

4.1 Reliability and validity test

The overall alpha reliability of the questionnaire was 0.851, and the lowest alpha of the variable questionnaire was 0.933 (Table 4 diagonal), indicating that the questionnaire was reliable. In this study, in order to improve the measurement validity of the questionnaire, some items were deleted (Chen, 2012). This study uses AMOS21.0 for confirmatory factor analysis, according to the factor load less than 0.5, there are more than 0.5 load on multiple factors and the maximum variance contribution rate, for IHRP, we delete the three items 2, 3, and 5. The discriminant validity of the study variables was tested by the factor model method. The fit of the four-factor model was the best, the single factor model has the worst fitting, indicating that there is no serious homology variance among the variables and has good discriminant validity.

4.2 Descriptive statistics

Variable correlation analysis (Table 2) showed that IHRP was significantly positively correlated with job performance, negatively correlated with emotional exhaustion, and negatively correlated betweenemotional exhaustion and job performance, making H1, H3 preliminary validated.

Table 2　Means, Standard Deviations, and Correlation Coefficients of Variables

	Mean	SD	1	2	3	4
1. IHRP	3.536	.815	0.953			
2.emotional exhaustion	2.565	.926	-.079	0.963		
3.job performance	4.074	.538	.429***	-.182***	0.956	
4.homesickness	3.162	.641	.128**	.473***	.137**	0.933

Note: 1) The diagonal data is the internal consistent reliability of the scale after partial item deletion by confirmatory factor analysis; 2) * indicates p<0.05, ** indicates p<0.01 and *** indicates p<0.001 (two-tailed test).

Table 3   Hypothesis Test

	Emotional exhaustion			Job performance			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Gender	-.117**	-.1 16**	-.020	-.022	-.039	-.041	.000
Age	-.062	-.071	.022	.066	.056	.011	.040
Native place	-.070	-.071	.025	.030	.020	.012	.011
Workplace	.051	.054	.048	.036	.044	.058	.041
Folk	.045	.044	-.063	-.058	-.052	-.055	-.078
Religion	.047	.047	-.018	-.015	-.009	-.009	-.009
Marriage	.046	.043	-.014	.001	.007	-.005	.032
Education	-.026	-.035	.023	.069	.063	.018	.019
IHRP		-.086*		.441 ***	.429 ***		
Emotional exhaustion						-.145***	-.182***
Emotional exhaustion *H							.191 ***

Note: 1) * indicates p<0.05, ** indicates p<0.01 and *** indicates p<0.001 (two-tailed test); 2)In Table 3, H represents centralized homesickness and emotional exhaustion of the last row in table 3 is also centralized.
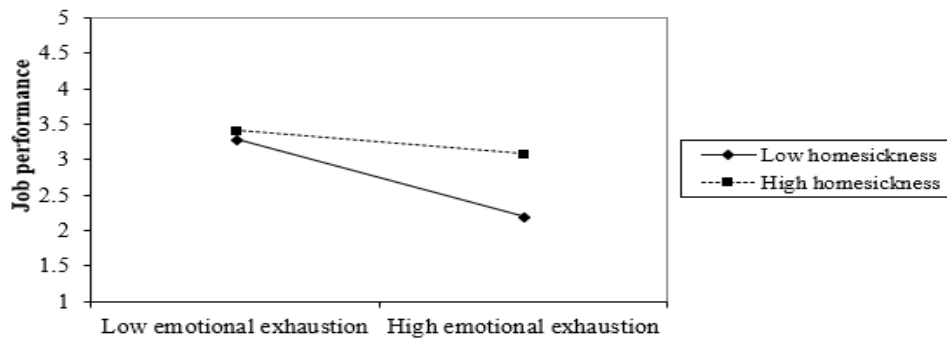
Figure 2   Interaction of Emotional Exhaustion and Homesickness on Job Performance

4.3 Hypothetical test

Direct effect test. According to the model 4 in Table 3, IHRP has a significant positive effect on job performance (β=0.441, p<0.001), supporting H1. According to model 2 in Table 3, IHRP is negatively correlated with emotional exhaustion (β = -0.86, p < 0.05), supporting H2.

The mediating effect test. Combining with model 4 and 5 in Table 3, the emotional exhaustion partially mediates the relationship between IHRP and job performance, supporting H3.

The moderator effect test. According tomodel7 of Table 3 and figure 2, we can see the homesickness negatively adjusts the relationship between emotional exhaustion and job performance. The higher the homesickness, the weaker the negative relationship between emotional exhaustion and job performance. failing to support H4.

5 Discussion

IHRP helps to reduce the disadvantages of diversified employees. Meanwhile, homesickness negatively regulates the relationship between emotional exhaustion and job performance. This may be the fact that hometowns are the source of energy replenishment when employees are homesick.It caninspire the spirit of hard work, which in turn supplements the energy consumption caused by emotional exhaustion; it may also be the result of internal interaction of variables.

6 Conclusion

The mainconclusions of this study: IHRP can improve job performance and reduce emotional exhaustion; homesickness negatively influences the relationship between emotional exhaustion and job performance. The contributions of this study are mainly reflected in the following aspects: first, enrich and complement the theoretical research on oriented human resource practice, employee emotional exhaustion and homesickness; second, a new human resource practice was put forward to provide ideas

for future research.Meanwhile weakness is unavoidable, the imitations of this study: (1) unavoidable common method bias, (2) limitations of the sample itself, (3) mediator variables may also be others.

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Investigation of Freshmen's Subjective Well-being Condition and Its Improving Countermeasures: An Example of Wuhan University of Technology

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Abstract：Subjective well-being is the subject feeling of whether people are happy or not. The pursuit of happiness is one of the ultimate goals of human's behavior. The condition of freshmen's subjective well-being has an important effect on their physical and mental health, their future growth and development in their college life. This paper adopts the happiness index scale compiled by Campbell to investigate 200 freshmen respondents in a technology university in Wuhan University of Technology. This pater analyzed the condition of their life satisfaction, general affect and well-being, and then compared the differences among gender, origin, the status of the one child family as well as the subjective well-being. After that, this paper puts forward four detailed improvement countermeasures to improve the Subjective well-being condition.

Key words: Subjective well-being; Freshmen; Investigation; Countermeasures

1 Introduction

Happiness is one of the ultimate goals of individual and society to pursuit. Subjective well-being(SWB), which is one of the important comprehensive indexes for judging individual quality of life, refers to the overall evaluation of the quality of life by individuals according to their own standards (Suh et al.1996;Diener et al.1999). Subjective well-being is a comprehensive evaluation of life satisfaction and individual emotional state which sensitively reflects not only the attention to their quality of life and feelings (Diener, 2000; Wang et al, 2017), at the same time, also has a close connection with a number of important indicators of mental health, such as optimistic, adaptability, anxiety and depression and suicidal thoughts and behavior (Shek, 1993; Folkman, 1997;Gao & lv, 2018). College students are the future of society and the country. The state of college students' subjective well-being will have a positive influence on their physical and mental health as well as their growth and development. To investigate the status quo of freshmen who just enter the university from high school is not only advantageous to the students themselves, but also to the university teachers who can carry out the targeted improvement measures in the future university life. Those also will have important significance to help freshmen pass meaningful college life and improve their subjective well-being condition.

Based on a mature subjective well-being index scale, this paper investigates the freshmen of Wuhan University of Technology as respondents to get the state of their subjective well-being. After that, SPSS is used to analyze the relationship of the subjective well-being and their gender, origin, major, status of the one child family and state of the economy.

2 Data and Methodology

2.1 Measurement and data

Index of well-being is a commonly used tool for measuring subjective well-being. The scale was compiled by a PsychologistAngusCampbellin 1976, which mainly measured the present happiness degree of the subjects including the overall emotional index and life satisfaction. The scale uses Liket 7 level to measure. Index of general affect consists of 8 emotional items with a weight of 1.0.Index of life satisfaction is composed of a satisfaction project with a weight of 1.1(Campbell, 1976). The overall of subjective well-being happiness is the sum of weighted two scores. The scale is widely used and has systematized psychological measurement empirical research basement.

This paper takes the freshmen of Wuhan University of Technology in Wuhan as the respondents. 200 questionnaires were distributed and 154 questionnaires were collected. 141 of questionnaires were valid after 13 deficiency questionnaires excluded. The effective recovery rate was 70.5%. Among them, there were 86 male students accounting for 60.99% and 55 female students accounting for 39.01%; 34 liberal arts students accounting for 24.11% and 107 science and engineering students accounting for 75.89 %; 84 students from one child family accounting for 59.5% and 57 students from the non-only

children family accounting for 40.5%; 82students from the city accounting for 58.16% and 59 rural residents accounting for 41.84 percent.

2.3 Methodology

SPSS for Windows 21.0 is used. The methodology of independent group mean difference test and double variables correlation significance test are used to analysis.

Because the Index of well-being is a mature scale, the validity of this measure has been verified. About the reliability, the Cronbach's Alpha=0.886. According to 0.8 as the Cronbach's Alpha lowest standard (Bryman & Cramer, 1997), this measurement has good reliability.

3 Results and Discussion

3.1 The general state of subjective well-being

The results showed that the mean of the index of life satisfaction is 3.53 ± 1.279, the mean of index of general affect is 4.885 ± 0.5138 and the mean of the index of happiness is 8.37 ± 1.49 (see table 1).

Table 1　The General State of Subjective Well-being

	N	The min.	The max.	Mean	Standard deviation
Index of life satisfaction	141	1	7	3.53	1.279
Index of general affect	141	3.25	6.63	4.4885	.51385
Index of well-being	141	4.35	14.33	8.3736	1.49209

To further study the life satisfaction of those fresh students, we can find the proportion of clearly satisfaction attitude（more than 4 scores）is 19.1%，clearly not satisfied satisfaction attitude（less than 4 scores）is 48.2% and 32.6% fresh students are not very clear（4 scores）. From the table, it can be seen that the proportion of dissatisfied freshmen are more than satisfied, which indicates that most students are not satisfied with their life.

Index of general affect, which measures the subjective emotional experience of people in a certain period of time, can be divided into positive and negative emotions. It is also called happiness. The distribution of college students' index of general affect score shows: less than 4 scores is 13.5%; average to 4 scores is 5.7%; more than 4 scores is 70.9%; more than 5 scores is 15.6%. In general, college students' positive emotion (more than 4 scores) is in a dominant position, but there are only 15.6% students' positive emotion is obvious (more than 5 scores) which shows that most students just slightly dominant positive emotions.

In terms of subjective well-being, the number of students who feel very happy (more than 13 scores) is only 1.4% and the proportion is very small; who feel relatively happy (11.5-13 scores) is 1.4% and the sum of the two is only 2.8%. Those who were unhappy (less than 9 scores) accounted for 64.5 percent, indicating that the overall subjective well-being of college students was at a low level, means a low level of happiness.

Compared with other studies and same Campbell happiness scale used, the study of (Zhang & Zheng, 2004) shows that the average of index of happiness is 10.46 ± 1.79, which was quite different from this study survey data: 8.37 ± 1.49; the study of (Chen & Yang, 2003) shows that college students' overall satisfaction of life is moderately low, with only 1%(this study is 1.4%), and most students are in the middle (Chen, 2003).Most other researchers' measurements of happiness of college students generally indicate that their life satisfaction and overall well-being are moderate, or slightly epigastric , or slightly hyponastic. Generally, this investigation reflects the condition of index of happiness of freshman in this university is very low.

3.2 The horizontal comparison of subjective well-being

3.2.1 The Relationship of gender and subjective well-being

Measurement results show that the male college students' index of life satisfaction, index of general affect and index of well-being are slightly higher than that of female college students,but the boy and the girl in the two aspects of index of life satisfaction and index of general affect does not exist significant difference（P>0.05）.However, the difference is significant in the index of subjective well-being, as shown in table 2.

Table 2　The Comparison of Sexual Differences of Subjective Well-being

	Gender	N	Mean	Standard deviation	SE Mean	t	sig.
Index of life satisfaction	Male	86	3.70	1.364	.147	1.943	.054
	Female	55	3.27	1.096	.148		
Index of general affect	Male	86	4.5174	.56235	.06064	.836	.405
	Female	55	4.4432	.42819	.05774		
Index of subjective well-being	Male	86	8.5849	1.64478	.17736	2.129	.035
	Female	55	8.0432	1.15382	.15558		

Scholars have different research conclusions about the gender difference in subjective well-being of college students. For example, the study of (Li & Zhao, 2000) found that male students' subjective well-being level is significantly higher than female students'. (Yan et al. 2003) shows that female students' subjective well-being and life satisfaction is significantly higher than male students'. (Chen & Yang, 2003) shows that the life satisfaction of female students is significantly higher than that of male students. (Li, 2000), (Yan et al. 2003) and (Song, 2018) shows that there is no significant difference between male and female college students in general well-being. Duan (1996)found that there is no significant difference in investigated students' general well-being, but the difference is significant in negative emotion state: male's negative emotion is observably less than female's. From above, we can see that the relationship between gender and subjective well-being are not unified.Whether there is sexual difference in subjective well-being research can't simply be answered by "yes" or "no".If there is sexual difference in subjective well-being is indeed hard to make sure.

3.2.2 The Relationship of origin and subjective well-being

Measurement results show that although rural students' mean scores of life satisfaction, index of general affect and subjective well-being is slightly higher than urban students', there is not significant differences.P>0.05）(As table 3 showed)

Table 3　The Origin Differences of Subjective Well-being

	Origin	N	Mean	Standard Deviation	SE Mean	t	sig.
Index of life satisfaction	Urban	82	3.48	1.354	.150	-.615	.540
	Rural	59	3.61	1.175	.153		
Index of general affect	Urban	82	4.4558	.51684	.05707	-.890	.375
	Rural	59	4.5339	.51057	.06647		
Index of subjective well-being	Urban	82	8.2790	1.58145	.17464	-.887	.377
	Rural	59	8.5051	1.36047	.17712		

Other researchers' conclusions are not consistent with each other, such as (Zhang & Zheng, 2003) shows that college students' index of well-being has significant urban and rural differences in the total score and urban is higher than rural. But (He, 2000) shows that urban and rural difference has no remarkable effect on total well-being of college students which is consistent with this study.

The reasons for the differences in subjective well-being of freshmen in this study may be: On the one hand, the urban and rural difference is just one of the reasons that affect college students' subjective well-being. The subjective well-being of college students is affected by complex factors, which the difference of students' origin from maybe not obvious; on the other hand, from the life experience, the rural students who can be admitted to the university has been living a studying life. Many of them have been sent to schools in counties or cities since junior high school, and have close contact with urban students and civilization. The differences of their lifestyle, thinking habits, values, personality traits between urban students gradually narrowed. All in all, whether there is significant difference between urban and rural areas, the depth and width of research should be carried out.

3.2.3 The relationship of one-child family background and subjective well-being

The results showed that there was no significant difference in life satisfaction, index of general affect and index of well-being between singleton and non-singleton college students(P>0.05)(As table 4

showed).

There are few studies on the difference of subjective well-being of college students from the condition of only children family. The study of Chen & Yang (2003) showed that singleton students' life significant obviously higher than non- singleton students'. On the contrast, the study of Guo & Cao (2003) shows that non- singleton students' well-being level is distinctly higher than singleton students ($P<0.01$).This research is different from previous studies finding that freshmen's life satisfaction, index of general affect and well-being has no significant difference with whether they are singleton students or not.

Table 4   The Differences of the Only-child Status in Subjective Well-being

	Whether only child or not	N	Mean	Standard Deviation	SE Mean	t	sig.
Index of life satisfaction	Yes	84	3.50	1.349	.147	-.359	.721
	No	57	3.58	1.179	.156		
Index of general affect	Yes	84	4.4628	.54806	.05980	-.719	.473
	No	57	4.5263	.46094	.06105		
Index of subjective well-being	Yes	84	8.3128	1.54726	.16882	-.586	.559
	No	57	8.4632	1.41557	.18750		

3.2.4 The relationship between Major and subjective well-being

The result shows that there is no significant difference between arts college students and science college students in life satisfaction, index of general affect and subjective well-being ($P>0.05$) (As table 5 showed).

Table 5   The Relationship between Major and Subjective Well-being

	Major	N	Mean	Standard Deviation	SE Mean	t	sig.
Index of life satisfaction	Science	107	3.56	1.290	.125	.473	.637
	Engineering	34	3.44	1.260	.216		
Index of general affect	Science	107	4.4743	.53496	.05172	-.580	.563
	Engineering	34	4.5331	.44521	.07635		
Index of subjective well-being	Science	107	8.3911	1.51663	.14662	.247	.805
	Engineering	34	8.3184	1.43265	.24570		

Different researchers have come up with inconsistent results. For example, (Li & Zhao, 2000) shows that there is no obvious difference between arts and science college students in index of well-being. (Chen &Yang, 2003) shows that the life satisfaction of arts and science college students is not significant different, which is in line with the results of this study. Nonetheless, other scholars have offered different conclusions, (Jing &Zhang, 1997) shows that the score difference between the college students major in mathematics and Chinese in overall well-being is significant and the students major in mathematics have higher subjective well-being, but the study of Ying He (2000) shows that the overall well-being of arts college students is notably higher than that of science college students.

4 Conclusion

From the survey, we can found that: (1) the life satisfaction of freshmen in Wuhan University of Technology is not high in the field of life satisfaction and subjective well-being, while the index of general affect is higher. It illustrates that the freshmen are filling with positive and happy emotionafter very hard work in school time, but their expectations of college life are too high to deal with the contradiction between ideal and reality causing low life satisfaction and subjective well-being. It is the problem should be solved that how to improve their life satisfaction and subjective well-being. (2) The study found the subjective well-being of this university's freshmen are not significant difference in the aspects of their gender, origin, the only child family and major. This is consistent with relevant studies. This reflects that the countermeasures of improving the college students' life satisfaction can be almost

same.

People's level of Well-being is very important to the development of their life. According to the results of the survey, there are four important countermeasures to improve freshmen's subjective well-being. Firstly, positive psychology health education should be carried out regularly. Well-being is the combination of external environment and inner psychological quality. Good mentality and sound personality are the important sign of human's physical health as well as the basic premise of happiness. When people's heart is clear, their world is always full of sunshine and happiness is everywhere. Regular positive psychology education can make the students possess full of love, good feeling and constantly improve themselves to set up their healthy psychological state.

Secondly, humanistic quality should be continually cultivated. If college students want to improve their subjective well-being, they should actively learn the wisdom of their predecessors and try to improve their humanistic quality. People' humanistic quality makes people understand the existence, value and consciousness state of human. The level of humanistic quality will directly determine the level of human moral civilization and their ability to grasp happiness.

Thirdly, every studentshould be guided to set up their suitable goals. According to the objective theory of subjective well-being, subjective well-being will come into being after whether the needs and goals are fulfilled. The content of the target, the activity to achieve goals and the result of pursuitwill directly influence people's well-being. So we should help college students to set up their suitable goals.

Fourthly, let the students set up exercise habit. Lots of researches have shown that exercise can produce positive emotions, reduce depression and stress, and also contribute to physical and mental health. For college students, exercise habit is a useful way to improve their subjective well-being.

The condition of subjective well-being is very important to the college students, special to the fresh students who just enter into the university.This paper uses a mature scale to investigate life satisfaction, general affect and well-being condition of the freshmen in Wuhan University of Technology, and differences among gender, origin, the status of the one child family and major. Based the situation, four detailed improvement countermeasures were proposed.In the future, other factors, such as the differentpersonality, different grades of the students should be researched.

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The Effect of Job Design on Science-technology Employees' Job Engagement: The Mediating Role of Psychological Capital

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Abstract: The influencing factors of scientific-technological worker'sjob engagement have received extensive attention, but there are few studies on how work design contributes to work engagement. This paper takes the 300 scientific and technical employees of a high-tech group company in China as the research object and explores how the work design influences the work engagement of science and technology employees. More specifically, we also focus on the intermediary role of psychology capitaland constructs a model for the intermediary relationship between work design, psychological capital, and workengagement for science and technology employees. The empirical research shows that psychological capital plays a role of mediating effect between the work design and staff's work engagement, and the work design has a significant positive effect on work engagement.
Key words: Science-technology employees; Jobdesign; Job engagement; Psychological capital

1 Introduction

Traditionally, job engagementhas been regarded as"self-matching between the self and the role inthe organization through self-management"，which is a multi-dimensional incentive concept reflecting employees' physical, cognitive and emotional involvement in work performance(Hu Shaonan & Wang Wei, 2014). Science-technology employees, as the core employees of the company, have the characteristics of scarcity, low substitutability, strong independence, high sense of innovation and sense of accomplishment. If they can maintain a high level of enthusiasm, dedication, and focus on their careers, it will be the key to the future development of the company. Therefore, how to effectively play those talents' role has become an important topic in the study of human resource management in modern enterprises, especially high-tech enterprises.

In this situation,academics and business managers have increasingly pay attention to various ways to enhance the engagement of scientific and technological employees. Most companies tend to adopt material incentives to increase the work effort ofthese staff, while ignoring the design of work processes and the work itself.Although Maslow's hierarchy of needs theory believes that the material can meet people's low-level demand, but the demand level of science-technology workers is quite big different from that of ordinary workers, whichisthe reason why material incentive effect on science-technology workers is very poor. Therefore, in order to improve the level of engagement in work, it is also necessary to focus on the nature of the work so as to realize the motivation of science-technology employees.At the same time, the level of work engagement is not only dependent on the work designinthe organization, but also closely related to the inner psychological state of the individuals(Hobfoll, 2011). Moreover, the relationship between work design and psychological capital has been proved by some existing empirical researchso that psychological capital may play an important intermediary role in the process of work design impact on job engagement.

As such, this paper contributes to the literature in two ways. First, we empirically test the direct impact of job design on science and technology employees' work engagement. Second, as discussed earlier, this study builds an intermediary effect model to explore the mediating effect of psychological capital on job design and job engagement.

1.1 Job design and job engagement

Job design (JD) refers to the decisions of specific work content and work process, including the identification of related tasks and activities and the assignment of tasks. Its importance lies in that it can describe the process and content of the organization's goal in detail and decompose the goal for each position, as well asplay a significant role in motivating employees (Lawler, Hackman & Kaufman, 2010).

In accordance withthe high work involvement modelof (Bennett and Bell, 2004), work design is aprofounddeterminant of employee work engagement.Besides, according to the most prominent theory about work design---the job characteristic model (JCM), proposed by (Hackman and Oldham, 1975), suggeststhat the five core dimensions ofJCM will affect the employees' experience of work meaningfulness and work responsibility, also provide internal driving force, satisfaction, needs,

motivation and other internal psychological feelings to the science-technology employees, all areinfluencing factors for improving the employee' work engagement.In addition, recent work has shown that autonomy and skill variety in the five-dimensional core characteristics of JCM can have significant impactonemployee'sexperienceof workmeaningfulness, and thuseffectively predict employees' job involvement level(Macey&Schneider, 2008).Another empirical study based on Job DemandsResources Model (JD-R) tests that the job characteristics themselves are crucial predictors of the work engagement, and there is a close positive correlation between the feedback and the control ability of work (a kind of autonomy) as well as the employee involvement (Li Jie, 2012). Moreover, the longitudinal study, Sun Lingxi (Sun Lingxi, 2013) and others conducted a follow-up survey of new science researchers and found that task integrity and job autonomy of JCM have a direct effect on work engagement, while the influence of skills variety, task significance and work feedback is not significant. Based on the above analysis, there may be a certain relationship between work design and work engagement of science-technology staff. Thus, we hypothesize:

Hypothesis 1: Job design is positively related to job engagement of science-technology employees.

1.2 Psychological capital and job engagement

With the development of Positive Organizational Behavior, Luthansand others put forward the concept of "psychological capital", which refers to an individual's positive psychological state in the process of growing up and developing, embodied in four dimensions: self-efficacy, optimism, hope, resilience.On the basis ofthe Psychological Resources Theory, psychological resources play a vital role in supplementing energy, stimulating motivation, maintaining work vitality, and regulating individual attitudes and behaviors.

Usually, employees with high psychological capital have abundant positive psychological resources and always work hard with a positive attitude.JD-R suggests that psychological capital, on the one hand is an endogenous psychological force that can be developed by an individual, which can provide energy support for the individual in the process of energy consumption such as continuous work requirements, thus lead to improvejob identification and stimulate their working motivation. On the other hand, it can also be used as a basic resource to regulate and manage other work resources and promote individual persistence to achieve positive results.However, there are few empirical studies on the relationship between psychological capital and work engagement, especiallymuchlessthe research involving the scientific and technological employees. At present, most studies focused on enterprise ordinary staff, hospital nurses, primary and secondary school teachers, all results have basically supported the positive relationship between psychological capital and employee work engagement (Chen Weizheng, 2012; Liu Chaoying, 2013; Mao Jinping, 2013). As a result, we hypothesize:

Hypothesis 2: The psychological capital of science-technology employees is positively related to their work engagement

With respect to the studies on the mediating effect of psychological capital mainly include the following. (Su Yong and others, 2011) argued that psychological capital can mediate the impact of other variables on employee behavior. His study on company's employees found that psychological capital plays an intermediary role in the relationship between job designand employee knowledge sharing behavior (Su Yong, Li Hui & Wang Wei, 2011). Research by NiuQiaohong(Niu Qiaohong, 2014) indicates that psychological capitalmediates the relationship between organizational support and nurses' work engagement. Thus, although there is no research on the role of psychological capital in the relationship between job design and work involvement,it is reasonable to think that psychological capital may have a mediating effect on this relationship. After all, Renn and Vandenberg (Renn and Vandenberg, 1995) examined the mediating effects of Critical Psycho-logical States (CPS)on the JCM and found that CPS do have a positive mediating effect between job design and workperformance.This provides a certain basis and ideological source for this study. Hence, we hypothesize:

Hypothesis 3: The relationships between work design and work engagement are mediated by psychological capital.

1.3 Job design and psychological capital

Work design and psychological capital are both considerable concepts in organizational behavior research, but at present, there is very little research on the relationship between them, only in a few literatures does the indirect reference to the influence of job design on psychological capital. For example, JCM suggests that material incentive resources are not the only factors affecting the individual behavior of employees, and JCM are more likely to believe that work characteristicsreflecting the meaning of work such as theimportance of work itself, will create mental encouragement for the employee and lead them to become more attentive and absorbed in their work. Besides, such

characteristics as challenging workwill have a significant impact on the self-efficacy of psychological capital.And if a job lacks these work features, employees will have more possibilities to experience negative internal emotions.Therefore, some certain characteristics of the work design will affect the individual's psychological state through the individual's perception, finally result in changing the level of employee's psychological capital. What's more, Hester (2006) pointed out that positive and valuable feedback, leadership recognition and care and other reasonable rewards can not only stimulate potential positive behaviors of employees, but also may transform employees' values. Consequently, we hypothesize:

Hypothesis 4: job design is positively related to psychological capital of science-technology employees.

Based on the above discussion and hypothesis, the basic relationship model of this study can be obtained, as shown in Figure 1.
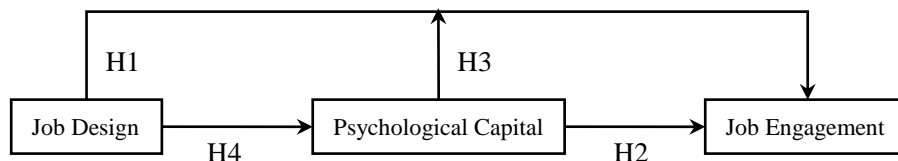
Figure 1　The Model of Basic Relationship

2 Data and Methodology
2.1 Sample
The hypotheses were tested using data from samples of employees nested in automation control system manufacturer in China. A total of 300 employees from the company, who are engaged in scientific and technological activities and employees who are going to engage in scientific and technological activities in the future, were surveyed through the online questionnaires.Finally, 292 were actually returned, and 285 samples were actually available, an effective response rate of 95.0%. Among these valid questionnaires, 73.3 percent of the respondents were male while 26.7 percent of the respondents were female. The demographic characteristics of the respondents are presented in Table 1.

Table 1　Respondent Demographics

	N	%
Gender		
Male	209	73.3
Female	76	26.7
Age		
20-30 years	116	40.7
31-40 years	108	37.9
Over 40 years	71	21.4
Education		
Junior college or technical school	36	12.6
Undergraduate	135	47.4
Postgraduate or above	111	38.9

2.2 Variables
Job design characteristics are selected as independent variables, we drew from the Job Diagnostic Survey (JDS), created by Hackman and Oldham (Hackman and Oldham, 1975),to measure the three facets of job design,namely task identity, task autonomy and feedback from the job. Each facet consists of three items, a total of 9 items. Job engagementis selected as dependent variable. We measured employee engagement usingUWES scale developed by Schaufeli (Schaufeli, 2002) and referencing the Chinese version revised by Zhang Yiwen and GanYiqun (Zhang Yiwen and Gan Yiqun, 2005). The final scale includes three subscales of vigor, dedication, and absorption, a total of 17 items. Psychological capital is selected as an intermediary variable. We adopted the four-dimensional scale of Luthans'PCQ

after revising, namely: self-efficacy, hope, optimism and resilience, a total of 24 items. With regard to control variables, gender, age and education of the respondents were included since these factors may affect the results.

All survey items are scored using the Likert 5-point scale. The Likert 5-point scoring standard has the following meanings: 1 means "completely disagree" and 5 means "completely agree".SPSS software 22.0 is used in data processing. The analysis methods of data include: reliability and validity analysis, descriptive statistical analysis, correlation analysis, and simple and multiple linear regression analysis.

3 Results

3.1Reliability and validity analysis

The reliability and validity of the job design, psychological capital and job engagement scales are tested in this study, as shown in Table 2. The computed Cronbach's α for all the constructs is above 0.70 and the average variance explained for each construct exceeded 0.5, thisindicates the achievement of internal consistency among the measures and an adequate level of convergent validity.

Table 2 Results of Exploratory Factor Analysis

Constructs	N	Avg. factor loading (λ)	Cronbach'sα	AVE
Job design	9	0.808	0.853	0.611
Psychological capital	24	0.745	0.798	0.558
Job engagement	17	0.747	0.883	0.674

3.2 Descriptive statistics and correlation analysis

The mean, standard deviation, and correlation of the variables were analyzed using SPSS 22.0 software. The results are presented in Table 3. The data shows that there are significant correlations (p<0.01) between the three variables, work design characteristics, work engagement, and psychological capital of science-technology employees, which provides preliminary support for the hypotheses of the study.

Table 3 Descriptive Statistics and Correlation Analysis

Variables	Mean	SD	1	2	3
Job design	3.64	0.87	1		
Psychological capital	4.05	0.79	0.451**	1	
Job engagement	4.17	0.86	0.479**	0.503**	1

Notes: **p<0.05;*p<0.1 (Two-tailed). N=285.

3.3 Hypothesis testing

In this study, 285 questionnaires are used as samples. The main effect analysis is to test the relationship between job design, and job engagement through hierarchical regression. Besides, this paper also tests mediating effect of psychological capital on the relationship between job design and job engagement with regression equations. The results are presented in Table 4.

3.2.1 Main effect

As shown in Table 4, Model 3 is the relationship among control variables and work engagement. Model 4 introduces independent variable, work design. The result indicates that work design is significantly positively related with science-technology employees' work engagement (β=0.335, p<0.01), so Hypothesis 1 is supported.

3.2.2Mediating effect

As discussed earlier, we already know that work design is significantly positively related with work engagement. And in order to test the mediating effect, we still need conduct three steps. First, we test whether the mediator is significantly affected by the independent variable. As shown in table 4, Model 2 is the regression model of the independent variable on psychological capital, and the result indicates that job design is significantly positively associated with psychological capital (β=0.361, p<0.01). Therefore, Hypothesis 4 is supported.

Second, we test whether the mediator has a significant impact on the dependent variable. Model 5 has shown a significant positive relationship between psychological capital and work engagement (β=0.543, p<0.01), which means the higher level of psychological capital the science-technology employees have, the more work engagement there will be. So Hypothesis 2 is supported.

Third, we put the mediator into the equation meanwhile and test whether the independent variable still significantly affects the dependent variable. Model 6 is generated based on Model 4 by introducing a mediating variable and the result indicates that job design is still significantly positively associated with job engagement ($\beta=0.202$, $p<0.01$), while psychological capital is significantly positively related with job engagement ($\beta=0.476$, $p<0.01$), so psychological capital partially mediates the relationship between job design and job engagement. Consequently, Hypothesis 3 is supported.

Table 4   Hierarchical Regression Results

Variables	Psychological capital			Job engagement		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
1. Control variables						
Gender	-0.070[*]	-0.240	-0.088	-0.003	0.023	-0.027
Age	-0.160	-0.020	-0.199	-0.072	0.049	-0.051
Education	0.066	0.075[*]	0.296[**]	0.158[*]	0.050	0.047
2. Independent variable						
Job design		0.361[***]		0.335[***]		0.202[***]
3. Mediating variable						
Psychological capital					0.543[***]	0.476[***]
R^2	0.107	0.143	0.146	0.246	0.301	0.336
Adj.R^2	0.056	0.135	0.097	0.220	0.294	0.329
F	2.083[*]	18.199[***]	2.98[**]	20.642[***]	27.081[***]	46.016[***]

Notes: ***$p<0.01$;**$p<0.05$;*$p<0.1$ (Two-tailed). N=285.

4 Conclusion

Through a questionnaire survey, this study explored and confirmed how work design affects the work engagement of science-technology employees. The results show that if organizations ensure jobs provide individuals with job design characteristic, such as work identity, autonomy, feedback and so on, then people will get high level of psychological capital, leading to be more engaged at work.Therefore, this requires the organizations not only to seriously study, excavate, and shape the psychological capital of the science-technology employees in the process of employee recruitment, training, and assignment of employees, but also to fully consider the incentives for the scientific and technical employees when organizing the work design. In this way, organizations can better motivate the science-technology employees to engage at their work.

In addition, this study also has some limitations. First of all, during the research designing, due to time and funding constraints, this study mainly used cross-sectional data. If data can be obtained at different time period, the research model can be more accurately validated. Secondly, this study adopted online questionnaires, researchers did not provide detailed explanations for the questions that were filled out in the questionnaires. Soit cannot be completely excluded that individual survey respondents have reservations about the actual ideas of the items. Therefore, in order to ensure the rigorous research, this study should have tested and controlled the above situation during data processing. In the future, if the resources are sufficient, it is recommended that the follow-up study take a wider range of samples, so as to further discuss and verify the model.

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Research on the Relationship Between Organizational Innovation and Organizational Performance Based on Shared Mental Model

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Abstract: Modern organizations are increasingly relying on organizations for innovation and innovation. Researching the shared mental model, organizational innovation, and organizational performance and the path of influence between them can help to improve the many problems in improving performance in business practice. This paper explores the mechanism of interaction between organizational innovation and organizational performance, and establishes a theoretical research model that shares the mental model as an intermediary. At the same time, a large sample empirical method was used to analyze the enterprise data collected by the questionnaire using spss20.00, and the hypothesis and model established in this paper were verified. The results of the study show that the team shared mental model plays a regulatory role between organizational innovation and organizational performance. Under the adjustment of the shared mental model, management innovation and organizational innovation are significantly positively correlated with organizational long-term performance and organizational long-term performance. The interaction between management innovation and organizational innovation has a wireless relationship with organizational long-term performance and short-term performance.
Key words: Work team; Shared mental model; Organizational innovation; Organizational performance

1 Introduction
1.1 Sharing mental models
The concept of the mental model comes from cognitive psychology. According to the definitions of Rouse and Morris, the mental model refers to the cognitive subject can use the inertial psychological mechanism or established in cognitive activities(Rouse and Morris,1986). The cognitive framework describes, interprets, and predicts cognitive objects to improve the efficiency of cognitive activities. Xu Hanyi et al. summarized the shared mental model into a four-dimensional structure such as a concrete underlying architecture and an upper abstract framework based on the same heterogeneity and dependence theory (Xu Hanyi et al,2008). The domestic researcher Yang Yaping defines the mental model as the way of thinking and psychological formation of people, others, organizations and the world at different levels due to heredity, living habits, knowledge background and personality attitude (Yang Yaping, 2012). Zhao Tingsheng et al. agreed on the definition of shared mental model as "what to do, how to do it, and who to do it" in order to coordinate their work to adapt to the work of the team and meet the needs of the members of the group(Zhao Tingsheng,2016). Scholars have different definitions of shared mental models, but they all emphasize the meaning of "sharing". Domestic scholars raise the mental model from the individual level to the team level.

1.2 Organizational innovation
Representatives at home and abroad have different expressions about the connotation of organizational innovation. Among foreign scholars, Daft first proposed that organizational innovations in strategy, management structure, products, technology, and work flow constitute organizational innovation (Daft, 1978). Damampour believes that organizational innovation should be divided into technological innovation and management innovation. Technological innovation refers to innovation in products, technologies, manufacturing processes, etc. Management innovation refers to organizational structure and management system, etc. Innovation (Damampour, 1991). Chinese scholars Tao Qiuyan et al. classified organizational innovation into exploration-based innovation and utilization-type innovation(Tao Qiuyan et al, 2018).Tao Qiuyan conducted theoretical discussions and experimental analysis on the relationship between the two and organizational performance. Zeng Ping studied the relationship between trust atmosphere and organizational innovation with high-tech enterprises in Guangdong. The research results show that if the trust atmosphere is stronger, the contribution of organizational innovation will be greater(Zeng Ping, 2014).Zeng Ping explained in detail the relationship between organizational innovation and other variables, further extending the definition of organizational innovation. Based on the needs of research purposes, this paper adopts the criteria for

dividing the contents of organizational innovation and adopts Damanpour's viewpoint. It is believed that there are two types of organizational innovation: technological innovation and management innovation.

1.3 Organizational performance

In the fierce market competition, innovation can enhance the level of corporate performance. Wang Faxian believes that scientific performance management is conducive to giving full play to the enthusiasm of employees to create performance for enterprises and improve their comprehensive competitiveness (Wang Faxian, 2016). Xie Hongming et al. (Xie Hongming et al, 2006) found that the research on enterprise data in South China found that the technology and management innovations in organizational innovation have a significant positive impact on organizational performance.Xie Hongming further classified organizational performance through practical investigation.Sun Wei and others（Sun Wei and others，2015）used team interdependence as a control variable to explore the mechanism of sharing mental models on team performance.Colin & Krumwiede (Colin & Krumwiede，2010) took service companies as the research object, and the results showed that service-oriented companies can promote the two kinds of innovative behaviors, gradual and abrupt, which can make the company obtain better market performance , And then have better financial performance. Xie Wei and Colin et al further explores the impact of different innovative approaches on organizational performance under different conditions.

2 Research Model and Research Hypothesis

2.1 Research model construction
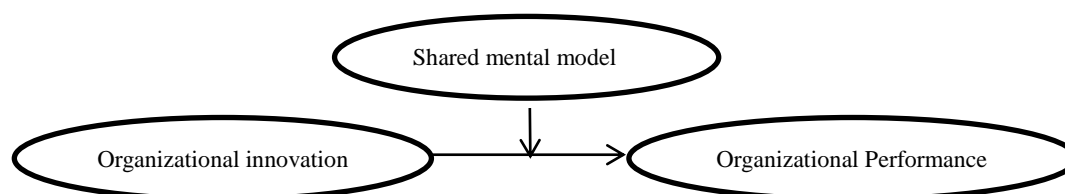
Figure 1   Models of Organizational Innovation and Organizational Performance under the Condition of Shared Mental Models

We divide organizational innovation into two dimensions: technological innovation and management innovation. We also divide organizational performance into two dimensions: short-term performance and organizational performance. Finally, we will share two types of mental models with higher degree of consistency and lower degree of consistency. The companies are divided into experimental group and control group, and they compare the two situations in which the regulatory variables are different, and explore the mechanism of the interaction between different dimensions of the two variables under the control of the shared mental model.

2.2 Research hypothesis

Organizational innovation can not only make the organization more resilient and flexible, but also contribute to the improvement of organizational performance. This has been confirmed by many scholars' empirical studies (Robinson Yamin & Gunasekaran, 1997).Organizational innovation is mainly divided into two aspects: management innovation and technological innovation. Management innovation can improve the flexibility and efficiency of organizational operations, and then improve organizational performance. Technological innovation is the core competitiveness of enterprise development in the new period and can bring high profits to enterprises.

Organizational performance is a true reflection of the effectiveness of the organization's operations. It is an effective output of the organization in order to achieve different levels of goals (Wu Zhengjie and Song Xianzhong, 2011). Traditional organizational performance measurement focuses only on short-term performance, but does not involve long-term performance. This position divides organizational performance into two dimensions: short-term performance and long-term performance. It fully considers the impact of organizational performance in different time periods and proposes the following assumptions.

H1a: Under the influence of the shared mental model, management innovation is positively related to the organization's short-term performance.

H1b: Under the influence of the shared mental model, technological innovation is positively related to the short-term performance of the organization.

H1c: Under the influence of the shared mental model, the interaction between management innovation and technology innovation is positively related to the short-term performance of the organization.

H2a: Under the influence of the shared mental model, management innovation is positively related to the long-term performance of the organization.

H2b: Under the influence of the shared mental model, technological innovation is positively related to the long-term performance of the organization.

H2c: Under the influence of the shared mental model, the interaction between management innovation and technology innovation is positively correlated with the long-term performance of the organization.

3 Research Process

This study uses a domestic management consulting firm as the research object of the experimental group. Its shared mental model has a high degree of consistency. At the same time, the high-tech communication companies are used as the control group's research objects, and their shared mental models are less consistent. Management consulting companies require smooth team communication and high execution power, which inevitably requires the support of shared mental models with a high level of consistency. The high speed of communication equipment updating and technological innovation of high-tech communication companies requires teams to have high creativity, which inevitably requires team members to have innovative thinking, so the level of team consistency is low. It is appropriate to explore the relationship between team innovation and team performance using these two types of companies as research objects.

A total of 20 enterprise teams participated in the study, including 10 subjects in the experimental group and 10 subjects in the control group. Invited all members of the team to participate in the survey, a total of 268 people, theteam size of about 11 people. The actual recovery sample was 238, and the recovery rate was 88.9%.

Data was collected using a questionnaire survey. With departments as the unit, the investigators will be convened in a conference room to answer questions during normal business hours. Between the answers, researchers uniformly explain the purpose of the survey and fill in the requirements. The questionnaire was sent to the researchers by the administrative staff after they were collected.

4 Research Results

This paper uses Pearson correlation analysis to test the correlation between variables. The specific means is to use SPSS22.0 to test the relevance of organizational innovation and organizational performance under the shared mental model adjustment to determine the rationality of the research hypothesis and the overall theoretical model.

This section focuses on the two cases of sample data sharing, the higher degree of consistency of the shared mental model, and the lower degree of consistency of the shared mental model. Regression analysis was conducted separately to test the consistency of organizational innovation in the shared mental model. The impact on organizational performance. A total of six models were included. The explanatory variables were still dependent on organizational performance. In Models 1 and 4, only management innovation is taken as the explanatory variable, and Models 2 and 5 are based on technological innovation only as an explanatory variable to examine the two management innovations and technological innovations. The two dimensions of management innovation and technological innovation share the mental model. The effect of adjustments on short-term performance and long-term performance was examined. In Models 3 and 6, the interactive items of management innovation and technological innovation were used as explanatory variables to examine the influence of interaction between two dimensions of organizational innovation on organizational performance. The regression analysis results are as follows:

Table 1   Results of Regression Analysis on Organizational Innovation and Organizational Performance when the Shared Mental Model Consistency Level is Low

	Short-term performance			Long-term performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age of organization	0.072	0		0.073	0.047	0.121
Nature of organization	-0.047	-0.091	-0.049	-0.031	-0.07	-0.035

Continual Table 1

	Short-term performance			Long-term performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Management Creativity	0.393***			0.437***		
Technological Creativity		0.450***			0.490***	
MC×TC			0.121			-0.021
R²	0.18	0.224	0.014	0.19	0.223	0.019
Adjusted R²	0.145	0.22	0.012	0.19	0.227	0.018
F	12.245***	18.662***	1.774	16.442***	18.742***	1.117

The results of Model 1 and Model 2 show that when the consensus mental model is low, there is a significant positive correlation between management innovation and technological innovation and short-term performance. That is, organizational innovation and short-term performance are significantly positively correlated. Therefore, the two dimensions of organizational innovation are significantly related to short-term performance when the level of consensus of the shared mental model is low. In addition, the results of Model 3 show that there is no significant correlation between the interaction items of management innovation and technology innovation and short-term performance.

The results of Model 4 and Model 5 show that when the level of consensus of the shared mental model is low, there is a significant positive correlation between management innovation and technology innovation and long-term performance, that is, organizational innovation and long-term performance are significantly positively correlated, so the two dimensions of organizational innovation are significantly related to performance when the shared mental model is low in consistency. In addition, the results of Model 6 show that there is no significant correlation between the interaction term of management innovation and technology innovation and long-term performance.

Table 2   Results of Regression Analysis on Organizational Innovation and Organizational Performance when the Shared Mental Model Consistency Level is High

	Short-term performance			Long-term performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age of organization	0.062	0		0.075	0.041	0.117
Nature of organization	-0.042	-0.087	-0.034	-0.037	-0.067	-0.031
Management Creativity	0.421***			0.456***		
Technological Creativity		0.456***			0.523***	
MC×TC			0.094			-0.018
R²	0.15	0.214	0.021	0.14	0.220	0.017
Adjusted R2	0.145	0.22	0.012	0.174	0.218	0.019
F	14.331***	17.625***	1.443	18.225***	18.532***	1.214

The results of Model 1 and Model 2 show that there is a significant positive correlation between management innovation and technological innovation and short-term performance when the shared mental model has a high degree of consistency. That is, there is a significant positive correlation between organizational innovation and short-term performance. Therefore, organizational innovation Both dimensions are significantly associated with short-term performance when the level of consensus of the shared mental model is high. It can be concluded that regardless of the level of the shared mentality level, under its regulation, organizational innovation is positively related to organizational performance. It can be concluded that the H1a and H1b assumptions are true.

In addition, the results of Model 3 indicate that there is no significant correlation between the interaction items of management innovation and technological innovation and short-term performance

when the level of consensus of the shared mental model is high. Combined with the above table, it can be concluded that the H1c assumption does not hold.

The results of Model 4 and Model 5 show that when the level of consensus of the shared mental model is high, there is a significant positive correlation between management innovation and technological innovation and long-term performance, that is, organizational innovation is significantly positively correlated with long-term performance. When the level of shared mentality is high, the two dimensions of organizational innovation are significantly related to performance when the shared mental model is low, and it can be concluded that the assumptions of H2a and H2b are established. In addition, the results of Model 6 indicate that there is no significant correlation between the interaction term of management innovation and technology innovation and long-term performance, so it is assumed that H2c is not established.

5 Conclusion

The research on organizational innovation and organizational performance based on the organizational shared mental model is a very complex and challenging task. Organizational innovation has become an important source for organizations to constantly improve their internal performance and ensure their sustainable development, especially in sharing. The mental model is also a new way of organizational research, making this work more meaningful in the times.

This study examines the theoretical background, the definition of related concepts, the analysis of basic principles, the presentation of the assumptions, the construction of models, the design of questionnaires, the examination of data, and the evaluation of empirical results. This study has obtained some relevant conclusions and viewpoints. The following summarizes these relevant conclusions and viewpoints as a summary of several preliminary results of this study, and is also the answer to the key hypothesis originally proposed in this study.

1) The team sharing mental model plays a regulatory role between organizational innovation and organizational performance.

2) Under the effect of the shared mental model, management innovation and organizational innovation are significantly positively correlated with the long-term performance of the organization and the long-term performance of the organization.

3) Under the moderating effect of the shared mental model, the interaction between management innovation and organizational innovation has a non-wireless relationship between organizational long-term performance and organizational short-term performance.

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Multi-Inclusive Human Resource Practice, Perceived Organizational Support, and Work Performance: The Moderating Role of Authentic Leadership

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Abstract: In this study, we investigated the mediating effects of perceived organizational supporton the relationship betweenmulti-inclusive human resource practice and employee work performance. In addition, we proposed the moderating effect of authentic leadership on the relationship between multi-inclusive human resource practice andperceived organizational support. According to the study, the influence of multi-inclusive human resource practice on employee work performance is mediated byperceived organizational support.When organizations implementmulti-inclusive human resource practice, employees' perceived organizational support will increase and their performance will increase.Moreover, whenauthentic leadership is at a high level, employees will have perceivedmore organizational support.Therefore, companies that want to promote the implementation of multi-inclusive human resources practices must improve the authenticity of leadership.
Key words: Multi-Inclusive human resource practice; Perceived organizational support; Authentic leadership; Work performance

1 Introduction

What kind of human resource management system is adopted by enterprises to upgrade the performance of the new generation of employees is an important issue faced by corporate managers? Although studies have shown that some other human resources systems, such as high-commitment human resource practices (Liu Zonghua etal., 2015), can improve employee performance, research on the mechanisms of multi-inclusive human resource practices affecting employee performance is still scarce.

With the acceleration of economic globalization, the organizational environment of companies is undergoing changes. The diversity of employees' racial, gender, and age levels and their deep diversity of values, interests, skills, and job preferences have become a prominent feature of the workplace.Poor management of diversity can lead to workplace conflicts, hostility, confrontation, and high turnover rates, which pose a serious challenge to organizational management.The academic community is developing inclusive leadership (Zhu Yu and Qian Shuting, 2014), team tolerance (Jansenet al., 2014), inclusiveness (Nishii, 2013), and inclusive management practices (Tanget al., 2015) and other topics for research.There are many documents on inclusive leadership between China and the West, involving theoretical discussions, empirical studies, and literature reviews.Researches on the practice of inclusiveness have yielded many valuable results abroad, and the country has just begun to emerge (Tanget al.,2015). There are few relevant documents.

For a long time, China has always emphasized and encouraged the promotion of the concept of inclusiveness and implementation of inclusive practices.It is of great value to grasp the concept, formation and function of the multi-inclusive human resource practice to promote the theoretical research and practical application of inclusiveness in the context of Chinese organizations. Diversity and inclusive management is a global issue. According to Deloitte's 2017 Global Human Capital Trends Report, issues concerning diversification and consistency will remain a challenge and a challenge for many companies.Fairness, equality and inclusion have caused widespread concern at the CEO level throughout the world.It can be seen that inclusive research is an internal demand for organizations to effectively manage diversity and is an important hot topic in the field of management.

The perceived organizational supportis an overall view of how employees view their contributions and care about their interests (Eisenberger and Stinglhamber, 1986). If employees perceive the organization's commitment and support to them, they will change their behavior and attitude to reward the organization (Rhoades and Eisenberger, 2002). Therefore, based on the perspective of social exchange, this study examines the mediating role ofperceived organizational support in the relationship between multi-inclusive human resource practices and employee performance, and aims to reveal the mechanism of multi-inclusive human resource practices on employee performance, and Improving

employee performance has important management implications.

2 Literature Review
2.1 Multi-Inclusive human resource practice
Bennett et al. (Bennett et al.,1994) first began to focus on inclusive practices and proposed inclusive human resource management practices that included the provision of employee assistance programs to provide rehabilitation opportunities to illicit drug users.Decision influence, access to sensitive job information, and job safety are three indicators of work environment tolerance (Pelled et al., 2010). In a multicultural coexistence organization, inclusiveness means equality, fairness, and full participation so that members of different groups can not only get equal access to decision-making opportunities and power status, but also be encouraged to work actively (Holvinoet al., 2004). Eliminating the barriers of full participation and contribution by employees, understanding, respecting and appreciation of workplace diversity, emphasizing and utilizing the knowledge and experience of different employees, and maximizing the potential of employees and teams are important aspects of organizational inclusion practices (Roberson, 2006). Tang et al. (Tang et al., 2015) found out that employees adapt to organizations, tolerate unintentional errors, and tolerate different perspectives is a unique inclusive practice of Chinese organizations. Different scholars have definedmulti-inclusive human resource practices based on different research objects and situations.This paper believes that multi-inclusive human resource practices incorporate the notion of inclusion in the activities of human resource management to form a fair recruitment, diversified training, fair performance appraisal system, diversified remuneration packages, and multiple promotion channels.

2.2 Perceived organizational support
Eisenberger (Eisenberger, 1986) defines the constructiveperceived organizational support: The organizations perceived organization's evaluation of its contribution and its concern for well-being will form a comprehensive overall understanding of the organization's support for employees.In addition, Millin (Millin, 1997) extended the concept of perceived organizational support and felt that the perceived organizational support should not only include the connotations proposed by Eisenberger (Eisenberger, 1986), but should also include instrumental support, ie, employees' needs at work. Information support, personnel training, material equipment support, etc.Scholars at home and abroad have defined the concept of perceived organizational support from different perspectives.The following are several representative definitions.

Table 1　Definition of Perceived Organizational Support

Author	Dimension
Witte(1991)	It is believed that the perceived organizational support is based on the employee's participation in reflecting the relationship between the employee and the organization. It is also the employee's feelings about the organization. The high-level perceived organizational support can make the organization members feel a sense of obligation, and thus promote the increase of employee's work input.
Xu Xiaofeng et al. (2005)	The first is whether employees feel the importance of their contribution to the organization, and the two is whether employees feel about whether the organization is concerned about their happiness.
Ling Wenshuo (2006)	Refers to employees' perceived support for their work, interest in their interests and recognition of their value.
Bai Yuxi (2010)	The employees feel the organization attaches importance to their contribution to the work and the degree of organization's concern for their employees. It includes organizational support for employees' work, concern for employees' interests and identification of employees' value.

Based on past research, this article defines the perceived organizational support as the perception of whether or not the organization agrees with itself.Through this recognition, organizational rewards, personal development, and job support are supported. Employees also use this feeling to balance their loyalty and contribution to the organization.

2.3 Work performance
Bemardin believes that work performance is the result of an employee's work based on his or her own job responsibilities or task activities (Wang Fang et al., 2001).Ling Wenyi and Peng Ze and others have pointed out in their research that the employee's work performance is a combination of time, methods, and results. It is the employee who, within a predetermined deadline, uses certain methods to

produce results in order to complete tasks reserved for the company (Yang Jie et al., 2004).Scholars have paid close attention to work performance for a long time. However, no consensus has been reached yet on what exactly is performance.The following are several representative definitions.

Table 2   Definition of Work Performance

Author	Dimension
Kene (1976)	Employees perform a record of the results achieved at the time of work, or the benefits of achieving the goal, within a specified period.
Boyatzis (1982)	Perform specific actions to achieve job requirements and maintain or meet the conditions, policies, and procedures of the organization's environment.
French & Seward(1983)	The degree to which a program of action achieves its goals, and the performance projects used by the general empirical research institutes often vary according to the research objectives. The main reasons for this are the different organizational goals and structures of each industry, and the adoption of different goals.
Murphy (1990)	A set of actions related to the goal of a person in the organization or organizational unit in which he works.
Borman and Motowidlo (1993)	All behaviors related to the goals of the organization, and this behavior can be measured by the degree to which the individual contributes to the goals of the organization.

3 Hypotheses Development
3.1 Multi-inclusive human resource practice and work performance

Devanna (Devanna, 1984) and others believe that: "Performance is a function of all human resource elements. Human resource management mainly affects individual performance and therefore productivity and organizational performance" (Devanna et al., 1984). Zerbe et al. (Zerbe et al., 1998) studied the impact of various human resource management measures on employees' service behavior and used aviation personnel as a sample. It was found that employees' self-reported service behavior was directly affected by the satisfaction of human resource management measures. This affects the personal performance of employees (Zerbe et al., 2010). The diversity of inclusive human resources practices emphasizes the importance of employee diversity.Most of the employees' performance comes from the employee's individual factors. The characteristics of the employees interpret the performance to the greatest extent. Therefore, certain characteristics of the employees should be strengthened through selection, performance management and training (Sun Qiaoling, 2008). According to the value model of human resources, human resources practice activities will affect the behavior and attitude of employees, and the results directly affect the daily performance of employees (Dyer and Reeves, 1995). Employees' motivation, skills upgrading, work environment improvement and other human resource management activities can improve employee capabilities and generate the behavioral modes required by the company's strategy, that is, employees' job performance changes (Becker and Huselid, 2006). Multi-inclusive human resources practices provide employees with an inclusive working environment, provide training for employees, and treat them fairly in terms of recruitment and performance-based compensation. Based on social exchange theory, employees will improve their performance-rewarding organizations.So put forward the following hypothesis:

Hypothesis 1:Multi-inclusive human resource practice is positively related towork performance.
3.2 Perceived organizational support as a mediator

Based on the theory of social exchange, employees contribute hard work and make contributions to the organization in exchange for the organization's compensation to employees (Rhoades & Eisenberger, 2002); the organization's "active treatment" of employees, the exchange of employees' positive attitudes, emotions, and behavior toward the organization. The perceived organizational support works by satisfying employees' needs for the organization and can express the willingness of the organization to provide material support and other support to employees (Eisenberger et al., 1986). According to the principle of reciprocity, if an employee perceives that the organization cares about its welfare and values its contribution, it will generate a sense of responsibility for the return organization and take action to help the organization reach its goal (Eisenberger and Stinglhamber, 1986).

Human resource practice is an important source of perceived organizational support (Farh et al., 1997). The multi-inclusive human resources practice consists of five dimensions: fair recruitment, diversified training, fair performance appraisal system, diversified compensation and benefits, and

diversified promotion channels.Previous studies have found that human resource practices such as job enrichment, participation in decision-making, performance management, compensation, and training significantly affect organizational support(Farmer et al., 2003), which in turn affects employee behavior.The perceived organizational support satisfies the emotional needs of employees. According to the social exchange theory, employees will reduce turnover and improve their work performance to reward organizations (Allenet al., 2003). Based on this, the following assumptions are made:

Hypothesis 2: Perceived organizational support mediates the relationship betweenmulti-inclusive human resource practice and employee work performance.

3.3 Authenticleadership as a moderator

In reality, whether human resource management practices can actually affect employees' perceived organizational support and work performance depends on their perception and interpretation of human resource management practices. Leadership is the person responsible for the human resources management function. Leadership style and methods directly influence the interpretation of human resources policies by employees. In other words, employees will use their leadership behaviors and methods to interpret human resource management practices in different contexts and respond flexibly (Zhang Hao et al., 2015). The support and identity obtained by the employees are more from their direct leadership than the organization. Therefore, the subordinates will direct their leaders' attitudes toward them as the key to whether the company supports them (Eisenberger et al., 2002). The authentic leadership will seek opinions from subordinates when making any decisions. This kind of exchange of opinions and feelings will promote the establishment of mutual trust and trust between superiors and subordinates. The establishment of such relationships can promote subordinates' self-development to some extent. This, to a certain extent, also allows employees to feel the organization's concern and help for its development and, in turn, feel the support of the organization. At the same time, authentic leadership can create a true and supportive atmosphere in the whole team or organization, so that subordinates have a certain degree of improvement in the sense of organizational concern, and the corresponding sense of support is strengthened to a certain extent, so the input of work will be increased accordingly.

Hypothesis 3: Authentic leadership moderate the relationship betweenmulti-inclusive human resource practice andperceived organizational support, and the relationship between multi-inclusive human resource practice and perceived organizational support is stronger when authentic leadershipis at a high level.

4 The Construction of a Research Model
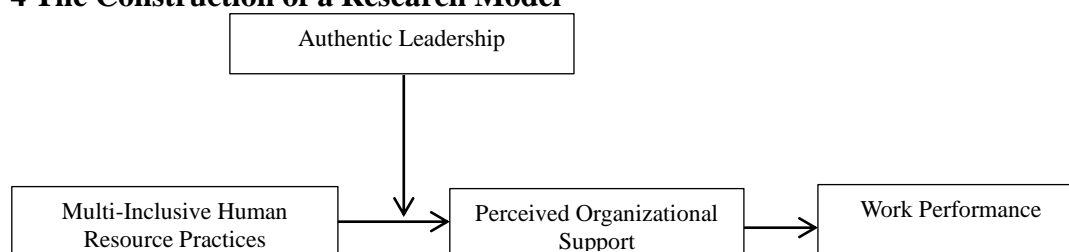
Figure 1   The Concept of FullRelationship Model

5 Conclusion

This study reveals the mechanism and boundary conditions for the positive impact of multi-inclusivehuman resource practices on employee work performance.Specifically, multi-inclusive human resources practices can improve employees' perceived organizational support and further enhance their job performance.Although the above-mentioned mediation mechanism is particularly important, the role of authentic leadership leaders cannot be ignored.Employees'perceived organizational support and work performance are influenced by and interacted with multi-inclusive human resource practices and authenticleadership.Under the guidance of high-level authentic leadership, multi-inclusive human resource practices have a stronger influence onperceived organizational support and employee job performance. At the same time, the mediating role of perceivedorganizational support is stronger.Therefore, this does not mean that good human resource management practices will certainly stimulate employees' perceived organizational support and enhance their job performance.Good human resource management practices also need to match the appropriate leadership style, and the two

complement each other.These findings not only connected for the first time the research field of multi-inclusive human resource practices, authenticleadership and perceived organizational support, and employee work performance, but also made theoretical contributions to them.

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The Effect of Perceived Internal Corporate Social Responsibility on Employees' Constructive Deviant Behavior: A Review of Literature

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Abstract: Currently there are various empirical research on destructive deviant behavior that dwells on behaviors that threaten the well -being of an organization and its members. Despite researcher's attention on this part, constructive deviant behavior which plays a significant part in creating positive organizational change has not yet been well investigated. To fill this gap, this review paper proposes a conceptual framework which portrays predictor, mediator and moderator of constructive deviance behavior in an organization. Several sources were utilized for identifying literature relevant for this particular study. These included numerous sources like Google Scholar, web of science hub, Ebscohost, Emerald Insight, JESTOR, Sage Journal online, Science Direct, Springer, Taylor and Francis online, Wiley-Blackwell, Directory of online Journal (DOAJ) and Social Sciences Citation Index. Besides, manual searches in a number of academic journals have been conducted. In framing the conceptual model, researchers depend on social exchange theory.
Key words: Constructive deviant behavior; Destructive deviant behavior; Perceived organizational support; Internal corporate social responsibility; Social exchange theory.

1 Introduction

Constructive deviance is defined by Galperin (Galperin, 2002) as intentional behavior that disregards significant organizational norms and consequently adds to the wellbeing of an organization, its members, or both. Different past researches in constructive deviant behavior stated that positive organizational change can be accomplished as a function of it (Galperin & Burke, 2006; Vadera, Pratt, & Mishra, 2013).

Internal corporate social responsibility is fundamentally concerned with internal organizational activities of management toward the welfare of employees beyond the strategic and legal bounds of organization (Low & others, 2016). Besides, Turker (Turker, 2009a) suggested the internal corporate social responsibility as a psychological endowment for the workplace. The level of HR practices as internal CSR allows employees to perceive the organizational support and respect the organization. Along these lines, the results of the study by Rasool & Rajput (Rasool & Rajput, 2017) suggest that practicing internal CSR can induce the positive attitude and behavior among employees for the management. Observing the significance of internal corporate social responsibility, various studies (Glavas & Kelley, 2014; Glavas, 2016; Newman, Nielsen, & Miao, 2015) have endeavored to explore the micro CSR in connection to internal corporate social responsibility and explored how the corporate social responsibility affects employee attitudes and behaviors (Rupp & Mallory, 2015). Nevertheless, most of these studies do not investigate the relationship of employees' perceptions of internal CSR on constructive deviant behavior of employees. Hence, this review paper endeavors to construct perceived internal corporate social responsibility as a predictor of constructive deviant behavior under the lens of social exchange theory.

2 Internal Corporate Social Responsibility and Perceived Organizational Support and Constructive Deviant Behavior

2.1 Internal corporate social responsibility and perceived organizational support

Internal CSR fulfills the psychological needs of employees within the organization (Aguilera, Rupp, Williams, & Ganapathi, 2007). Rhoades & Eisenberger (Rhoades & Eisenberger, 2002) contended that perceived organizational support rises up out of internal CSR practices. Perceived organizational support is the result of organizational activities toward employees. Workers assess the perceived organizational support against the care of organization shown for employees (Rasool & Rajput, 2017). Employees who find high levels of perceived organizational support response through positive conduct, which enables the organizations meet their goals and achieve set targets (Eisenberger, Huntington, Hutchison, & Sowa, 1986).

Workers distinguish the perceived organizational support through the regard and care they get from

the organization (Krishnan & Mary, 2012). (Eisenberger et al. 1986) recommend that a firm ś various approaches to treating their HR impact worker perception of perceived organizational support. Further, Rhoades, Eisenberger, & Armeli (2001) argue that "perceived organizational support is reinforced by favorable work experience that employees believe reflect voluntary and purposeful decisions made by the organization". Along these lines, it is especially the discretionary character of internal corporate social responsibility (ICSR) that may flag the company's watch over their employees' well-being, thus expanding their perceived orgizational support (Kroh, 2014).

According to (Turker, 2009b), the internal CSR is connected with a physiologically and psychologically endowed working environment. Today, employees are more intrigued to comprehend the role of internal CSR for their own particular welfare and interest rather than for society and external stakeholders (Abd-Elmotaleb, Saha, & Hamouda, 2015). The social exchange theory portrays that people respond in view of what they get, and employee perception of internal CSR declares about how much an employer cares about the employee. Perceived organizational support is a key precursor of employee attitude in the social exchange theory and gets the immediate impact of internal CSR (Glavas & Kelley, 2014). In view of the above argument, we propose that internal corporate social responsibility practice that address employees demand beyond the legal requirement fosters perceived organizational support.

2.2 Perceived organizational support and constructive deviant behavior

Perceived organizational support refers to employees' "global beliefs concerning the extent to which the organization values their contributions and cares about their well-being" (Eisenberger et al., 1986). Eisenberger, Fasolo, & Davis-LaMastro (Eisenberger, Fasolo, & Davis-LaMastro, 1990) recommended that employee's perception of organizational support may play a vital role in determining work attitude benefiting the organization. The more the employees perceived being supported by their organizations the more probable they participate in constructive deviance (Chen, Eisenberger, Johnson, Sucharski, & Aselage, 2009; Farmer, Tierney, & Kung-Mcintyre, 2003).

Moreover, research by Christian & Ellis (Christian & Ellis, 2011) demonstrates that perceived organizational support plays a significant role in explaining the likelihood of employees to engage in constructive deviance. In a similar vein, Eisenberger et al. (Eisenberger et al., 1990) proposed that constructive deviance may be strongly influenced by perceived organizational support. According to social exchange theory, perceived organizational support reciprocates the positive outcome behavior.

2.3 Internal corporate social responsibility and constructive deviant behavior

The review of the previous research on the connection between CSR and employee internal (intrinsic) motivation demonstrated that there is a positive relationship between CSR initiatives embraced by the organization and its employee satisfaction, self image, teamwork, loyalty, retention, trust, psychological need of belongingness, employee morale and commitment (Aguilera et al., 2007; Viswesvaran, Deshpande, & Milman, 1998).

More about this, Skudiene & Auruskeviciene (Skudiene & Auruskeviciene, 2012) Confirmed that internal and external CSR activities positively correlate with internal (intrinsic employee motivation. Explaing further, Skudiene & Auruskeviciene (Skudiene & Auruskeviciene, 2012) pinpointed that intenal CSR was found strongly related to internal (internsic) employee motivation than all the external CSR dimensions. Intrinsic motivation refers to a drive to become involved a particular task because it is inherently interesting or enjoyable (Ryan & Deci, 2000). Studies invoking an intrinsic motivation mechanism argue that individuals are likely to engage in constructive deviance as they take risks, explore new cognitive pathways, and are playful with ideas and materials (Oldham & Cummings, 1996). In this paper, we argue that internal corporate social responsibility practice increases constructive deviance by means of uplifting employee internal (intrinsic) motivation.

3 Corporate Hypocrisy as A Potential Moderator

Corporate hypocrisy is a stakeholder's belief that a firm has failed to deliver on its promises (Wagner, Lutz, & Weitz, 2009). Up until this point, the literature has concentrated on the misalignment between words and deeds of organizations. That is, when firms say something different in their CSR policies and communications than they actually implement. This word-deed mismatch then evokes perceptions of hypocrisy (Wagner et al., 2009). Scheidler, Edinger-Schons, Spanjol, & Wieseke (2018) accentuated that a deed-deed jumble is by a wide margin harming to an organization. That is, hypocrisy perceptions among employees may likewise emerge when companies practice what they preach in one CSR dimension, but do so less in others (Scheidler et al., 2018). Without a doubt corporate hypocrisy

happens when a company demonstrates concern for the wellbeing of individuals outside of organizational boundaries (via external corporate social responsibility (ECSR) engagement) but not within. External corporate social responsibility activities (ECSR) are directed at societal or environmental causes and primarily benefit external stakeholders (Brammer, Millington, & Rayton, 2007). On the other hand, internal CSR activities (ICSR) are those CSR investments that are directed at enhancing employees' physical and psychological working environment (Turker, 2009).

In view of the knowledge from Jones et al. (Jones et al., 2018), we incorporate inconsistency in CSR practices that favor external stakeholders as a moderator of CSR impacts. To summarize, we suggest that CSR strategies with larger levels of external corporate social responsibility activities (ECSR) contrasted with internal corporate social responsibility activities (ICSR) summon corporate hypocrisy perceptions and the subsequent perception negatively moderate the association between internal CSR pratcice and perceived organizational support.

4 Methodology

Several sources were used for distinguishing written works pertinent for this specific study. Various electronic databases accessible at our university's library such as EBSCOhost, Web of Science, Science Direct, Wiley online library, ABI/Inform Global, and Nature were utilized to scan for supporting materials and resources. In addition, different sources like Google Scholar, Emerald Insight, JESTOR, Sage Journal online, Springer, Taylor and Francis online, Wiley-Blackwell, Directory of online Journal (DOAJ) and Social Sciences Citation Index were investigated. Moreover, manual searches in a number of high profile academic journals have been conducted. The keywords used for this inquiry were constructive deviant behavior; destructive deviant behavior; perceived organizational support; internal corporate social responsibility; and social exchange theory. To mention some of the top journals where by manual search conducted; Academy of Management annals, Academy of Management journals, Academy of Management learning and education, Academy of Management Perspective, Academy of Management Review, the Journal of Organizational Behavior, the Journal of Vocational Behavior, Organizational Behavior and Human Decision Processes, and Personnel Psychology.

5 Conceptual Model Development

Relaying on the above discourse, a conceptual framework is developed to demonstrate the connection between internal corporate social responsibility and constructive deviant behavior using corporate hypocrisy and perceived organizational support as moderator and mediator respectively. To put in a nutshell, we at present do not have a sufficient comprehension of whether and how internal CSR affects employee's constructive deviant behavior and, the mediation and moderation effect in this relationship. We therefore, proposed the accompanying conceptual model (figure 1)
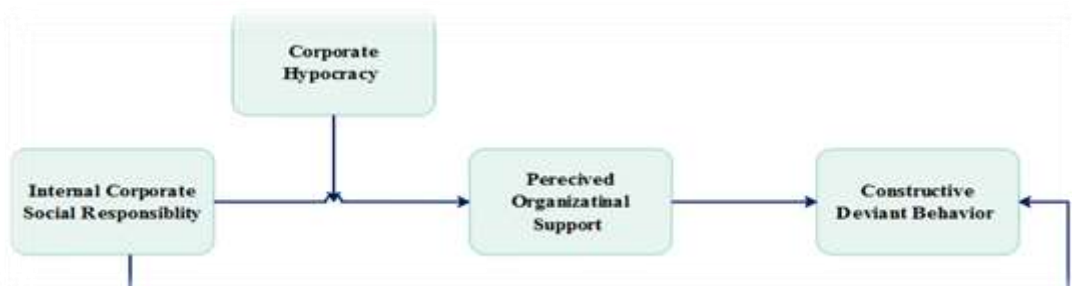
Figure 1   The Direct and Indirect Effect of Internal Corporate Social Responsiblity on Employee's Constructive Deviant Behavior

Based on the aforementioned literature review and our conceptual model, the following propositions are framed for future investigations:

a) Internal corporate social responsibility practices are positively related to perceived organizational support

b) Internal corporate social responsibility practices are positively related to constructive deviant behavior

c) Perceived organizational support is positively related to constructive deviant behavior

d) The relationship between internal corporate social responsibility and constructive deviant

behavior is mediated by perceived organizational support

　　e) Corporate hypocrisy negatively moderates the association between internal CSR practice and perceived organizational support

6 Conclusion

　　This study intends to examine how internal corporate social responsibility practice helps an organization to foster constructive deviant behavior in the workplace. To the best of our insight, no previous study has investigated the link between internal corporate socially responsible practice and constructive deviant behavior of employees. Being the first of its type, this study tries to add to the existing HRM literature by developing a theoretical understanding of the effects of internal corporate social responsibly practices on fostering constructive deviant behavior at work. In order to explain the conections of the variables in the proposed model, the writers relies on social exchange theory. To this end, a conceptual model is developed as a foundation for further investigation of this uncharted territory. Despite the fact that the connection between internal CSR and constructive deviant behavior has been developed in this conceptual model, it has some limitation. First, it ought to be tried to see whether it is valid or not. Second, different elements (factors) that influence constructive deviant behavior need also to be explored. These limitations besides constitute direction for future research.

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Research on Compensation Mechanism of Rural Human Capital Gap from the Perspective of Targeted Poverty Alleviation through Entrepreneurship

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Abstract: Based on the theory of rural human capital and targeted poverty alleviation through entrepreneurship, this paper, aiming at the situation of human capital deficiency, attempts to put forward the hypothesis of the compensation mechanism of rural human capital gap in the view of targeted poverty alleviation through entrepreneurship, analyze the influence path that the mode of entrepreneurial poverty alleviation exerts on rural human capital gap and measure the influence through empirical research to reveal the compensation mechanism of rural human capital gap from the perspective of targeted poverty alleviation through entrepreneurship, thus provides policy suggestions for improving the compensation mechanism of rural human capital gap.

Key words: Targeted poverty alleviation through entrepreneurship; Human capital; Compensation mechanism

1 Introduction

In the context of knowledge-based economy and information society nowadays, human capital has extraordinary significance for poverty alleviation in developing countries and backward areas. China is a great agricultural country. In China's poor rural areas, low-level human capital and human capital gap are considered to be one of the main factors leading to poverty (PengChunning, 2016). Most of the young and middle-aged laborers with relatively higher education and skills in rural areas have turned to looking for jobs in urban cities instead of doing farm work at home. Most of the rural students have migrated to cities and developed regions through attending colleges. This migration will inevitably lead to the outflow of human capital and decline of the overall quality of human capital in poor rural areas, which will ultimately affect the long-term development of rural economy and agricultural modernization, thereby aggravating rural poverty (Tobias et al, 2013; Tatiana A. Thieme, 2015).

Although unremitting efforts have been made by the government in the past few decades, poverty is still a common rural phenomenon in China. Since traditional methods of poverty alleviation such as national policies, cash grants and charitable causes lack corresponding profit-driven mechanisms to attract peasant-workers and rural college students to participate in rural economic development, it is difficult to effectively solve the poverty problem caused by the lack of rural human capital. Under this background, targeted poverty alleviation through entrepreneurship can break through the limitations of traditional methods of poverty alleviation, encourage migrant workers and college students to return to their hometowns, and help to eliminate rural mental poverty and poverty caused by skill deficiency (Cho et al, 2016). In terms of the existing research results, scholars have carried out a relatively comprehensive study on the concepts, modes and mechanisms of targeted poverty alleviation through entrepreneurship, as well as human capital theory and basic characteristics (Usman, A. S, Tasmin, R , 2015; Yan Ya et al, 2013), but little research has combined targeted poverty alleviation through entrepreneurship with rural human capital gap, and little research has analyzed rural human capital gap from the perspective of targeted poverty alleviation through entrepreneurship; or the methods of previous research are mainly based on qualitative analysis, and lack of more rigorous empirical research to explore the mechanism of influence between targeted poverty alleviation through entrepreneurship and rural human capital (Asaju K, 2012). Therefore, how to compensate for rural human capital gap by means of the mode of entrepreneurial poverty alleviation according to the situation of rural human capital deficiency has not yet been effectively solved. Based on this, this paper, aiming at the situation of human capital deficiency, attempts to reveal the compensation mechanism of rural human capital gap in the view of targeted poverty alleviation through entrepreneurship, so as to establish an effective compensation mechanism to compensate for the poverty caused by the human capital gap in rural areas and accelerate the building of a moderately prosperous society in rural areas as well as enhance coordinated development between urban and rural areas.

2 Theoretical Bases and Research Hypothesis

2.1 The mode of entrepreneurial poverty alleviation and rural human capital

According to the theory of human capital, the biggest obstacle to the development of rural poverty-stricken areas comes from the shortage of human capital. Li Shan, Wang Xiaodongand other scholars believe that targeted poverty alleviation is surely conducive to the cultivation and accumulation of human capital in poverty-stricken counties. Under the background of "mass entrepreneurship and innovation", poverty alleviation has achieved remarkable results through entrepreneurship. Mostly, local governments act as the lead and lift farmers in poverty-stricken areas out of poverty through poverty alleviation modes such as science and technology, industry and tourism development, which effectively compensates for rural human capital gaps in education, training, medical care, and population migration. Specifically, the poverty alleviation modes not only help impoverished people break away from poverty by increasing their per capita income, but also promote the construction of rural health care, medical care and other infrastructure; furthermore, they can improve the education conditions as well as education level of rural impoverished population, and improve the skills and overall quality of the poor by increasing practical agricultural technical training, vocational education training, and skill training targeted to the young in poor areas. Based on the above analysis, this study proposes the following hypothesis:

H1: Targeted poverty alleviation through entrepreneurship has prominent positive influence on the compensation for rural human capital gap.

2.2 Entrepreneurial intention

According to the empirical research on targeted poverty alleviation in poverty-stricken areas, Zhong Wangli and Guo Hongdong (Zhong Wangli and Guo Hongdong, 2010) concludes that farmers in underdeveloped areas have more strong entrepreneurial intention than those in developed areas since the former hope to change their backwardness through entrepreneuring.status quo. Entrepreneurial intention is considered to be a key factor affecting the effectiveness of targeted poverty alleviation through entrepreneurship. The poor individuals involved in entrepreneurial poverty alleviation may have different willingness to start a business. Some of them merely hope to maintain their living standards at mean level through entrepreneurial poverty alleviation activities without the expectation for long-term development (Christensen LJ, Parsons H, Fairbourne J, 2010). At the same time, Yadav & Goyal (Yadav & Goyal, 2015) and other scholars believe that the mode of targeted poverty alleviation through entrepreneurship can stimulate farmer' entrepreneurial intention, which will break the traditional ideas of feeling contented with poverty and looking down upon entrepreneuring and then compensate for human capital gap spiritually. Therefore, based on the above analysis, the study puts forward the following hypothesis:

H2: Entrepreneurial intention partially plays an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap.

2.3 Entrepreneurial ability

According to the theory of capability poverty, the most significant factor affecting the relationship between entrepreneurial poverty alleviation and rural human capital compensation is entrepreneurs' entrepreneurial ability. One of the main challenges of rural human capital compensation is entrepreneurial ability that matches entrepreneurial opportunities. At present, the trend of entrepreneurial poverty alleviation indicates the importance of entrepreneurial education and training for increasing entrepreneurial ability such as creativity and innovation (Bradley, 2012).Asan effective factor compensating for rural human capital, entrepreneurial lability can promote and encourage the poor to gain entrepreneurial skills by stimulating their entrepreneurial potential, so as to generate a group of well-trained human resources to meet the needs of poverty alleviation. Therefore, it is necessary for the government to set up relevant mechanisms and modes for entrepreneurial poverty alleviation in order to provide targeted supplements to entrepreneurial capabilities for entrepreneurial farmers, and hence to create more choices and solutions to the improvement of the overall human capital gap in rural areas. From the above, this study proposes the following hypothesis:

H3: Entrepreneurial ability partially plays an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap.

2.4 Entrepreneurial resources

Based on the factor endowment theory, promoting the compensation for rural human capital gap

requires the support from entrepreneurial resources and favorable factors at the time of promoting entrepreneurial poverty alleviation. On the one hand it needs the support from the entrepreneurs' own resources such as friends and family; on the other hand, it also needs the support from external resources such as government and non-governmental organizations, educational institutions and other private institutions(Jiang Jianyong, Qian Wenrong, Guo Hongdong, 2013). A sound mechanism of entrepreneurial poverty alleviation can not only accelerate poverty alleviation, but also create positive social impact. Entrepreneurs can build a better sense of social cognition and social responsibility; furthermore, they may also be more inclined to start a business on the basis of self-confidence. Namely, the enrichment of entrepreneurial resources can enhance the entrepreneurial intention of people in poverty-stricken areas (Santos FM, 2012). The main body of entrepreneurial poverty alleviation is the poor, but the poor people are extremely short of start-up and working capital essential for entrepreneurship, and need to obtain capital through microfinance and other means. Therefore, above all, this study proposes the following hypothesis:

H4: Entrepreneurial resources partially play an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap.

According to the theoretical basis and research hypothesis above, this paper builds a conceptual model, as shown in Figure 1. It links entrepreneurial poverty alleviation, rural human capital, entrepreneurial intention, entrepreneurial ability, and entrepreneurial resources together to explain how entrepreneurial poverty alleviation compensates for rural human capital through its implementation mode and how entrepreneurial intention, entrepreneurial ability and entrepreneurial resources play their roles in this process.
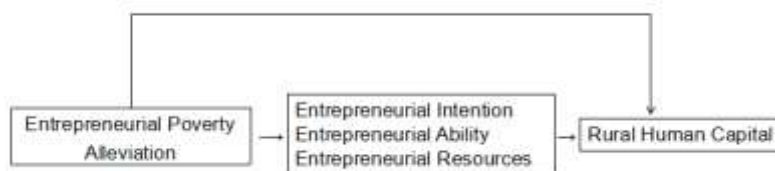
Figure 1   Conceptual Model

3 Research Design

3.1 Research sample

This study takes the peasant households involved in entrepreneurial poverty alleviation in the poverty-stricken counties of Hubei Province as the object, and adopts random sampling method to hand out questionnaires in LuoTian, Qichun and Ying Shan County (three national key poverty-stricken counties in Huanggang City, Hubei Province). To ensure the accuracy of the survey results, the entrepreneurial farmers and peasant entrepreneurs should be taught how to fill out the questionnaires and be interviewed in depth in the process of issuing them. When selecting subjects of the survey, we try to cover the entrepreneurial farmers who are engaged in the first, second, third industry or integrated industrial development as much as possible to ensure more convincing and accurate results of this survey. The survey has distributed 180 questionnaires to entrepreneurial farmers in Huanggang City and collected 148 copies 138 of which are valid questionnaires. The recovery rate and effective rate of the questionnaires are 82.2% and 93.2%respectively.

3.2 Variable measurement

This study primarily adopts the scale put forward by Faliang Y U, Chen L (Faliang Y U, Chen L, 2013) to measure entrepreneurship poverty alleviation and adds elements of Chinese context to it. The scale consists of 5 question items each of which is scored by 7 points, and is evaluated by the entrepreneurial farmers. The reliability coefficient (Cronbach α) of the scale is 0.794, which indicates its good reliability. To measure entrepreneurial intention, the study adopts the scale of Martin Obschonka et al and Francisco Linan et al and selects the dimensions of belief control and exemplary role model, which is also assessed by entrepreneurial farmers. The scale consists of 4 questions, and its reliability coefficient is 0.789. In terms of entrepreneurial ability, the entrepreneurship scale developed by Thomas W.Y. Man et al (Thomas W.Y. Man et al, 2002) is adopted. Consisting of four items with a reliability coefficient of 0.782, the scale can measure the abilities including opportunity identification, social relations and resource integration. Entrepreneurial resources are measured by the scale designed by Martin Obschonka et al (Martin Obschonka et al, 2012) which takes the characteristics of

entrepreneurial farmers into consideration and then selects three dimensions of financial resources, human resources and social resources. The scale includes four items and its reliability coefficient is 0.782. Lastly, to measure human capital, the study employs the definition of rural human capital and the scale put forward by Asaju K (Asaju K, 2012) which includes seven items in the three dimensions of education and training, health care, and population migration, with the reliability coefficient of 0.798.

Previous studies have shown that age, gender, education and entrepreneurial time may affect entrepreneurial poverty alleviation, entrepreneurial intention, ability, and resources. Therefore, this study takes age, gender, education, and entrepreneurial time as control variables separately.

4 Hypothesis Testing Results
4.1 Descriptive statistical analysis

Table 1 summarizes the mean, standard deviation, and correlation coefficient of the variables. From it, we can conclude that the entrepreneurial poverty alleviation and entrepreneurial intention (r=0.478, p<0.01), entrepreneurial ability (r=0.496, p<0.01), entrepreneurial resources (r=0.398, p<0.01) rural human capital (r=0.435, p<0.01) show a significant positive correlation. Also, entrepreneurial intention (r=0.513, p<0.01), entrepreneurial ability (r=0.349, p<0.01), and entrepreneurial resources (r=0.499, p<0.01) are significantly positive correlated with rural human capital. In addition, there is no significant correlation between gender (r=0.114), age (r=0.123), entrepreneurial time (r=-0.134) and the mode of entrepreneurial poverty alleviation, which indicates the modes of entrepreneurial poverty alleviation that entrepreneurs of different genders, ages, and entrepreneurial time choose are of little difference.

Table 1 Mean, Standard Deviation and Correlation of Major Variables

Variable	Mean	Standard Deviation	CM	CY	CZ	CN	NR	Gender	Age	Edu	Year
CM	4.9957	1.14840	1								
CY	5.5652	.96838	.478**	1							
CZ	4.8424	1.23146	.496**	.327**	1						
CN	5.1667	1.10462	.398**	.456**	.471**	1					
NR	6.8853	1.06363	.435**	.513**	.349**	.499**	1				
Gender	1.36	.480	.114	.071	.142	.018	-.003	1			
Age	2.41	.893	.123	.130	.044	.070	.060	-.083	1		
Edu	3.30	1.343	-.168*	-.034	-.131	-.134	-.128	.024	-.499**	1	
Year	2.16	.785	-.134	-.094	-.091	-.029	-.077	-.093	-.020	.120	1

4.2 Hypothesis verification

To verify the hypothesis, we adopt the method of hierarchical regression to measure: (1) the impact on the intermediary variables (entrepreneurial intention, entrepreneurial ability and entrepreneurial resources): we introduce control variables, and then measure the impact of independent variables (the mode of entrepreneurial poverty alleviation). (2) The verification of mediate effects: we introduce control variables, and then measure the influential effects of independent variables (the mode of entrepreneurial poverty alleviation). Lastly, we introduce intermediary variables (entrepreneurial intention, entrepreneurial ability, and entrepreneurial resources). The results of the hierarchical regression analysis are listed in Table 2.

Table 2 Results of Regression Statistics

Variable	CY	CN	CZ	NR			
				Model 1	Model 2	Model 3	Model 4
Control Variable							
Gender	0.024	-0.027	0.086	-0.054	-0.064	-0.043	-0.070
Age	0.120	-0.048	-0.007	-0.036	-0.085	-0.017	-0.035
Edu	0.114	-0.054	-0.106	-0.068	-0.115	0.047	-0.048
Year	0.033	0.130	-0169	-0.013	0.000	-0.037	0.045
Independent Variable							
CM	0.479***	0.395***	0.473***	0.434***	0.238**	0.281***	0.345***

Continual Table 2

Variable	CY	CN	CZ	NR			
				Model 1	Model 2	Model 3	Model 4
Intermediary Variable							
CY					0.411^{***}		
CN						0.388^{***}	
CZ							0.189^{+}
Results							
R^2	0.244	0.178	0.283	0.196	0.324	0.320	0.222
AdjustedR^2	0.215	0.147	0.256	0.166	0.293	0.289	0.186
ΔR^2	0.244	0.178	0.283	0.196	0.048	0.018	0.087
F-value	8.498^{***}	5.731^{***}	10.414^{***}	6.445^{***}	10.459^{**}	10.280^{**}	6.221^{***}

Note: + indicates significant at $p \leq 0.1$; ** indicates significant at $p \leq 0.01$; *** indicates significant at $P \leq 0.001$

From the results shown in Table 2, it can be concluded that the mode of entrepreneurial poverty alleviationhas a significant positive impact on rural human capital ($\beta=0.434$, $p<0.01$), which verifies hypothesis 1. At the same time, after the variables of entrepreneurial intention (CY), entrepreneurial ability (CN)and entrepreneurial resources (CZ) are added, the standardized coefficient of the impact that entrepreneurial poverty alleviation (CM) exerts on rural human capital (NR) declines; namely, the positive impact declines thatthemode of entrepreneurial poverty alleviation (CM) has on rural human capital (NR). Or in other words, entrepreneurial intention, entrepreneurial ability and entrepreneurial resources each partially plays an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap. Therefore, hypothesis 2, 3, and 4 are all verified. Based on the above results, we can come to a conclusion that targeted poverty alleviation through entrepreneurship has prominent positive influence on the compensation for rural human capital gap, and that entrepreneurial intention, entrepreneurial ability and entrepreneurial resources each partially plays an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap.

5 Conclusion

Taking peasant households who participate in entrepreneurial poverty alleviation as the object, this paper focuses on the compensation mechanism of rural human capital gap in virtue of entrepreneurial poverty alleviation based on the opinions of domestic and foreign scholars, and draws the following conclusions through analysis of empirical data:

(1) The conclusions of this study verify the positive impact of entrepreneurial poverty alleviation on compensation for rural human capital gap. From previous experience of targeted poverty alleviation, the scarcest factor in anti-poverty process in poor rural areas of China is human capital. Compared with those in developed urban areas, people in rural areas generally receive relatively lower-level education with backward ideas. Rural areas possess low stocks of human capital of education and knowledge, and lack capabilities of self-development. Entrepreneurial poverty alleviation focuses on self-development; on the one hand, it stimulates the entrepreneurial enthusiasm of the poor and returned migrant workers through policies and financial support to improve the flow of rural human capital; on the other hand, it helps the poor to enhance their techniques and management skills to increase the stock of rural human capital.

(2)Entrepreneurial intention partially plays an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap. People's ideological concept as the will of survival and developing way has a dynamic positive effect on the compensation for rural human capital gap. At present, the widespread poverty in rural areas of China is not only an economic phenomenon, but also a phenomenon indicating people's backward thoughts and ideas. Due to the poor regional information, the poor have long been bound by traditional concepts. With a weak sense of self-development and innovation, they are resistant to high-risk entrepreneurial activities. In this case, the mode of entrepreneurial poverty alleviation can rely on financial support and technical support to stimulate the initiative and entrepreneurial enthusiasm of the poor through, to foster their entrepreneurial intention, and to eliminate the conceptual poverty and mental poverty, thus compensating for the rural human capital gap.

(3) Entrepreneurial resources partially play an intermediary role in the positive influence that targeted poverty alleviation through entrepreneurship exerts on the compensation for rural human capital gap. In the process of this study, it can be found that most farmers participating in entrepreneurial poverty alleviation have strong intention of entrepreneuring. However, most of them say that the biggest problem in the process of entrepreneurial poverty alleviation is lack of sufficient entrepreneurial resources. Guided by the government, entrepreneurial poverty alleviation aims at the impoverished peasant households whose information have been kept on file, and sets up a "petty loan specially for entrepreneurial poverty alleviation" to provide financial support for entrepreneurial farmers, which stimulates the entrepreneurial enthusiasm of the poor, returned migrant workers and college students. As a result, they will turn to engage in the second and third industry, which may compensate for rural human capital gap.

(4) Entrepreneurial ability partially plays an intermediary role in the positive impact of the mode of entrepreneurial poverty alleviation on the rural human capital gap. The young in rural areas are generally at a disadvantage in terms of knowledge structure, skill level and entrepreneurial ability. Entrepreneurial Poverty Alleviation can teach the poor knowledge and technology related to the entrepreneurial industry depending on "Science and Technology Commissioner", "Maker Space", "Internet + Poverty Alleviation" and other modes of poverty alleviation, which improves individual survival and developing capabilities and grades the quality of rural human capital.

Acknowledgement

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Foreign Investment Changes and Regional Differences in China's Hotel Industry

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Abstract: Based on the inter-provincial data of China from 2001 to 2015, this paper systematically analyzed the historical evolution of foreign investment in China's hotel industry since the beginning of the new century from aspects of the number and the operating income of foreign-funded star hotels. Then we studied the regional differences of foreign investment and their trends in the hotel industry. The results show that from 2001 to 2015, the level of foreign investment in China's hotel industry was relatively stable overall, and it has shown a slight decline in recent years. The level of foreign investment in the hotel industry in China's sub-regions demonstrates large regional differences. The number of foreign-funded star hotels and the ratio of the operating income of foreign-funded star hotels to the operating income of the entire hotel industry in the eastern area are much higher than that of the central and western areas. At the same time, the regional differences of foreign investment in China's hotel industry have shown an upward trend as a whole during the sample period, while it has been on a downward trend in recent years.
Key words: Hotel industry; Foreign investment; Historical evolution; Regional differences

1 Introduction

The hotel industry is one of the earliest industries in China to attract foreign investment, and it is also one of the major tourism sectors attracting foreign investment (Zhang et al., 2012). The booming development of China's hotel industry is inseparable from the introduction of foreign investment. In 1982, Beijing Jianguo Hotel cooperated with Hong Kong Peninsula Hotel Group to build the first joint-venture hotel since the founding of new China. The cooperation marks the beginning of the introduction of foreign investment into China's hotel industry. The opening up of the hotel industry introduced advanced management experience and business philosophy to the hotel industry, which promoted the booming development of the hotel industry in China (Hung, 2013). During this period, the consumer demand grew fast, which has driven the rapid expansion of the hotel industry, and the foreign investment scale in the hotel industry has continued to grow in China (Mao & Yang, 2016). Previous literatures mainly focused on studying the location selection of foreign investment in the hotel industry (Yang et al., 2012; Yang et al.,2014; Assaf et al., 2015), ownership structure (Hsu et., 2012; Jiang et al., 2014), determinants of foreign investment flows (Falk, 2016) and foreign investment spillovers in the hotel industry (Mao & Yang, 2016). However, the evolution tendency and regional differences of foreign investment in China's hotel industry have not been given priority to in the existing literatures. Then what is the historical evolution pattern of the foreign investment in China's hotel industry? What are the differences among the three regions in foreign investment in China's hotel industry? What are the reasons for the volatility and spatial differences in foreign investment in China's hotel industry? This paper will answer the above questions in order to clarify the development tack and regional characteristics of the foreign investment in China's hotel industry, and provide support for further research in related fields.

2 The Historical Evolution of Foreign Investment in the Hotel Industry

The completion of China's first joint venture hotel in 1982 marked the beginning of the introduction of foreign investment into China's hotel industry. Shortly afterwards, multinational hotel groups such as Accor, Hilton and Marriott entered the Chinese market(Jiang et al., 2014). Relevant statistics shows that as of 1988, 26 multinational hotels have entered the Chinese market, and they operate and hold the equity of more than 60 hotels in China. With the continuous deepening of reform and opening up, multinational hotel groups have successively settled in areas with high economic level or rich tourism resources in China through franchising and management contracts. The foreign investment in the hotel industry has grown rapidly, and the policy dividend has gradually been released (Wu et al. 1998).

Considering the availability of data, we analyzed the number (NUM), room occupancy rate(ROR),

operating income(OI) and fixed asset(FA) of foreign-funded star hotels in China (see Table 1), in order to clarify the historical evolution of foreign investment in China's hotel industry.

Table 1   The Operation Status of Foreign-funded Star Hotels in China

Year	number(NUM)	room occupancy rate (ROR) (%)	operating income (OI) (in millions yuan)	fixed asset (FA) (in millions yuan)
2001	592	64.40	24887.31	70334.03
2002	686	65.41	26973.19	79100.58
2003	678	56.72	30341.98	75340.07
2004	531	68.39	22726.24	63864.62
2005	570	67.09	25745.29	76419.17
2006	585	66.03	28118.74	81831.01
2007	592	65.61	28481.95	82515.82
2008	561	57.75	25261.34	76080.77
2009	574	53.01	23683.29	77392.86
2010	537	60.75	33442.30	79676.07
2011	492	62.42	33745.94	76893.05
2012	467	59.46	33124.64	77133.17
2013	480	58.07	25847.28	63379.28
2014	442	57.98	29007.59	74831.56
2015	383	56.70	20311.36	57576.89
Mean	563	61.36	27085.06	74012.54

It is to be noted that the raw data in this paper are collected from the Yearbook of China Tourism Statistics and its supplements.

As shown in Table 1, it can be seen that China's entering into the WTO in 2001 promoted the development of foreign investment in China's hotel industry. In 2002, the number and the room occupancy rate of foreign-funded star hotels steadily increased. Comparing it with the data of other years, it can be found that the number of foreign-funded star hotels reached a peak in 2002. In 2003, affected by the SARS virus, the overall decline in the hotel industry in China makes the number of foreign-funded star hotels decrease to 531 in one year. In the meantime, the hotel occupancy rate dropped sharply from 65.41% to 56.72% during SARS. In 2005-2007, due to the rapid development of China's economy, the number of foreign star hotels increased year by year, while the occupancy rate of foreign-funded star hotels did not show a growth trend, and even showed a slight decline. This may be attributed to the rapid expansion of the hotel industry, which has made the supply of hotel rooms exceed the market demand (Falk, 2016).

From 2008 to 2009, influenced by the global financial crisis, some multinational hotel groups withdrew from the Chinese market, which led to a slight decline in the number of foreign-funded star hotels in China. At the same time, owing to the decline in consumer demand in China's domestic hotel industry, the room occupancy rate also fell sharply for the first time since 2003. After 2011, thanks to the improvement of local brand effect, the number of China's domestic chain hotels has soared, and the market share of domestic chain hotels has increased correspondingly. Meanwhile, the slowdown in the growth rate of economy and resident income of China resulted in a continuous decline in the number of foreign-funded star hotels. As a result, the room occupancy rate of foreign-funded star hotels has also slightly declined since 2011.

In the meantime, the operating income of foreign-funded hotels remained in the range of 20 to 35 billion yuan, and the fixed assets remained in the range of 50 to 85 billion yuan during the sample period, which was in a relatively stable state. The trend of the changes in operating income and fixed assets were similar. The three minimum values appeared in 2004, 2009 and 2013 respectively, which means that the changes of operating income and fixed assets are periodic. As a industry with relatively high opening level, the hotel industry is significantly affected by the policies and macro environment. In 2003, the SARS virus' outbreak had a negative impact on the operating income of China's hotel industry. The fixed asset also decreased in the following year. The global financial crisis of 2008 had a direct impact on the operating income of China's foreign-funded star hotels as well. After 2012, China's economic growth rate slowed down and entered into the "new normal" phase, which greatly influenced the

operating income and fixed assets of foreign-funded star hotels in a negative way.

3 The Regional Difference of Foreign Investment in the Hotel Industry

Based on the classification standard of the China Statistical Yearbook and the availability of data, we divided China mainland into three regions: eastern region; central region; west region.
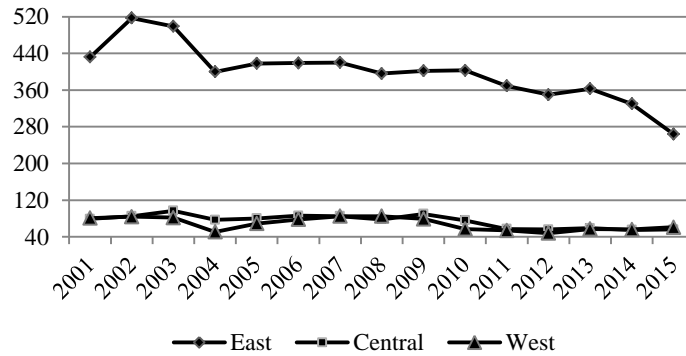
Figure 1   The Number of Foreign Star Hotels in China's Three Major Regions, 2001-2015

Figure 1 depicts the trend of the number of foreign-funded star hotels in China's three major regions from 2001 to 2015. Figure 2 reports the trend of the foreign participation degree in the hotel industry (the ratio of the operating income of foreign-funded star hotels to the total operating income in the hotel industry) in China's three major regions from 2001 to 2015. It can be seen from Figure 1 and Figure 2 that the eastern region is the main area attracting foreign investment in the hotel industry.
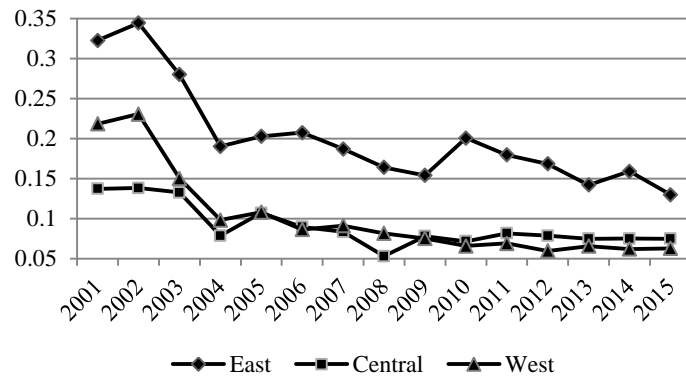
Figure 2   Foreign Participation Degree in the hotel industry of China's Three Major Regions, 2001-2015

The number of foreign-funded star hotels and the degree of foreign participation of the hotel industry in the eastern region are significantly higher than those in the central and western regions. The possible reason is that foreign investors investing in China tend to choose areas with more preferential policies and higher economic development levels so as to reduce the cost of transnational operations and take advantage of the huge market demand (Wei et al., 1999). Contrary to this, the central and western area of China is confined by the relatively low level of economic development, so it is more difficult for them to attract foreign hotels to invest in local hotel industry. According to the Yearbook of China Tourism Statistics (supplement), foreign hotels did not enter the central and western regions until 1985, and the central region did not have the first international hotel (Tianan Holiday Hotel) until 1991. In addition, during most years of the sample period, the number of foreign-funded star hotels and the foreign participation degree of the hotel industry in the central region were slightly higher than those in the western region, which may be attributed to the relatively developed economy in the central region.
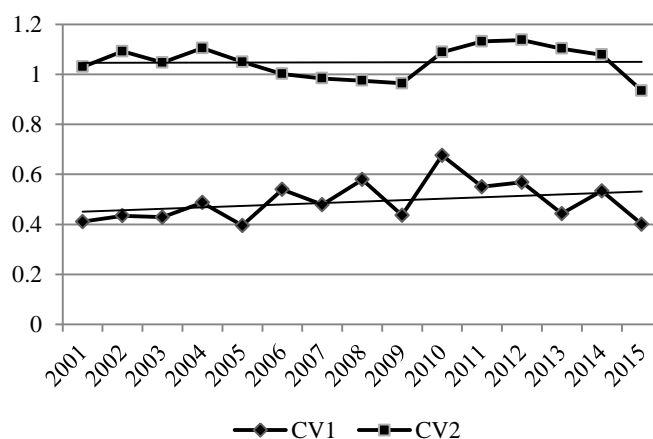
Figure 3   The Changing Trend of Regional Differences in Foreign Investment of China's Hotel Industry

In order to investigate the changing trend of regional disparities of foreign investment in China's hotel industry, we calculated the coefficient of variation of the number of foreign-funded star hotels (CV1) and that of the foreign participation degree in hotel industry (CV2). It can be seen from Figure 3 that during the sample period, the coefficient of variation of the number of China's foreign-funded star hotels showed an overall upward trend. Specifically, from 2001 to 2009, it showed a downward trend; from 2010 to 2012, it showed an upward trend, and from 2013 to 2015, it showed a downward trend again. The coefficient of variation of foreign participation degree in China's hotel industry was also on the rise. Specifically, from 2001 to 2010, it presented a fluctuating upward trend; after 2010, it showed a downward trend year by year. In summary, during the sample period, the regional disparity of foreign investment in China's hotel industry presented an overall upward trend, and there has been a declining trend in recent years.

4 Conclusion

This paper investigated the historical evolution of foreign investment in China's hotel industry since the new century by analyzing the number, the operating income and the fixed assets of foreign-funded star hotels in China from 2001 to 2015. On this basis, we studied the regional differences of foreign investment in the hotel industry, and employed the coefficient of variation to analyze the evolution of regional differences. The conclusions of this paper are as follows: During the sample period, the foreign investment in China's hotel industry remained relatively stable, but the number of foreign-funded hotels presented a declining trend in recent years. China's hotel industry's foreign investment presented large regional heterogeneities. Specifically, the number of foreign-funded star hotels and the foreign participation degree in the hotel industry of the eastern region are significantly higher than the central and western Region. The study on the changing trend of regional differences found that the regional gaps in foreign investment of China's hotel industry were enlarging during the sample period, but have narrowed in recent years.

The policy implications of this paper are as the following: China should fully recognize the importance of foreign investment in the hotel industry to the local economic growth. The government can attract multinational hotels to invest in China by formulating appropriate taxation and subsidies policies. In addtion, the central and western regions should further enhance the foreign investment level of the hotel industry by introducing preferential investment policies, thus gradually narrowing the gaps in foreign investment and economic development level of the hotel industry among the three regions.

It is to be stressed that there is still room to extend the study in this paper. Future studies can consider the provincial differences of foreign investment in the hotel industry. In addition, more methods can be used to analyze the regional differences of foreign investment in the hotel industry.

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The Teaching Standards and Skills of Higher Education Teachers of Business Studies in Brazil: A study of the Teaching Staff in Public and Private Institutions

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Abstract: The general purpose of this study is to understand (from the standpoint of Business Administration teachers in higher education) what is required to have lessons of good quality that provide students with an effective return in terms of learning. A qualitative research methodology was employed which was of an exploratory character and descriptive nature; this involved a bibliographical and documentary analysis, together with in-depth interviews, following the guidelines of a semi-structured study, with twelve teachers who came from both public and private institutions. After the study had been undertaken, it was found that what characterizes a good teacher is that he has have a good grounding in didactics and knowledge of the subject being taught. This involves practical work in the classroom with regard to the subject in question, and preferably based on his own professional experience. The teacher should also know how to make use of new technical resources so that classes can allow the students to take part in a more active way. However, it was also clear that a good class does not only depend on the teacher but also on the willingness of the students to learn and the availability of good teaching material. As well as this, it is essential for the academic staff to be supported by the teaching institutions in both the public and private sector.
Key words: Standards of higher education; Public and private institutions; Business administration course; Teaching skills

1 Introduction

Education in Brazil has been discussed in several areas of knowledge and in different spheres (basic, education, secondary school and higher education). This has given rise to thoughts about both ideal standards and the real standards of education found in the Brazilian educational system. The studies concerning higher education have shown that there are serious *gaps* between the requirements of the market, scientific training and the teaching and institutional activities carried out in the *praxis* (Garonce & Santos, 2012; Gomes & Moraes, 2012; Silva, 2013; Vieira, 2013). As a result, there are losses to the students who seek to have their rights to education ensured and a chance to obtain a better position in the workplace. Globalization and the revolution in information and communications have led to a society that is in constant change and requires changes in the educations system as well (Peng *et al.*, 2014). Modern society expects teaching of a high standard with modern methods and not the concept of education described by (Paulo Freire, 1997) as "banking", in which the teacher leads students to rote memorization of the content they give (Gil, 2009).

Thus, it is important for the teacher to have a solid grounding in the subject that he/she is willing to teach but also, there are other factors that must be taken into account to create a pleasant atmosphere in the classroom. The rapid growth of Teaching Institutions causes a deficiency in the training of these professionals. The structural factors and support for teaching and learning have also been impaired by the contingencies of this new market (large educational groups). They are effects that, in the long term, can lead to the mechanization of teaching and learning, at the expense of critical reflection and production of new knowledge.

For this reason, this article seeks to investigate (from the point of view of teachers involved in Business Administration courses), what is necessary in order to have a quality class, with practical and reflexive techniques that allow emancipation of the student.

2 A Theoretical Framework
2.1 Achieving high standards in higher education

The expansion of higher education in Brazil and in other developing countries has shown some

significant numerical indicators (Gomes & Morais, 2012). However, the rise in numbers in terms of places/enrollments does not give an accurate reflection of the quality of the teaching being provided (Carvalho, 2013). There are objections regarding the capacity of the current teaching and learning models to train professionals to have a reflective/critical stance, as a result of a lack of changes in the school curriculum or a change in discourse with regards to a modernized system for practice (activities) (Saraiva, 2011).

In this context, the higher education institutions have effectively turned into business centers, which conceive, produce and advertise education as a *commodity*. This affects the training standards as a whole and has implications for both students and the rest of society (Saraiva, 2011; Carvalho, 2013). The radical change of the educational sector is one of the consequences of globalization, especially in the emerging markets (Carvalho, 2013). It has arisen because of market planning, social networks, new tools for teaching and learning and the effects of these changes on patterns of human behavior (Castells, 2000; Dowbor, 2001; Freeman, 2005; Simic & Carapic, 2008; Touraine, 2007).

The situation outlined here is embedded in the dual context of theory (thinking) and practice (doing) (Marcelo, 2013; Nassif, Grobril, & Bido, 2007). It concerns new economic paradigms in teaching and the decentralization of scientific reflection in an immediate practical application (Faria & Figueiredo, 2013). This is in response to the changes in the market and the modern application of knowledge and information in the face of operational requirements (technical know-how) (Silva, 2013).

The central feature of ´doing´ (to the detriment of ´knowing`) has caused a breakdown in the process of starting a dialogue (the communicative aspect of education) which is the driving-force behind the continuous flow of teaching and learning (Freire, 1981). As a result, the willingness to share knowledge by building bridges between the educator and the learner (the `I´ and the other) is being replaced by operational mechanisms of immediate application, without any critical reflection (doing) (Hermann, 2014). Thus, the modern critic - whether with regard to education for practice (the market) or reflective education (emancipation) - is introduced into the area concerned with questions regarding the quality of higher education and teaching/learning (creativity, appropriation and the use of skills and knowledge) (Carvalho, 2013).

It is worth stressing that the quality of education (or lack of it) is closely bound up with the advent of ´mass´education in educational systems (Gomes & Moraes, 2012). A good deal of harm is caused to teaching standards by giving prominence to mass education systems. What emerges is a species of half-baked training and undue stress on ´content´which leads to the commodification of education and the insertion of commercial character in educational and cultural training (Silva, 2013) .

For this reason, in a form that is diametrically opposed to this marketing tendency, the quality of higher education is guided by some intrinsic and extrinsic features with regard to the role of the teacher (Garonce & Santos, 2012). However, the quality of teaching can only be revealed by bringing together a set of activities, resources and actors involved. The essential requirements of a school (material resources, technologies, physical conditions and people), the technical domain (theory and practice), the pedagogical scope and environmental areas of interaction (real, virtual, internal or external), are the key features for the development and acquisition of new kinds of knowledge (Nogueira & Bastos, 2012).

According to the MEC (Ministry of Education), the government body responsible for education in the country, the minimum standards of quality are the variety and minimum amounts of essential inputs to the development of the teaching-learning process. This body defines the twelve principles that should be the foundation of education, one of them being the assurance of standard of quality. (Lorenzo and Knop, 2011) understand that to measure the quality of higher education, assessment processes are necessary, such as the one introduced in the 1990s, known as Provão, replaced in 2004 by ENADE (Examination of National Students Performance), with the purpose of measuring the knowledge given to students during their graduation.

(Mainardes and Domingues, 2013) in a survey conducted in Brazil in the IES of Joinville-SC, spoke about the key attributes of the Administration graduation courses which contribute the most for the course to be considered of high quality by students. According to the authors, the environment where the course happens, the quality of disciplines, the learning incentive and student engagement are the elements that define the perception of quality of the Administration course by students.

Some authors like Garance and Santos (2012) and Magalhães, Oliveira and Duarte (2014), claim that the role the teacher plays in the classroom is still regarded as one of the only factors important to have a good higher education. However, it is necessary to categorize the systemic concepts of quality in higher education. The poor working conditions of the teaching staff and the institutional constraints in the availability of physical, technical and didactic resources, among other factors, have caused the

teacher to play the role of an antagonist to ensure success or be regarded as the protagonist who is responsible for the school failings in higher education (Rodriguez, 2008).

It should be stressed that there has been a complete swing of the pendulum from the paradigm of coercion (the authority of the teacher) to the paradigm of the democratized environment with participation in teaching and   learning (by companies, the family, society, class institutions and so on) (Fortaleza, 2007).   This analysis simulates efficiency through integration of the different parts and the dialogue between the academic world and other institutional players in their particular social sector. By itself, it seems to be a transforming force in the academic environment, which acts as a space for plurality, diversity and equitable rights (Hermann, 2014).

However, on a broaden field of vision the legitimizing of democratic educational space offers an opportunity to give flexibility to teaching and learning in the most rudimentary areas of knowledge. This meets the demands of economic groups focused on education or diploma marketization, without any teaching or learning (which are certifiers of knowledge) (Carvalho, 2013).

This implies that the teacher has a unique responsibility for teaching and learning standards. As a result, the following points can be confirmed: a) a dialogic process based on ethical principles for the creation of a shared world (between the teacher and learner) (Hermann, 2014), b) a sense of enthusiasm and commitment on the part of the teacher to carry out more complex teaching activities (Fortaleza, 2007), c) the instrumental and technological interface in the support   for what is known and for what still has to be found (Marcelo, 2013) the attitudes, didactics, relationships, knowledge and experience   the teacher manages to transmit to students (Kühl, Maçaneiro, Cunha, & Cunha, 2013; Veres, Hetesi, & Vilmanyi, 2009), e) also, the media scene which is incorporated in the teaching/learning process (Garonce & Santos, 2012).

However, as mentioned earlier, we should stress the fact that the quality of teaching and learning are supported by a set of institutional, political and economical factors (that go beyond teaching responsibilities), that need to be taken into account when addressing the question of standards in higher education. For Lorenzo and Knop (2011), the quality perceived by the student is related to tangible factors such as library, computer lab, the physical structure of the IES and its appearance. Another factor is the reliability of the preparation to the job market and their involvement in the class. It is important to note that quality is related to the expectations of the student in relation to the institution and teaching. In this regard, the pedagogical teaching resources (Gomes & Moraes, 2012), the policies of concession of vacancies in higher education courses and new forms of marketing of education are evident (Carvalho, 2013).

Hence, when seeking to assess the quality of teaching and learning in higher education, we find that these challenges are related to teaching skills and the quality of the class. This problem is connected to its means and ends by links that isolated produce fragmented results. Attention should be drawn to the theoretical notes that signal that there is a set of ordered activities in every area which are designed to render educational services that can improve the quality of higher education.   Moreover, it should be underlined that this is not the abolition of the responsibilities of the teacher, but the finding of the full completeness of all players that are involved in the educational process of quality.

2.2 Teaching skills

The concepts of skills and abilities are recurrent both in the professional and educational fields (Viera, 2013). The complexity and demands of the business market, linked with globalization, brings out the need to focus on professional skills to obtain a competitive advantage. In this sense, there has been a narrowing of the relationship between knowledge and learning as new factors in the preparation of professionals that are suited to this historic period. In this context, a semantic kinship relation can be inferred between the words *competence* and *competition, which* derive etymologically from the Latin *competere*, which means that when someone wins, another person loses, when they are linked to each other. However, this relationship is the opposite when we are dealing with knowledge because the person who teaches has nothing to lose but on the contrary, renews their knowledge. The words *to compete* and *competence* need to be broadened in the university campuses to "seek with", by endowing the teacher with a pivotal role in the training of qualified and competent professionals (Nassif, Hanashiro & Torres, 2010).

However, what are the attributes that can describe a competent teacher? By describing the strategies needed for the training of teachers, Nassif, Hanashiro and Torres (2010), recommend that the teacher should display the characteristics of an entrepreneur by being flexible with regard to changes and accepting innovations in an investigative and critical spirit, with a capacity to contextualize the reality of the studied situation so that the knowledge can be conveyed. In the view of Viera (2013), the

teacher needs to have the qualities that are analogous to those of a corporate body and be able to work in a team to carry out interdisciplinary projects. This entails having responsibility and autonomy and being able to handle the pupils in an organized way by making use of differentiated and reflexive kinds of pedagogical practices. It also requires making use of technology, ensuring the involvement of students, encouraging them to learn and awakening the desire to conduct research, which requires them to manage the continuous learning process. Perrenoud (2000) categorizes 10 essential teaching skills for each chapter of his book: a) organizing and supervising learning situations; b) following the progress made by the learners; c) conceiving and creating devices for differentiating instructions; d) involving the students in their learning and class work; e) working in teams; f) taking part in the school administration; g) keeping parents informed and involving them in the life of the school; h) making use of new kinds of technology; i) carrying out responsibilities and facing up to the ethical dilemmas that arise in the profession and j) administering their own continuous education.

The need for continuous updating can be put into effect by the use of new kinds of technology for teaching, producing more teaching material in every area and overcoming the problem of a lack of empirical experience on the part of the students of Business Administration. This way, the use of current case studies must be linked to practices that can create discussion among groups of students and ensure interaction in the classroom (Sobrinho, Pinto, & Disidério, 2014).

However, broadening the range of the subjects and discussion is not always desirable for the students unless they are aware that the teacher is knowledgeable and able to convey what he/she knows (Sobrinho, Pinto, & Disidério, 2014; Viera, 2013). The knowledge of the teacher is put to test by the pupils who have a wide range of technological apparatus available to hold the teacher to account. In is here that the competence required by the teacher plays a role, as it involves his capacity to find matters of interest that can attract the students (Sobrinho, Pinto & Disidério, 2014).

Magalhães and Patrus (2013) state that there is no single way of characterizing what a good teacher is but rather, there are different types of good teachers that fit different student profiles. Despite this, the authors have attempted to characterize Business Administration teachers by providing a summarized model with three dimensions. Two of these dimensions are adapted here, as illustrated in Table 1.

Table 1   Dimensions and Categories for Analyzing What Constitutes a Good Teacher

Dimensions	Categories
1) **Training**	a) Academic training;
	b) Knowledge and
	c) Experience
2) **Didactics and Personality**	a) Planning;
	b) Execution;
	c) Teaching strategies;
	d) Assessment techniques and
	e) Relationship with the students

Source: drawn up by the authors on the basis of Magalhães & Patrus (2013)

It should be stressed that Table 1 only shows the dimensions that depend on the teacher but in practice, we know that the question of whether or not one is regarded as a good teacher also depends on a number of external factors. These include the availability of suitable educational resources, technical support, training in the use of new forms of technology in the classroom and the way the course coordinators and managers of higher education institutions view the students and their complaints regarding teachers. Some teaching institutions regard their pupils as clients in which everything is possible if they complain, whereas others believe that the students are both clients and a product too, since the students educated in the school will pass on their opinions outside the school, if they think they have not been taught in an appropriate way. This risks affecting the reputation of the school and hence influencing the standards of new students who will seek to enroll in courses in the future (Carvalho, 2013).

(To Viera, 2013), Nassif, (Hanashiro and Torre, 2010), interdisciplinarity is an essential feature of teaching as a result of globalization and the combining of common areas, which ensures that knowledge can be integrated in the interests of research. If knowledge is consolidated rather than being broken up into separate subjects, students will have greater independence and will be able to reflect on empirical questions in general terms, by broadening their critical awareness of events and adapting their learning to their personal experiences (Nassif, Hanashiro, & Torres, 2010).

Some universities fail to recognize the value of teaching skills as a competitive differential and

only make an assessment of a teacher´s career, their requirements and their ability to convey knowledge, since they are simply concerned with professional qualifications to meet the needs of the job market. But giving a good lesson does not only consist of preparing the students well or having the necessary knowledge or practice and being able to master the subject; competence involves having will and power. A determination to teach combined with the power of transmiting knowledge are the intrinsic features required before a teacher can be regarded as competent (Nassif, Hanashiro, & Torres, 2010; Viera, 2013).

3 Methodology

The general aim of this study is to understand (from the point of view of a teacher of Business Administration courses) what is necessary in order to have a quality class with an effective return in terms of learning for the students. For this work, we decided to conduct a qualitative research with an exploratory character and descriptive nature. This choice of a qualitative approach was due to the wide diversity and plurality involved in the conceptualization of the teaching skills and characteristics of a good class. (Godoi e Balsini, 2010) claim that the qualitative work allows an understanding of the agents involved, not seeking for regularity, but the motivations for their actions. (Creswell, 2014) states that the main purpose of conducting qualitative research is to attempt to understand a particular social situation.

Because of the gaps in the literature on this subject and the need to understand what happens in the classroom in the applied social sciences courses of higher education, the study adopted a descriptive approach (Alves-Mazzotti & Gewandsznajder, 1999). In addition, Triviños (1987, p. 110) states that descriptive studies "[...] aim to deepen the description of a particular reality".

The procedure adopted was to conduct a field research in order to empirically investigate the phenomena in the place of its occurrence and to demarcate the features requiring explanation (Vergara, 2007).

Primary and secondary sources were taken into account for the data collection. The primary data were obtained by means of in-depth interviews with twelve teachers doing a degree course in Business Administration, six of whom attended State universities and six were at private universities. The sample comprised seven women and five men with ages ranging from 29 to 53. They had an average of 14 years working in the area of teaching – two of them had PhDs, nine had a Master´s degree and one was doing a Master´s degree course. The data collected together with the main people involved were essential for interpreting the phenomenon.

A semi-structured interview schedule was employed to guide the research within the subject in hand and this provided the interviewees with a degree of flexibility in their answers in a way that allowed new questions to be asked and an interpretation to be made of the research findings. Since it entailed conducting research of a qualitative nature, at the outset there was no a priori definition of the exact number of interviews (Godoi & Mattos, 2010). The decision about the interviewees was defined by the criterion of convenience (Gil, 2002; Vergara, 2007).

The interviews were conducted in August and October 2015, and, on average, lasted for 30 to 40 minutes; they were recorded and transcribed. Secondary data were derived from a bibliographical review which involved carrying out a systematic form of research with published material in books and articles which provided the basis for a theoretical/methodological framework for the study (Vergara, 2007). This material led to further questions that underpinned the interviews.

4 Results

According to the results obtained, the majority of the respondents regarded the didactic method of the teacher and his/her knowledge of the subject as being essential requirements to ensure that the lesson flows in a natural way and to hold the students´ interest. Another factor considered important and brought up by (Kuhl *et al*, 2013) is the teacher's experience on the topic that is being addressed. Reporting of practical situations, particularly those experienced by the teacher, greatly helps the students in their learning. In addition, all the teachers who were interviewed believe that it is also important for the teacher to know the purpose of the subject being taught and which skills need to be developed in the students. Then, the teacher is able to define the strategies he is going to adopt and what resources are needed to teach each lesson.

Apart from the importance of aligning strategies with the students (through language), there are other key factors needed to ensure a good lesson like: appropriate teaching environment (suitable equipment and facilities, classrooms with reasonable numbers of students, good acoustics and teaching

material of high quality), interface between the different subjects and communication between the teachers, as well as a continuous attempt on the part of the teacher to make improvements in didactic and pedagogical areas. Evidence of this was also shown in other studies such as those of Carvalho (2013), Garonce e Santos (2012), Hermann (2014), Nogueira and Bastos (2012) and Nassif, Hanashiro and Torres (2010). With regard to the question of behavior, the research found that teachers must be patient, have emotional control, be persuasive, know how to relate with the students and show commitment and enthusiasm. This corresponds to what has already been described by Magalhães and Patrus (2013) and Viera (2013).

In Table 2 we present a summary of what teachers reported in interviews to be the necessary teaching skills for an adequate administration course, their main challenges and difficulties found.

Table 2   Necessary Skills, Challenges and Main Difficulties for Teachers

Necessary skills for teachers	Challenges	Main difficulties
- Must have domain of the technical knowledge; - Must have good communication; - Must be in continuous update; - Must have commitment with students and institution; - Must have some practical experience regarding the subject they are teaching.	- Carrying out activities in the classroom that relate theory and practice - Organizing events with professionals - Constantly improve the teaching didactics - Being able to attract students attentions to classes	- Low qualifications of new students - Little investment in technology by educational institutions - Lack of resources for the training of docents - Classes with many students, which makes it difficult to learn (some teachers have reported having more than 70 students per class).

Source: drawn up by the authors

It is understood that it is in the dialogical process that the teaching activity and learning occurs. As a result, education is a contextualized communication in a specific sense for each subject (student) or group (class). The story of students ´lives, their experiential and relational knowledge are part of the bulk of the students ´skills and teachers must use them to ensure better results in the educational process.

There was the perception of respondents that the combining of resources (human, technological and structural) is essential to achieve good results when teaching business administration degree courses. These resources can allow higher education to expand but require attention with regard to the question of quality since an increase in offer does not necessarily mean maintaining or improving standards.

At the outset of this study, it was expected that there would be different answers from the teachers in public and private institutions. However, apart from the fact that the classrooms in the private sector had more students, it was found that the problems facing the teaching staff were very similar. All of them complained of the following: that the students had failings that were the outcome of their time in primary and secondary school; that the teachers had to put up with behavioral problems in the classroom; that the students were always consulting the Internet or their mobile phones during the lessons and not paying attention to the subjects being taught by the teacher; that the students were unwilling to study outside their scheduled lessons;   and that there should be a greater recognition of the value of teaching. Some teachers call this the "Google generation", as the students believe that everything is available on the Internet and that there is no need to read or pay attention during the lessons. What is clear, as one of the teachers pointed out, is that learning "is a two-way street: the teacher must be good at teaching and the students must be good at learning...".

All the teachers were unanimous in stating that the new technologies for teaching have an adverse effect (by scattering the students about the classroom), but that they also have a good side: so long as the teachers know how to work with these new teaching platforms, they can make the classes more interesting and encourage the students to be more involved. As one of the teachers interviewed put it:

"The technology can be an aid or a hindrance. Unless we know how to introduce the technology into the classroom, it can end up causing harm because the students will use it to look at other things like WhatsApp, Facebook,..., but on the other hand, you can use it in the classroom to access material on one´s own cell phone device. You can encourage students to use WhatsApp, including for

communicating with the rest of the students in the classroom, but you must set limits, such as having a schedule for when the tool can be used or not ...".

At all events, learning to use these new kinds of technology requires time to be spent by the teachers and financial resources. The teaching institutions are not always willing to give support with regard to this or remunerate the staff for the time devoted to preparing lessons or contacting the students through e-mail, etc outside their working hours.

Another point that was noted is that carrying out effective lessons and obtaining the respect of the students does not only depend on the teachers. It also requires basic facilities being available in the institution and support given to the teachers by their superiors in the school hierarchy on matters such as whether or not to attach importance to complaints made by students about a type of lesson, the marks awarded in assessment tests etc. Some teachers stated that it was difficult to give marks that fail students or to require them to read more. This only confirms the dilemmas some of them face: "the teachers feel they are put under pressure not to have high failure rates ...", "...there is pressure from the institution. If these students begin to fail, they will leave the school and this is in nobody´s interests ...".   In reality, this is a problem that affects some of the private institutions more seriously, because some of the students who are failed switch to other institutions that are competitors in the market. When the school adopts a policy of failing the minimum number of students possible, and said students become aware of this, they tend take advantage of the fact. As Carvalho (2013), and Gomes and Moraes (2012) point out, globalization and mass educational systems impair the quality of teaching.

The public teaching institutions of Brazil are considered the best by students, as they are also the fullest, and they are free. If students decide to go to other private institutions because they have failed in their exams, they will suffer not only in terms of the level of recognition of the diploma but also in financial terms, because they will have to pay for a course in a private institution.The entire set of teachers analyzed said they liked teaching and felt they had a talent for it. This is one of the factors considered important by Magalhães and Petrus (2013) to ensure that a teacher is able to succeed in conveying knowledge. Some of the teachers had previously worked in other professions such as in offices of private companies or consultancies but today are wholly devoted to teaching activities which generally offer a fairly lower salary than what they had earned when carrying out those previous responsibilities.

5 Conclusion

This study has made some notes on the quality of teaching and skills of teaching professionals in the area of Business Administration in Higher Education. The literature addresses issues such as the precarious conditions of teaching, new kinds of technology as magnifiers of teaching activities and the new profile of students, among other factors.

Among this set of features and from the interviews that were conducted, it was clear that didactics and knowledge of the subject are seen as important for the results to be effective in order to stimulate and develop the skills of the students. However, they must be associated with a set of supporting tools, which enhance the results in interactions and improve the quality of teaching activities. In addition, it was clear from the interviews that if the students are unwilling to learn, it is difficult for the teacher to be able to teach effectively. Today, the task of teaching is becoming increasingly more difficult since the students feel tempted to "escape" from the subject of the classes and consult electronic resources, which are easily available. How can a teacher compete with these resources and ensure that their lesson can be more interesting? This is the main challenge of our current world. Some, however, believe that the use of these kinds of technology in lessons can make the students feel more involved and help to achieve better results.

It is a consensus among teachers that the use of new teaching technologies can make classes more dynamic and interesting but at the same time can disrupt the learning process for the students, because it can cause dispersion in class. These new technologies require more time for the teachers to train and also more investment by educational institutions, public or private.

The learning process is a two-way street, as one of the interviewed teachers said, not only the teacher has to be good at teaching, the student also has to be good at learning. In this scenario it is clear that low qualification of students entering the university is one of the main difficulties reported by several teachers. It is recommended that future research projects seek to integrate the attitudes of the teachers and learners and carry out an assessment of the kind of activities that could be of value to each of the categories examined. This could lead to a better understanding of this phenomenon within the

context of interaction.

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A Research on Cross-cultural Adaptation of International Students in Universities of Wuhan

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Abstract: The research for cross-cultural adaptation is of vital importance and has a strong practical value. The empirical research of questionnaires and interviews involves four dimensions, ranging from living, learning, communication to culture. The results show that international students' cross-cultural adaptation is good in general. They show good integration capacity in communication and language environment. But some difficulties still exist, such as: inadaptation to the content and form of teaching, hard to comprehend Chinese culture, unused to accommodation environment etc. Therefore, we propose four specific suggestions for the education and management institutions of international students.
Key words: Cross-cultural adaptation; International students; Universities; Wuhan

1 Introduction

According to the Ministry of Education of the People's Republic of China, half million international students from 204 countries and regions were studying in Chinese universities in 2017. The number of international students is increasing, and China has become the largest studying abroad destination of Asia. The problem of cross-cultural adaptation not only affects the learning and living conditions of international students, but also affects their cognition of China. In addition to the theoretical research, empirical research in colleges and universities are increasingly rich in recent years. But empirical research on international students in Universities of Wuhan is inadequate. Comprehensive analysis about current cross-cultural adaptation is insufficient. Therefore, the problems of international students also affect Wuhan's connection with the world and its image in the world.

Based on the current cross-cultural adaptation theoretical framework, this study focuses on multiple dimensions and takes international students in universities of Wuhan as the research subject. Feasible advice will be put forward for education and management institutions of universities in Wuhan.

2 Literature Review

Cross-cultural adaptation research began in the early 20th century in the United States. American anthropologist Redfield, Ralf Linton and Melville Herskovits put forward the cross-cultural adaptation concept.It refers to the two groups from different cultural background having a lasting and direct cultural contact which causesthe original cultural patterns change. (RedfieldR, LintonR, Herskovits MJ, 1936) After 1980s, the study of cross-cultural adaptation entered the golden age. Berry proposed two-dimension acculturation strategy and four adaptation strategies of cross-cultural adaptation. The two-dimension strategy refers to the attitude and behavior of immigrants on cultural maintenance and host-group relationship. Four different adaptation strategies are assimilation, integration, separation and marginal organization. (BerryJW, 1997)In the 21st century, the research methods of cross-cultural adaptation have become more abundant and the research scope is continually expanding. Most people agree with Ward's view that cross-cultural adaptation can be divided into two dimensions: psychological adaptation and sociocultural adaptation. (WardC, 1996)Psychological adaptation refers to mental health and life satisfaction in cross-cultural contact. Sociocultural adaptation refers to an effective way to adapt to local society and to contact with local social members, based on the measurement of difficulties experienced in local society. This research is carried out on the basis of this theory.

Since the 21st century, researchers of China gradually enriched the study of cross-cultural adaptation. The main content focused on 3 aspects. The first aspect is cross-cultural adaptation theory, construction and tests of cross-cultural adaptation models(Sun J, 2010; Chen G M, Yu T, 2012; Li J, 2016; Peng R Z, Wu W P, 2017) The second aspect is the interaction between mental health and culturalenvironment (Lei W M, 2013; Zhong J B, Gao J, Xie G, 2013; Song F N, Chen X L, 2014; Zhi X, Qian M, 2017) The research focused on foreign groups' change caused by intercultural exchanges from the perspective of anthropology and sociology. The last was mainly about the psychological reaction of foreigners in the new cultural environment and the social integration. The research focused on the changes of individual values, attitudesand behaviors in

different regions. (Zhong G H, Xie AB, Xu M D, 2013; Ya Li, 2017)

3 Data and Methodology
3.1 Subject
The subjects are randomly selected from 7 universities of Wuhan. 90 pieces of questionnaire were issued. 86 of them were recycled and effective. Subjects are undergraduate and graduate students majoring MBA, Art and Design, Computer Science, Materials Science, Civil Engineering, International Economy and Trade and so on. The proportion of sample represents the proportion of subjects.
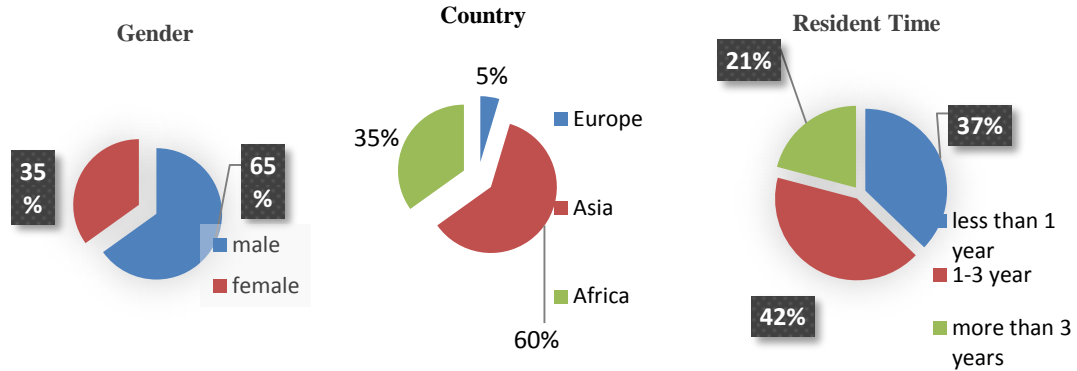
Figure 1   Basic Information of Subject

3.2 Method
3.2.1 Quantitative research
The questionnaire of the research consists of five parts: the first part is the personal information of international students, including gender, nationality, major and resident time in China. The second part is the learning dimension, including the purpose of studying abroad, and the status of activities after class etc. The third part is the communicative dimension, including the frequency of contacting with the Chinese students, the main way to improve Chinese, whether cross-cultural communication barriers can be negotiated, whether nonverbal means can be used and so on. The fourth part is the life dimension, including the evaluation of life, the future employment plan, the source of happiness and so on. The fifth part is the cultural dimension, such as the adaptation of table manners and festivals, the understanding of Chinese long literature, and the identification of core socialist values with Chinese characteristics.

This questionnaire consists of 30 questions, which are graded according to the Lecter Scale from "strongly disagree" to "strongly agree".
3.2.2 Qualitative research
Based on 30 questions of the questionnaire,ten questions are designed to further explain the causes of present cross-cultural adaptation condition.Face-to-face talk, QQ and WeChat are used for interview between researchers and interviewees. The interview involves different habits and customs, social atmosphere, employment plans, scholarshipetc.,which makes up for the inadequacy of the questionnaire.
3.3 Data analysis
The questionnaire data is analyzed by SPSS 18.0. In order to ensure the validity and reliability of the methods and result, quantitative data of questionnaire and qualitative data of interview are analyzed comprehensively.

4 Result and Discussion
4.1The content and teaching form should be reformed.

Table 1   Learning Dimension

Variable factor	Number of sample	Maximum	Minimum	Mean
ic1	86	5	1	2.31
ic2	86	5	1	2.08
ic3	86	5	1	2.15
ic4	86	5	1	1.98

ic1=courses of major is difficult; ic2=knowledge of major is useful;ic3=like the courses of major; ic4=feel satisfied with the teaching level and methods

Table 2　Proposal for Teaching Department

Proposal forTeaching Department	Percentage
Adding more practical knowledge to the courses	26.4%
Organizing more academic activities	11.5%
Improving the level of teaching facilities	5.7%

The mean of ic1, ic2 and ic3 are under 2.5.and It shows the majority of international students feel unsatisfied with the teaching methods and the content of the courses. The highest option ofthe proposal for teaching department is adding more practical knowledge to the course, accounting for 26.4%.The second is organizing more academic activities, accounting for 11.5%. The lowest option is improving the level of teaching facilities, which takes up 5.7%, such as the library and classroom environment, multimedia hardware, etc. Therefore, it can be concluded that teaching hardware facilities in universities of Wuhan are of high level.

Through the interview, it is found that the practicability of some courses is not high enough. "In my opinion, some courses are just not up-dated. They are unable to meet the reality needs. Some are useless to future study and work." The teaching department in Universities in Wuhan should improve the practicability of the courses.Strengthening the construction of academic exchanges and creating a more open academic environment are also long-term and indispensable tasks.In MBA course in Wuhan University of Technology, international students are arranged in divided classes without Chinese students. "I hope there could be more Chinese students in our class.The balance between international students and Chinese students will be better." A student from computer science major said. Other international students also expressed that the number of international students in the class should be equivalent to that of Chinese students, rather than teaching international students separately from Chinese students.

Faculty plays a vital role in spreading Chinese culture. The incompatibility with Chinese faculty and teaching methods has greatly strengthened the sense of estrangement among international students. So the awareness of differences, respect for different culture, fully understanding the customs and religious beliefs from different countries and regions must be cultivated.

4.2 Integrate international students into Chinese communicative environment

Table 3　Communicative Dimension

Variable factor	Number of sample	Maximum	Minimum	Mean
ic5	86	5	2	2.98
ic6	86	5	2	3.09

ic5=can negotiate with people from different cultural backgrounds when confronted with conflicts;ic6= can continue communicating by non-linguistic ways when confronted with communication barriers

As the residence time in China goes by, international students can seek proper solutions by themselves when confronted with cross-cultural conflicts and misunderstandings, such as using nonverbal communication, gestures, realizing the differences between two cultures, negotiating more smoothly. The most important way to improve Chinese is communicating with Chinese people, followed by Chinese language training course. The lowest proportion is self-study.

The best way to eliminate the language barrier of international students is to increase various opportunities of communication with Chinese. "I felt Chinese students are sometimes indifferent to us",a student from Bangladesh said. We found that a large number of international students were clearly estranged from the Chinese students' social circle. Therefore, international students are more inclined to communicate in the groups from the same or similar cultural circle, and cannot fully lend themselves to Chinese communication environment. Therefore, it's essential to increase Chinese courses for international students. More Chinese students should be scheduled into the class to establish one-on-one helping relationship. It maximizes the opportunities for international students to integrate into Chinese communicative environment.

4.3 Obstacle and happiness in life

Table 4　Life Dimension

Sector	Percentage
Life in China is rich and colorful	52.9%
Plan to work in China in the future	28.7%
Go back to own country	42.5%
Positive attitude brings happiness	19.5%
Good career development and life plan brings happiness	16.1%
Excellent academic performance brings happiness	15%
Homesickness is the biggest obstacle	11.5%

As for the choice of employment country, 42.5% choose their own country. It is found that students who choose to work in China are more optimistic about potential economic development and wage level of China or have a deep interest in Chinese culture. However, most of the international students who choose to return to their homeland do not adapt to China's social and cultural environment, and are strongly eager to return to the original life and interpersonal communication circle. The top three factors that contribute to the happiness of international students are positive attitude, good career development and life planning, and excellent academic performance. For international students, the biggest obstacle in life is language barrier, followed by homesickness.

In order to simplify the management of international students, the majority Universities in Wuhan arrange separate dormitories for international students. It broadens the gap between them and Chinese students as well as reduces the opportunities for them to integrate into Chinese daily routines. Therefore, administrative departments should improve the conditions for the joint management of Chinese and international students, instead of taking one-size-fits-all living management. For the international students who prefer to live with Chinese students, the department should provide the corresponding accommodation.

It is necessary to hold folk activities in different countries and regions. "There is almost no feeling of belonging to China society", as an international student said. Thus, creating the cultural atmosphere from their hometown helps to alleviate the serious homesickness. It will further influence their choice of working place in the future. Making them feel at home will greatly enhance the sense of belonging to Chinese society.

4.4 View of Chinese tradition and characteristics

Table 5　Culture Dimension

Variable factor	Number of sample	Maximum	Minimum	Mean
ic7	86	5	1	2.53
ic8	86	4	1	2.47
ic9	86	5	1	1.41
ic10	86	5	1	3.20

ic7= be accustomed to Chinese festival customs; ic8= gradually accustomed to Chinese table manners (such as being urged to drink as much as possible) and feel less reluctant; ic9=feel less violated when Chinese ask you about your privacy(age,salary,marital status and so on); ic10=know and agree with Core Values of Socialism with Chinese Characteristics (prosperity, democracy, civility, harmony, freedom, equality, justice, the rule of law, patriotism, dedication, integrity, friendship)

International students are not accustomed to Chinese tradition, such as table manners and festival customs. The core values of Chinese society have not been deeply rooted in international student's minds.

More experiential activities are effective to expand channels for international students to understand Chinese tradition. "The Chinese Corner activity is held almost once a month.It is inefficient for us to learn more about Chinese culture actually." University-level associations should be more active in organizing Chinese cultural experiential activities to meet the international students need, such as literature works, folk appreciation, interpersonal etiquette etc. It also helps to convey imperceptible effects of Chinese cultural characters to them.Immersing them in a strongerChinese culture atmosphere, the more rapid and more specific understanding of the Chinese tradition and characteristics will they get.

5 Conclusion

This research enriches the empirical data on cross-cultural adaptation of international students in universities of Wuhan.With the increasing number of international students, the education and management must be adjusted and reformed according to the present situation. The suggestions from four aspects above will be useful for the education and management institutions of universities in Wuhan to further enhance integration of international students.In the future, more empirical data about international students in Wuhan's universities are expected to enrich this research, and more practical advice should be provided to the relative institutions for creating better eternal cultural environment.

Acknowledgement

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A Research on the Relationship Between Intercultural Contact and Intercultural Competence

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Abstract: As the development of globalization, intercultural contact with people from different countries and cultures become more and more frequent. Hence, it is necessary to research on the intercultural competence development of college students who are the main group of intercultural contact. Using the literature research method, this article reviews the relative studies on intercultural competence in domestic and foreign firstly, then explores the components of intercultural competence and the paths of intercultural contact, and reveals how these intercultural contact paths play a positive effect on these components of intercultural competence finally. It can not only provide some reference of intercultural competence research, but also give the guidance for colleges to create more contact opportunities in improving intercultural competence of students.
Key words: Globalization; Intercultural competence; Intercultural direct contact; College students; Literature research method

1 Introduction

With the development of globalization and the increasing cooperation and communication with other countries in the 21st century, intercultural communication activities become more and more frequent. As a major group of intercultural contact, college students have more and more opportunities to contact people from different cultures. Therefore, it is necessary to study their intercultural competence and discuss the impact of the intercultural contact on intercultural competence, which provide some reference for the development of intercultural competence through the exploration of the research theory and practice.

2 Studies on Intercultural Competence

Domestic research on intercultural competence begin in the early 1970s. And it mainly involves these aspects. Firstly, some scholars explore the understanding of intercultural competence from different perspective. For example, for the constituent elements, the issue of which competencies are considered as an important part of intercultural competence is discussed. Although scholars have different views on the understanding of intercultural competence, the common elements (cognition, emotion and behavior) can be summarized. Secondly, the relationship between intercultural competence and foreign language teaching is discussed. For example, scholars explore how to cultivate the intercultural competence of college students in terms of teaching modes and intercultural competence dimensions (You & Lin & Chen, 2017). The application of modern science and technology to intercultural foreign language teaching classroom is strongly advocated. Through the training of the intercultural competence of foreign language teachers in universities, it has laid a solid foundation for the cultivation of international talents. Thirdly, the assessment of intercultural competence is investigated. There is not much literature on the assessment of intercultural communication competence in CNKI, which mainly focus on the following aspects. The first key to coming up is that, scholars at home and abroad have not reached consensus on the connotation and constituent elements of intercultural competence, and universally accepted assessment tools have not yet emerged, but the academic community has reached the three important consensuses (Deardorff, 2006). Firstly, intercultural competence is measurable. Secondly, the assessment of intercultural competence must be conducted from different perspectives, adopting multiple quantitative and qualitative methods. Third, intercultural competence assessment must take into account many factors such as the assessor, assessment object, assessment purpose, assessment application, specific scenarios, social conditions, history and so on. And others develop the measurement scale of intercultural competence that is suitable for Chinese university students based on the dimensions of intercultural competence. Chinese College Students' Intercultural Communication Competence Measurement Scale is constructed by the combination of Knowing (knowledge, consciousness, and critical thinking ability) and Doing (attitudes, skills and strategies) (Gao, 2014). And the evaluation model of college students' intercultural

competence is constructed from the perspective of language subjectivity. The intercultural assessment scale has gradually matured from the initial exploration stage to the ICC evaluation scale that is suitable for the Chinese students with good reliability and validity. Fourthly, the importance of cultivating intercultural competence is discussed from an interdisciplinary perspective. In teaching Chinese as a second language, the goal of popularizing Chinese language and spreading Chinese culture is achieved by urging students to improve intercultural competence.

3 Components and Models on Intercultural Competence

Interest in intercultural competence emerges in the literature in the 1950s. Thereinto, many scholars regard *The Silent Language* published by Edward Hall in 1959 as the foundation stone for intercultural communication. In order to understand intercultural competence in depth, this article analyzes and combs the components and models of intercultural competence.

First of all, theoretical conceptualizations of intercultural competence seem to be diverse in their disciplines, terminologies, and academic and practical objectives, as reflected in the variety of terms such as intercultural competence, intercultural effectiveness, cross-cultural awareness, international competence, global competitive intelligence and intercultural adaptation that trace back to the 1970s (Fantini, 1999). And for the detailed connotation of intercultural competence, scholars describe and define it from different perspectives. (Ruben, 1976) argues that to understand and assess individuals' behaviors, it would be necessary to employ "measures of competency that reflect an individuals' ability to display concepts in his behavior rather than intentions, understandings, knowledge, attitudes, or desires". Successful intercultural communication is a decent and effective act that take place in a certain context, with rich knowledge, reasonable motivation, and skillful actions (Lusting & Koester, 1996). The definition is presented as: an individual's ability to communicate and interact across cultural boundaries (Byram, 1997). (Spitzberg, 2000) considers intercultural competence broadly as appropriate and effective behaviors in a particular context. (Wiseman, 2004) sums up previous research results and believes that after decades of research, the academic community has gradually reached a consensus that intercultural competence specifically refers to the knowledge, motivation and skills needed to communicate with people properly and effectively from different cultural backgrounds. Intercultural competence is defined as "a complex of abilities needed to perform effectively and appropriately when interacting with others who are linguistically and culturally different from oneself" by Fantini (Fantini, 2006). And ICC is described as the following: the appropriate and effective management of interaction between people who, to some degree or another, represent different or divergent cognitive, affective, and behavioral orientations to the world (Spitzberg & Chagnon, 2009). Later, Peng (2015) states that based on their intrinsic and external qualities (such as: knowledge, attitude, skill and awareness), communicators can effectively and appropriately communicate and interact with people from different cultural backgrounds in the context of intercultural communication. And the two core elements can be concluded, special context and effectiveness, appropriateness.

Then, the discussion of the constituent elements of intercultural competence is presented. Some scholars agree that intercultural competence should include motivation, knowledge and skills. Chen (1989) tends to the four parts: personality strength, psychological adaptation, communication skills, cultural awareness. From the perspective of social skills, Martin and Hammer (1989) believe that ICC include communicative function behavior, verbal and non-verbal behavior, and conversation control behavior (Martin & Hammer, 1989). (Byram, 1997) proposes a widely accepted five-factor composition: attitudes, knowledge, skills (the skills of interpreting and relating; the skills of discovery and interaction), critical cultural awareness. (Deardorff, 2006) adopts the Delphi technique to seek common ground, and selects 22 items of intercultural competence that are more than 80 percent of their identity. And he notes three dimensions of ICC that depict the movement between attitudes, skills, and knowledge and comprehension at the individual level and the internal and external outcomes at the interaction level. (Fantini, 2006) provides a comprehensive list of related terms in literature to describe intercultural competence including intercultural competence, cross-cultural awareness, intercultural sensitivity, ethno relativity and global competencies. While Lustig and (Koester, 2007) approve motivation, knowledge and action. Wu, Fan, and (Peng, 2015) find that ICC involve six main factors: knowledge of self, knowledge of others, attitudes, intercultural communicative skills, intercultural cognitive skills, and awareness in the Chinese context. Besides, other elements have also been identified as contributors to ICC, including positive attitude toward other cultures, and empathy (Arasaratnam, 2015), personal spiritual wellbeing (Sandage & Jankowski, 2013), knowledge of other cultures (Pettigrew & Tropp,

2011), and curiosity (Deardorff, 2006), among others. As above noted, the dimensions of ICC such as knowledge, attitudes, skills, and awareness are considered as the main indispensable components of ICC.

  In addition, the broad concept of intercultural competence has led to a range of models that have served as the basis for different approaches to its assessment. It mainly can be divided into three types: component model, development model and empirical model. (1)Component model, a widely accepted model of intercultural competence include the five parts: attitude, knowledge, the skills of interpreting and relating, the skills of discovery and interaction, and critical cultural awareness (Byram, 1997). Fantini (2000) puts forward that ICC should involve abilities related to knowledge, attitude, skills and awareness. (2)Development model, Lysgaard (1955) describes the intercultural psychological adaptation process as a U-shaped curve, which is divided into six phases: honeymoon period (novelty of different cultures), conflict period (discomfort with cultural differences), humor period (optimism for different cultures), synchronization period (adaption to the various norms of different cultures), contradictory period (feeling contradictions before returning home), and re-adaptation period (re-adapting to national culture after returning home). And the Developmental Model of Intercultural Sensitivity (DMIS) presents six stages (Ethnocentric Stages: Denial, Defense, Minimization and Ethnorelative Stages: Acceptance, Adaptation, Integration) of the DMIS is used to assess the communicators' intercultural experience (Bennett, 1993). (3)Empirical model, in the 21st century, it has become a trend to test the validity and applicability of these assessment models in practice. Through the investigation of 23 internationally intercultural communicators and 24 U.S. higher education managers, and the Pyramid and Process Model is put forward, which should include attitudes, skills, and knowledge and comprehension at the individual level and the internal and external outcomes (Deardorff, 2006). Besides, Wu, and Fan, and (Pengm, 2015) conduct an empirical study among Chinese college students by the questionnaire of quantitative research and interview of qualitative research, then establish a systematic and operational model of Chinese college students' ICC, with the related six main factors: knowledge of self, knowledge of others, attitudes, intercultural communicative skills, intercultural cognitive skills, and awareness, in the Chinese context. And Wu, and Fan, and (Peng, 2015) put forward the ICC Model, which is presented by the following figure 1 clearly.

Figure 1 Wu's ICC Model of Chinese College Students(2015)

4 Paths of Intercultural Contact

  Research on the paths of intercultural contact, the first thing should do is to know something about intercultural contact. In terms of contact, there are cross-cultural contact, intercultural contact and intergroup contact. Generally speaking, overseas scholars regard the former two as the same. In overseas studies, "intergroup" usually refers to two or more groups or communities from different cultural backgrounds that to a large degree, it can be referred as "intercultural contact" (Zhang, 2012). So the discussion of intergroup contact also can be seen as the discussion of intercultural contact. First of all, the characteristics of intercultural contact can be presented, then to explore the paths of intercultural contact according to its characteristics.

  Many researchers widely investigate how intercultural contact can reduce intergroup prejudice under certain conditions, then put forward Intergroup Contact Hypothesis. This hypothesis thinks that the four favorable conditions can effectively reduce intergroup prejudice, that is "equal group status

within the situation; common goals; intergroup cooperation; and the support of authorities, law, or custom". Based on the hypothesis, the characteristics of intercultural contact is explored. (1) Generalization, it means that positive contact with members of an outgroup can reduce prejudice towards the entire outgroup (Wright et al., 1997). (2) Secondary transitivity, it refers to the positive effects of contact with an outgroup extending to ingroup and another outgroup that has not involved in contact (Pettigrew, 2006). (3) Unequivalence, it means that intercultural contact has different influences on different status groups that the attitude of superior group change more than inferior group (Tropp & Pettigrew, 2006).

In addition, as for the characteristics of generalization, researchers initiate a series of detailed discussions in an effort to extend the effectiveness of intercultural contact theory from the three aspects. (1) Cross-context generalization, some studies have shown that the accumulated positive effects can only change the attitude toward the other group if only the best context is repeated. For example, the United States advocate the abolition of racial segregation in order to provide the best interethnic contact. (2) From individuals to groups generalization, different scholars have put forward different strategies for how to make the positive effect of contact generalize from interpersonal level to intergroup level. Hewstone and Brown (1986) advocate salient categorization strategy that when a group member has a salient identity, contacts will treat the member as a group representative, thus producing a positive intergroup effect. (3) From outgroup to other group generalization, it is regarded as the highest form of generalization. (Pettigrew, 1997) conducts the large scale of investigation on European that those individuals with interethnic friendships who are obviously friendly to all outgroups.

Then based on the characteristics of intercultural contact and related practice exploration, the intercultural contact paths are also presented. Some scholars divided it into direct contact and indirect contact. Direct contact also includes oral or written interaction with native or non-native speakers who speak target language, generally speaking, that is direct oral contact and direct written contact. Positive direct contact is considered a shortcut to reduce prejudice and interethnic conflicts (Allport, 1954). While the finiteness of direct contact urge researchers to explore the other ways that can reduce prejudice. So the intercultural contact theory begins to extend indirect contact. Indirect contact mainly includes the two types: indirect interpersonal contact and indirect cultural product contact. At the same time, it also involves contact with target language through various mass media (such as: TV, internet, movie, magazine, newspaper and so on) and popular social platforms (such as: QQ, Wechat, E-mail, BBS, Video conference, Blogs and so on).

In addition, some scholars systematically and comprehensively explore the paths of Chinese college students' intercultural contact according to the actual situation of China. It includes two main pathways and six sub-pathways (Peng & Wu, 2016). One of the pathways is direct contact, involving the four sub-pathways such as domestic social media, foreign social media, domestic intercultural communication activity and foreign intercultural communication activity. Another main pathway is indirect contact, which includes the two sub-pathways, such as cultural products and multimedia and courses. And the reliability and validity of the intercultural contact scale is verified by EFA and CFA, which includes six dimensions and 31-item scale. And the paths of intercultural contact can be presented by figure 2. Then based on Peng's intercultural contact scale, (Li, 2017) proposes that the intercultural awareness of teachers should be included in the pathways of improving the intercultural competence among college students. Scholars seek to further reveal the impact of intercultural contact on intercultural competence through the exploration of intercultural contact pathways.
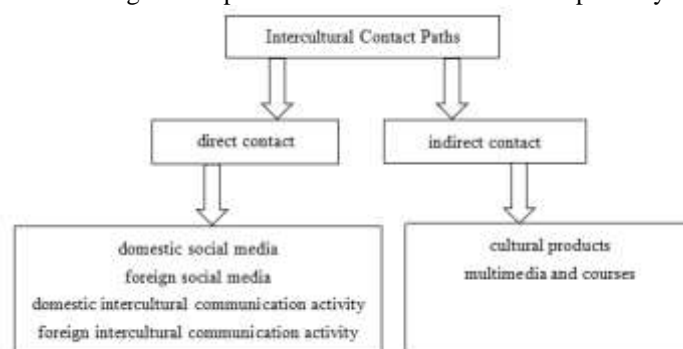
Figure 2   Peng's Intercultural Contact Paths of Chinese College Students(2016)

5 The Relationship between Intercultural Contact and Intercultural Competence

Based on previous research, intercultural contact pathways can be divided into two main dimensions: direct contact and indirect contact. And most of the existing literature focus on the exploring of how direct contact (overseas experience, social platforms, international conference and traveling abroad) has an impact on intercultural competence. For example, Kormos & Csizér (2007) investigates the effects of studying abroad from the perspective of Second Language Acquisition and states that intercultural contact is beneficial to improve the initiative of intercultural communicative among students. (Cushner & Chang, 2015) explores the impact of overseas experience on intercultural competence development. Besides, many scholars focus on the intercultural sensitivity of students with overseas experience by a series of empirical studies. The impact of social platforms (QQ, Wechat, E-mail, BBS, Video conference, Blogs and so on) on intercultural competence is also discussed. For example, MOOs mainly focus on the creation of identities and negotiation (O'Dowd, 2003). (O'Dowd, 2007) conducts online communication in the Irish and American Cooperation Classroom with the help of social platforms (E-mail, BBS, Video conference), the results show that virtual intercultural contact can promote the development of intercultural competence of students. Additionally, some researchers demonstrate that blog interaction has a positive effect on the intercultural competence of students (Melopfeifer, 2015).

In addition, some Chinese scholars have conducted research on issues of direct contact, such as students with intercultural experience, intercultural contact through web-based channel. For example, Wang Tianjun (2010) in his M.A. thesis investigates the intercultural contact among students at Fudan University with foreigners and find that Chinese college students show great interest in intercultural contact. Huang Yuanyuan (2012) conducts a comparison on non-English major students between having intercultural experience and no overseas experience, and find that international exchange program can facilitate the improvement of students' ICC. Additionally, some researches show that intercultural contact through web-based channel also has a positive impact on intercultural competence. For instance, through providing the real intercultural communication context, the international telecollaboration course has significant effects on students' interaction confidence and interaction enjoyment, the two components of intercultural sensitivity. And through the investigation of Zhejiang foreign students, it verifies Wechat plays an important role in improving the students' intercultural communication ability.

The research on the impact of intercultural indirect contact on intercultural competence is relatively less, which mainly involve reading literature and watching English movies. For example, Liaw (2006) conducts a research on the efficacy of an online learning environment, which show that it is beneficial to foster EFL students' intercultural competence. And an empirical study on EFL classroom of the language program at a public university, and data are collected to show that learners can acquire cultural knowledge, develop critical intercultural skills, and create positive attitudes through the reading literature (Rodríguez, 2013). And exposure to foreign cultural products and cultural relics can help learners change their attitude towards foreign cultures (Kormos & Csizér, 2007). English movies and songs are used to enhance students' interest and curiosity toward foreign cultures (Miu, 2018).

Additionally, Chinese scholar (Peng, 2016) conducts a more comprehensive research on the relationship between intercultural competence and intercultural contact paths form the situation of Chinese college students. Intercultural competence includes the six main factors: knowledge of self (KN1), knowledge of others (KN2), attitudes (AT), intercultural communicative skills (SK1), intercultural cognitive skills (SK2), and awareness (AW). And intercultural contact paths involve the six dimensions: domestic social media (DSM), foreign social media (FSM), domestic intercultural communication activity (DICA), foreign intercultural communication activity (FICA), cultural products (CP), multimedia and courses (MMC). Based on the components and models mentioned above, Peng's research uses the structural equation approach to test and analyze the fitness of each dimensions, and then the relationship between intercultural competence and intercultural contact is clear. And the result show multimedia and courses can improve knowledge of self and intercultural attitudes; domestic intercultural communication activities and cultural products is beneficial to knowledge of others; domestic intercultural communication activities and multimedia and courses can facilitate the improvement of intercultural communicative skills; cultural products are useful to intercultural cognitive skills; last, multimedia and courses has a positive effect on the development of intercultural awareness. And the detailed relationship can also be presented by figure 3.
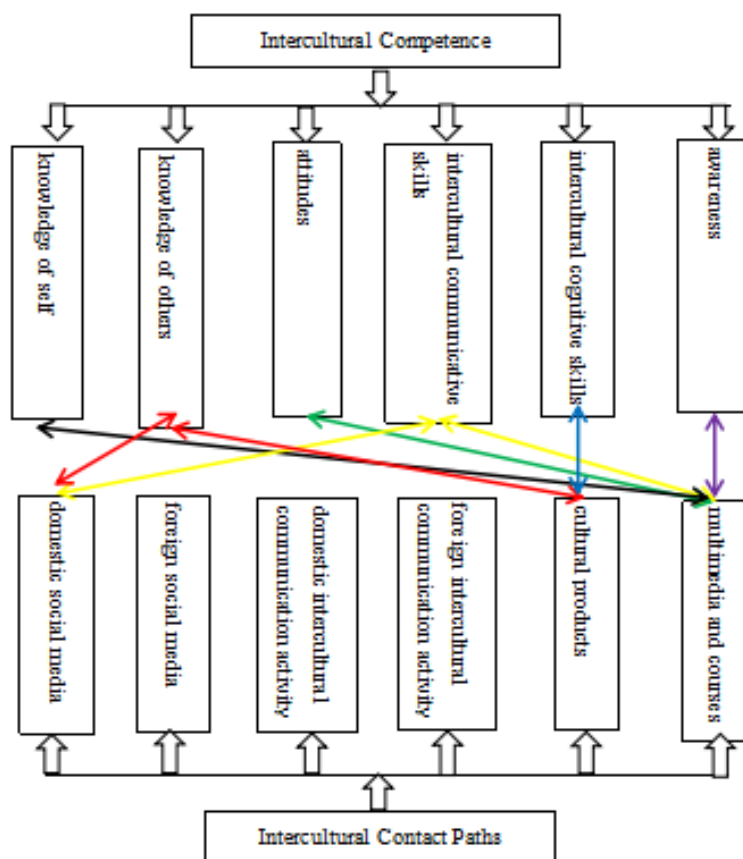
Figure 3   The Relationship between Intercultural Competence and Intercultural Contact

6 Conclusion

Based on the reviewing of domestic and foreign scholars' research on the intercultural competence and intercultural contact, knowing what is intercultural competence, how to assess intercultural competence and which intercultural pathways can be obtained, then further explore the correlation between intercultural competence and intercultural contact pathways and finally reveal that the positive impact of intercultural contact on intercultural competence. Through the discussion above, it is of great theoretical significance to provide theoretical references for intercultural competence research. And also provide the references for colleges in creating positive intercultural contact for college students' intercultural competence development. However, compared with foreign research, some limitations are also obvious in China. Firstly, the research on intercultural competence and intercultural contact in China's national conditions is relatively rare. Thirdly, most of the research all focus on the direct contact, while the analysis of the impact of indirect contact on intercultural competence is less. And direct contact is mainly based on overseas experiences and web-based channel, while the other contact pathways (such as: international conference, traveling abroad et al.) are mentioned rarely. Indirect contact is mainly based on online reading and English movies, while the research on indirect interpersonal contact is rare. So future research on this area can be further explored from these perspectives to make up the researching gap. At the same time, the research on intercultural contact just exists in China at the starting stage, and hoping that this article can stimulate the interest of domestic and foreign scholars in this field.

Acknowledgement

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Executive Incentive, R&D Investment and Corporate Performance of Listed Companies in GEM

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Abstract: Based on the relevant data of listed companies on the GEM(Growth Enterprises Market) of 2012-2016, this paper studies the relationship between executive incentives, R&D investment and corporate performance, and uses R&D investment as a regulatory variable to explore the regulatory role of R&D investment. The empirical results show that executive equity incentives, executive compensation incentives, and senior executive promotion incentives have a positive effect on corporate performance. R&D input negatively regulates the relationship between executive incentives and corporate performance.This paper divides executive incentives into three dimensions, and tests the negative adjustment effect of R&D investment, which may offer some advices about the level of R&D investment.This will benefit the growth and development of listed companies on the GEM.
Key words: Executive incentive; R&D investment; Corporate performance; Listed companies on GEM

1 Introduction

Driven by innovation-driven development strategy, new technologies, new formats, new models, and technological innovation have become the backbone of economic development. China is working hard to actively build an innovation-oriented country and vigorously develop innovative science and technology enterprises. In modern corporate governance, the role of executive incentive mechanisms has become more and more significant, especially in science and technology innovation companies, where executives play a crucial role in the decision-making of R&D and innovation. Through the research on companies listed in GEM of China, we have explored a governance approach that is consistent with the development of companies listed in GEM. Although the level of corporate governance in China is constantly improving, how to implement executive incentives to improve corporate performance requires more discussion. Based on the data of companies listed in GEM of China, this paper studies the relationship between executive incentives and corporate performance, and uses R&D investment as a regulatory variable to examine the regulatory role of R&D investment in the relationship between executive incentives and corporate performance.

2 Theoretical Analysis and Research Hypothesis

Innovation is the source of a company's rapid development. To achieve outstanding operating results and achieve sustainable growth, we must pay attention to the implementation of technological innovation. In modern enterprise management, the right to operate and ownership are separated. (Jensen and Meckling, 1976) argue that one of the important reasons for the agency cost is the inconsistency between the company's residual value claim and control. According to principal-agent theory and signal transmission theory, corporate executives may violate the company's goals for their own benefit. In order to promote the unification of the interests of the principal and the agent, the owner encourages the managers by giving up the equity or raising the salary level and providing promotion opportunities. (Liu Zijun, Liu Zhiqiang and Liao Jianqiao, 2011) discussed the gap between the executive compensation and its impact. The conclusion show that the salary gap is significantly positively correlated with the company's performance.(Xu Juanjuan, 2016)found that there is a significant positive correlation between the implementation of equity incentives and CEO equity incentive intensity and company performance.And (Chen Zhiguang, 2002) found that the annual compensation of senior executives was significantly positively correlated with corporate performance. However, when companies implement executive compensation incentives, R&D investment requires a large amount of capital investment. Therefore, R&D investment may negatively affect the relationship between executive compensation incentives and corporate performance. If an enterprise increases the proportion of senior management holdings through equity incentives for senior executives, the senior management will naturally become one of the owners of the enterprise. The senior management will consider the interests of shareholders more and pay more attention to the long-term interests and long-term development of the enterprise. The R&D investment of the company is a long-term investment, which will bring about the growth of the

company's future interests, which will increase the long-term return of the senior management. Therefore, the R&D investment may have positive effect on the influence of the executive equity incentive and corporate performance. If the company implements promotion incentives for senior executives, executives can gain greater control over the company's decision-making operations, and there is a sense of "ownership" in corporate governance, and R&D investment activities are indispensable for companies listed in GEM of China. The activities of these R&D investments will effectively reduce the cost of their products, increase the market share of the products, and improve corporate performance. Therefore, R&D investment executives have positive adjustments to the relationship between promotion incentives and corporate performance. In summary, the following assumptions are made in this paper:

H1: R&D investment has a negative regulatory effect on the relationship between executive compensation incentives and corporate performance

H2: R&D investment positively adjusts the relationship between executive incentives and corporate performance

H3: R&D investment has a positive effect on the relationship between executive promotion incentives and corporate performance

3 Research Design
3.1Sample selection and data sources
This paper uses companies listed in GEM of China from 2012 to 2016 as the base sample. The following principles were followed in the selection of study samples: (1) to exclude companies that were specifically treated during the study period; (2) to exclude companies that could not completely obtain relevant data. According to the principle of data selection, the sample finally obtained 2245 observations. The listed company data comes from the CSMAR database. In addition, in order to eliminate the influence of extreme value, this paper uses stata12.0 to process Winsorize at 1% level before and after fiscal data, and uses stata12.0 data processing and analysis software to test the regression model empirically.

3.2Variable definitions
(1) The explained variable. In this paper, corporate performance indicators are used as explanatory variables. They are mainly divided into two categories: The first category is financial indicators, including return on assets, return on net assets, and return on operating cash assets. The second type is market indicators. It is represented by Tobin's Q value and stock's annual return rate. This paper uses ROA as a company performance indicator.

(2) Explanatory variable. Executive incentives are explanatory variables. In this paper, executive incentives are divided into senior executive equity incentives and senior executive compensation incentives as well as executive promotion incentives. The proportion of senior management holdings: The proportion of senior management holdings is the ratio of the total number of shares held by directors, supervisors and senior executives. Because of the greater influence of directors, supervisors and senior executives in corporate governance, they feel that companies The strategic development of the future, and responsible for the development of the company's business executives responsible for the management, the shareholding ratio in this paper is abbreviated as MSR. Executive Compensation: The executive compensation of this paper is defined as the natural logarithm of the sum of the directors, supervisors, and executive compensation as an indicator of executive compensation incentives, which is simply LnPay. At present, there are relatively few research literatures related to promotion incentives. In the few literatures, GAP is mainly used as a substitute for promotion incentives.

(3) Moderator variable. By sorting out relevant research documents at home and abroad, it can be found that the selection of R&D expenditure indicators is relatively uniform, and R&D expenses are used to quantify R&D investment. The relative number of R&D expenditures is numerically equal to the ratio of R&D expenditures invested by the company in the current year to the company's main operating income for the year, which is abbreviated as R&D.

(4) Control variables. Asset-liability ratio: numerically equal to the ratio of total ending liabilities to total assets at the end of the period, which is abbreviated as LEV. Total asset turnover: numerically equal to the ratio of operating income to the ending balance of total assets, which is abbreviated as CASHFLOW. Enterprise size: It is measured by the natural logarithm of the number of employees at the end of the period, which is simply SIZE. The above variable definitions are shown in Table 1:

Table 1　Variable Definitions

	Variable Name	Variable Symbol	Variable Definitions
The explained variable	Corporate Performance	ROA	Net profit / total assets
	Executive Stock Incentive	MH	Total number of shares held by senior executives / total number of shares
Explanatory variable	Executive Compensation Incentive	LnPay	Natural logarithm of the total remuneration of directors,supervisors, and executives
	Executive Promotion	GAP	The natural logarithm of executive pay and non-core executive pay gap
Moderator variable	Investment costs	R&D	R&D expenses / main operating income
	Asset-liability ratio	LEV	Total liabilities / total assets
	Business scale	SIZE	Natural logarithm of the number of employees at the end of the period
Control variables Continual Table 1	Variable Name	Variable Symbol	Variable Definitions
	Total assets turnover ratio	CASHFLOW	The ratio of operating income to the ending balance of total assets

3.3Model design

This paper is based on the motivation of executives of 724 listed companies in GEM. The relationship between R&D investment and corporate performance is the focus of research. The impact of executive incentives on corporate performance, executive incentives on corporate R&D investment, and R&D investment on corporate performance. This paper we use the lag one period of ROA data to solve the endogenous problem, and we use control variables such as business scale. For the listed companies on the GEM, the size of the company is an important factor in the research.

(1) Executive compensation incentives, R&D investment and corporate performance

$$ROA = a_1 + b_{11}LnPay + b_{12}R\&D * LnPay + c_i \sum control + \varepsilon_1 \qquad (1)$$

(2) Executive Equity Incentives, R&D Investment and Corporate Performance

$$ROA = a_2 + b_{21}MH + b_{22}R\&D * MH + c_i \sum control + \varepsilon_2 \qquad (2)$$

(3) Promotion of senior executives, R&D investment and corporate performance

$$ROA = a_3 + b_{31}GAP + b_{32}R\&D * GAP + c_i \sum control + \varepsilon_3 \qquad (3)$$

In the above model, a_i is a constant term,b_{11}、b_{12}、b_{21}、b_{22}、b_{31}、b_{32} represent the degree of influence of each explanatory variable on the interpreted variable, and ε is a random error term.

4 Empirical Results and Analysis
4.1 Descriptive statistics

Table 2　Descriptive Statistics

	N	MAX	MIN	MEAN	Std.Dev
ROA	2245	0.188835	-0.87796	0.0555401	0.044362
MH	2245	0.6571539	0	0.1840381	0.1877276
LnPay	2245	16.3987	13.78361	14.98032	0.5454006
GAP	2245	14.31249	11.343	12.72583	0. 595787
R&D	2245	36.47	0	7.036182	6.070896
SIZE	2245	8.978282	5.003946	6.774327	0.8139357
LEV	2245	0.68893	0.03319	0.2737642	0.1585178
CASHFLOW	2245	1.434713	0.098986	0.4610886	0.2306789

From the descriptive results we can see:

(1) It can be seen from the descriptive results of corporate performance that the performance of companies listed in GEM during the period of 2012-2016 was a minimum of -0.87796, with a maximum value of 0.188835, indicating that most companies still have Certain profitability, some companies have weaker profitability, which has a certain relationship with the industry nature and scale of companies listed in GEM of China.

(2) Through the descriptive statistics of the proportion of shares held by MH, it can be seen that there is a big gap between the maximum value of senior executives and the minimum value of the stocks of companies listed in GEM. Generally speaking, the senior executives of companies listed in GEM have a higher shareholding level. It indicates that the stocks held by senior executives in companies listed in GEM are widespread.

(3) From the descriptive statistics results of R&D investment, the maximum R&D expenditure ratio of companies listed in GEM is 36.47, the minimum value is 0, and the average value is 7.036182, indicating that companies listed in China mostly focus on R&D investment. In terms of technological innovation, a small number of companies have insufficient awareness of R&D investment.

4.2 Regression analysis

We first control the factors that affect corporate performance, including the size of the company, total asset turnover, and asset-liability ratio. The model regression results are shown in Table 3 below.

Table 3   Regression Analysis

	Model1 ROA	Model2 ROA	Model3 ROA
MH		0.001*** (3.38)	
LnPay	0.000*** (7.49)		
GAP			0.000*** （7.37）
GAP*R&D			0.000*** （-3.50）
LnPay*R&D	0.000*** (-4.02)		
MH*R&D		0.004*** (-2.90)	
LEV	0.000*** (-18.88)	0.000*** (-6.63)	0.000*** （-18.50）
SIZE	0.918 (0.10)	0.006*** (-2.78)	0.302 （1.03）
CASHFLOW	0.000*** (15.32)	0.000*** (4.08)	0.000*** （15.04）
N	2245	2245	2245
R-squared	0.2151	0.2000	0.2144
Adj R-squared	0.2133	0.1982	0.2126

Note: The values in parentheses are t values, * for p<0.05, ** for p<0.01, and *** for p<0.001.

In Model one, the result shows that H1 is validated. It shows that while companies implement executive compensation incentives for senior executives, R&D and innovation activities require a large amount of capital investment. Both of them have certain conflicts in terms of funding requirements.

In Model two, the result is in contrast to the previous H2. The reason for this result may be that their anti-risk capabilities are weak, while technological innovation requires a large amount of capital investment. The proportion of shares, the lagging effect of R&D investment will still cause the R&D investment to have a negative impact on the relationship between executive equity incentives and corporate performance.

In Model three, the result shows that H3 is invalid. The reason for this result may be that the scale of the company is not large, even if the company implements promotion incentives for senior executives, but this measure brings about the improvement of corporate performance is not enough to affect the lag effect of R & D investment.

5 Conclusion

From the above analysis, executive incentives for equity incentives, executive incentives, and senior executive incentives can improve corporate performance. For companies, technological innovation capabilities as the company's core competitiveness cannot be ignored, the company's R&D investment is essential for technological innovation. In theory, as the intensity of R&D investment increases, companies will achieve good results in technological innovation, leading to increased production technology. However, due to the fact that most of the companies listed in GEM of China are small and medium-sized enterprises, their anti-risk capability is weak, and R&D investment has a certain lag effect. Therefore, when R&D investment is used as a regulatory measure, it must be based on the scale and operation of the company. Conditions to reasonably determine the level of investment, combined with executive incentives, and ultimately achieve the goal of improving corporate performance.

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Research on Vocational Accomplishment Cultivation of Maritime Students Based on Semi-militarized Management

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Abstract: The author has made an investigation for students of 2016-2017Marine squadron. The main content of this research include professional awareness, professional ethics and vocational ability. This paper surveys and analyzes the status of current professional careers of sailing students through questionnaire surveys and interviews, pointing out that the semi-militarized management of maritime colleges and universities is a management method between military management and general management. It has positive significance in the promotion of students' professional qualities and further proposes ways and paths to cultivate professional qualities.
Key words: Semi-militarized management; Professionalism; Navigation; College students

1 Introduction

Professional literacy is a key factor in the employment competitiveness of students majoring in navigation. The problems encountered in the professional consciousness, professional ability and professional ethics of maritime students need to be solved urgently. Present studies mostly pay attention to what vocational traits anemployeeor High vocational college studentsshould have but fewexplore about students majoring in navigation.

Through investigation and research, this article takes Wuhan University of Technology as an example.

the research object is for students majoring in marine engineering, sending out 600 questionnaires, retrieving 596 questionnaires and 585 valid questionnaires. Finding that marine students have low occupational sensitivity, professional ideological instability, professional industry identity and sense of belonging is not strong, employment diversity, occupational sensitivity is low, and professional career planning awareness is weak, etc., further proposed based on semi-militarization Management professional literacy training strategy.

1.1 Professional literacy connotation

Professional literacy is the behavioral norms that humans need to abide by in social activities, is the internal requirements of the profession, and is the overall quality that a person manifests in his career [1]. It is the sum of relatively stable, long-term morality, ideas, behaviors, and abilities that people show in long-term professional activities. It includes professional ethics, professional skills, professional knowledge, professional image, professionalism, career ideals (Zheng Ruitao, 2015).

Marine oceangoing work is a highly professional and challenging career and has high requirements for practitioners' professional quality. In the journey of building a strong shipping country, maritime institutions need to correctly understand the current status of students' professional qualities, continue to strengthen the professional accomplishment of nautical professional students, cultivate a group of international standards, meet the requirements of international conventions, have high comprehensive quality, and have a strong sense of safety and environmental protection. Market-competitive, high-quality, integrated maritime talents promote the development of the shipping industry.

1.2 Professional literacy status

1.2.1 Weak professional awareness

Professional awareness is a comprehensive reflection of the psychological components of people's identity, evaluation, emotion, and attitude (Yin Fengxia, 2015). It is the individual's fundamental attitude and attitude towards the profession, and it is the combination of occupational awareness and professional activity. The formation of professional consciousness is not accidental, but it is a gradual process from blurring to clarity, from fantasy to reality, from superficial to profound. Taking Wuhan University of Technology as an example, through the survey of marine engineering students and graduation employment tracking, some students have low professional sensitivity, unpredictable professional thinking, lack of professional industry identity and sense of belonging, job diversification, occupational sensitivity. Professional career planning and other characteristics are low and poor.

In the past five years, the first volunteer acceptance rate of Wuhan University of Engineering

students has reached above 97%. In 2017, the first voluntary acceptance rate of freshmen is 100%. However, when students apply for professional selection, more students are going to read in the future. Less than 10% of Graduate students or who are employed on land really intend to engage in ocean navigation work. Only 16% of students choose major because of professional interests as shown in Figure1.
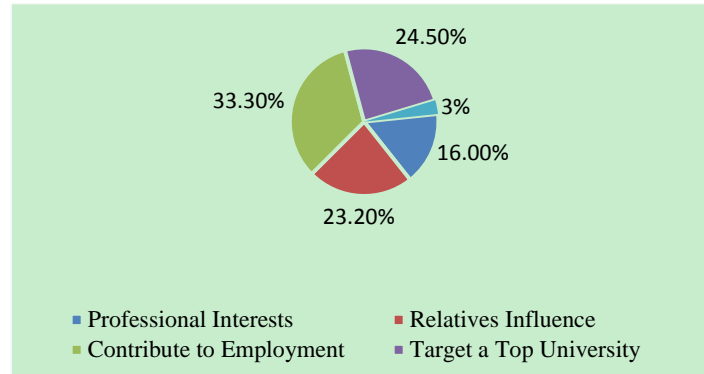
Figure 1   the First Consideration of Colleges When Selecting School

It is not difficult to find out the employment trends of marine engineering projects from the statistical analysis in recent years that the proportion of graduates engaged in ocean shipping has decreased year by year, and more and more students have chosen graduate study. Combining the marine engineering major aims to cultivate the professional knowledge of ship power and turbine systems, in line with the Manila Amendments to the International Seafarers' Training, Certification, and Duty Standards Convention (STCW 78/95) and the requirements of China's Seafarer Crew Competency Standards. The qualifications of marine engineers are qualified, and they can be used for the training of advanced technical personnel such as turbine operation, maintenance, ship supervision, supervision, marine management, and ship inspection in various enterprises and institutions of ship transportation and marine engineering. The professional awareness of students needs further improvement.

Graduates can be engaged in ocean and offshore turbine management work of the vessel in shipping enterprises and institutions, also be engaged in the maintenance-related work in the shipping department, harbor superintendence, ship inspection and other related enterprises. In addition, graduates can also in shipyard, Marine diesel engines factory, mechanical engineering or related units. Latest five years graduate employment situation as shown in figure 5.
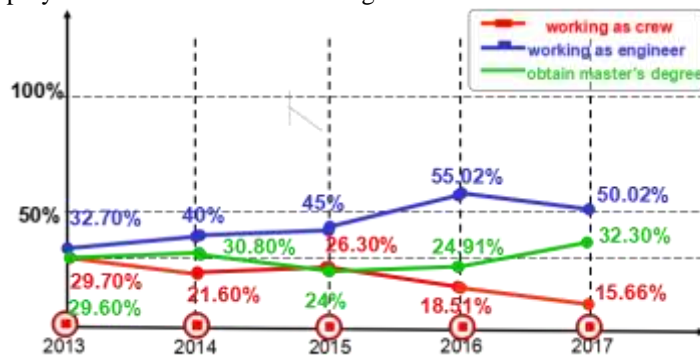
Figure 2   Statistics of Graduates Employment in the Last Five Years

1.2.2 The awareness of professional ethics is not strong

Professional ethics is a certain spiritual realm that is embodied in certain behavioral norms and reflected in professional activities (Dai Yulan, 2015). It is a code of conduct that all practitioners should follow in their professional activities, including behavioral requirements, ethical responsibilities, and obligations. Although the professional ethics of sailing students has been greatly improved, the distance from the seafaring talents still exists. Although the professional ethics of mainstream majors of marine majors are positive, healthy, and progressive, there are still some students' sense of responsibility, collective consciousness, honor consciousness and professional dedication becoming weaker. Money worship, hedonism, individualism, utilitarianism is more and more obvious.
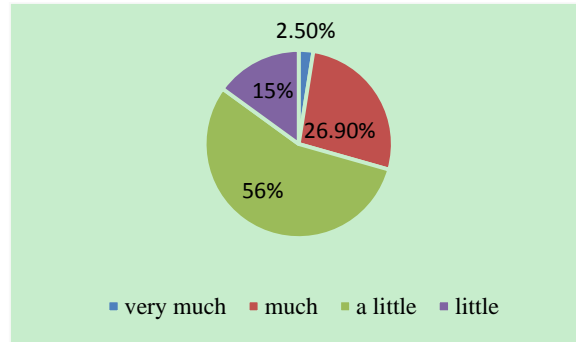
Figure 3   Understanding Level of Professional Ethics

Regarding to the level of understanding of professional ethics, 56% of the students only heard a little, 26.9% of the students knew better, and 15% did not understand the professional ethics at all as shown in figure 3. It shows that undergraduates do not have enough knowledge of professional ethics and the concepts of college students' professional ethics need to be strengthened.
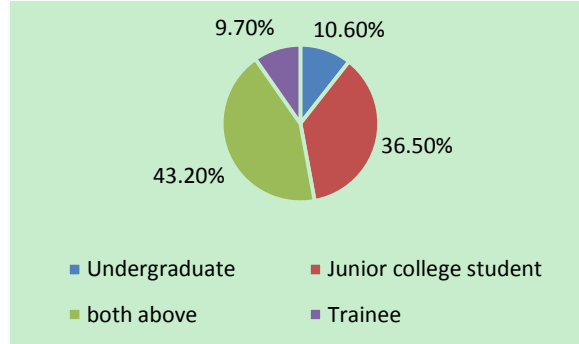
Figure 4   The Necessity of Ethics Education

In terms of professional ethics education, 43.2% of students believe that professional ethics education is targeted at undergraduates and college students, 36.5% of students think that professional ethics education is targeted at junior college students, and only 10.6% of students think that professional ethics education is targeted at Undergraduate students. In figure 4 it shows that most college students think it is necessary to carry out professional ethics education. The focus is on college students. However, the situation of professional ethics education in undergraduate colleges is not optimistic.

1.2.3 lack of professional ability

Professional competence is the ability of an individual to accomplish certain career tasks by classifying the knowledge, skills, and attitudes who has learned in a particular class of professional activities or situations (Yin Fengxia, 2015).Professional capabilities include professional and management skills, learning ability, innovation ability, emotional management ability, and expression communication skills. In the evaluation of professional competence, 41.1% of the students are not confident in their professional ability, and 24.2% of students are not confident in their professional ability as shown in figure 5.
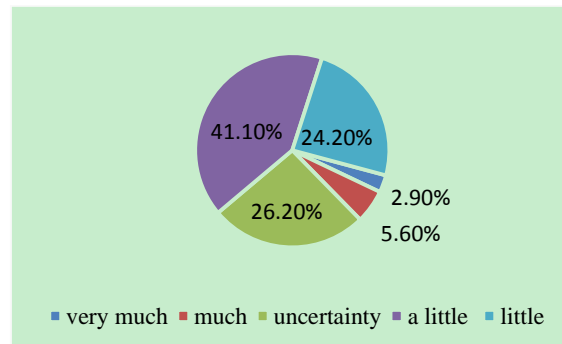
Figure 5   Self-assessment of their Professional Competence

In the job search process shown in figure6 the most competitive factors accounted for 21.2% of the academic performance, 20.1% for professional skills, 16.8% for practical training experience, and 16% for student cadres. The percentage of professionals who chose to obtain relevant vocational skills certificates accounted for 21.9%. It shows that in the process of students' job hunting, professional ability is reflected in all aspects. College students pay more attention to academic performance, professional skills, practical training, and student work. However, there is still a long way to go from the professional skills that students already possess.
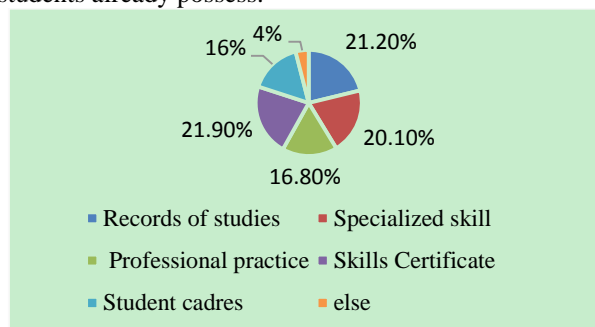
Figure 6   the Most Competitive Factor in Employment Selection

2 The Significance of Semi-militarized Management for Nurturing Vocational Literacy

The semi-militarized management of maritime colleges and universities is a management model. It refers to the management methods of non-military units with reference to military management units, and the management mode is between military management and general management (Wang Haipeng, 2018). The semi-militarized management of maritime colleges and universities is an important measure and approach for the cultivation of advanced maritime talents. The aim is to cultivate students with good political quality, organizational discipline, teamwork spirit, professionalism and leadership of the sailing students. Make students becoming highly qualified marine specialized talents with international competitiveness in terms of "strong adaptability, strong working spirit, and strong sense of innovation".

Semi-military management helps to strengthen students' political orientation, train students to obey orders and obey commanders' obedience, cultivate students' hard-working, courageous and hard-doing will, develop solidarity and cooperation, form a rigorous and pragmatic work style, cultivate students' habits and habits, cultivate students' awareness of love and respect for their jobs, cultivate students' spirit of hard work and entrepreneurship, broaden students' international perspective, improve the students' professional psychological quality, improve the students' comprehensive quality.

3 Professional Literacy Training Strategy

3.1 Combining semi-military management with theoretical practice education

1）Further optimize the teaching curriculum. Focusing on students' professional literacy needs, colleges and universities should further revise their professional training plans and programs, improve the strength of teachers, ensure the ratio of teachers and students in navigational specialties, optimize design professional introduction, professional courses, sailing career planning, maritime psychology, cross-cultural communication courses, etc. Teaching content should enrich students' knowledge and broaden their horizons. At the same time, in the teaching of professional courses, professional ethics education, professional awareness awakening education, cooperative spirit education and struggle spirit education are constantly penetrated to improve students' professional ethics.

2) Continuously strengthen students' cognition education for industry and profession. Strengthen the education of ideals and beliefs of college students, raise awareness of responsibility for the country and society, and combine personal ideals with the country's future and national cause. Through professional education, atmosphere creation, role models, featured activities, etc., improve the effectiveness of various thematic activities, create a soft environment from the perspective of the second classroom, guide students to establish a love of industry, professional concepts, clear learning objectives, enhance the professional awareness of students.

3) Construct a theoretical and practical curriculum system. Exploring the inter-class teaching and practice cross-teaching mode, the professional quality education runs through the students' daily

education. It not only highlights the students' explicit professional literacy education, but also pays attention to the students' implicit professional literacy education. The basic curriculum emphasizes the combination of in-class teaching and extra-curricular practice, ability development and quality enhancement, internalization and externalization. In the fun activities, situational training and other processes to optimize student professional qualifications, enhance the professional quality of students, enrich students' professional emotions.

4) Strengthen the joint training of schools and enterprises. The company has improved the practice training base for students. The school invites corporate alumni to enter the campus to carry out vocational lecture education, and schools and enterprises cooperate to develop students' professional quality development training. Further promote the joint training of schools and enterprises. Adhere to the combination of maritime culture construction and the cultural construction of shipping companies, integrate social enterprise resources, strengthen cultural exchanges and cooperation between schools and enterprises, form a joint force, and jointly educate people. Give full play to the advantages of nautical culture construction activities, enrich and improve the carrier of maritime culture construction, and further promote the school through the "Navigation Forum", "Navigation Festival" and "Navigation Skills Competition", "Navigation Summer Camp" and corporate title activities. Enterprises jointly cultivate and promote the improvement of students' professional quality.

3.2 The combination of semi-militarized management and self-management

1) Strengthen the semi-militarized management. In combination with reality, maritime schools and colleges use the management methods of military academies and universities to build practical and semi-militarized management models. Through the daily life and rest system, students' habits and behaviors will be strengthened and their habitual education will be strengthened to raise students' awareness of discipline and self-discipline. Through the military militia discipline system, continuously improve students' professional etiquette awareness. Through collective classes, collective training, and collective activities, students' awareness of teamwork and collaboration are enhanced. The effective implementation of these systems makes students' behaviors and thoughts resonating with the industry culture and experience the professional culture in person so that students can gradually understand, use and consciously abide by the quality requirements of the industry, so that the professional quality can be well cultivated.

2) The combination of institutional management and cultural atmosphere construction. Further strengthen the creation of a maritime culture atmosphere. Efficient use of ideological and political education positions will be incorporated into the year-round weekly meeting, situation and policy education and teaching, and students will be provided with ideological and political education that is targeted, effective, and culturally distinctive. Let students feel the charm of seafaring culture, let students establish a solid ideal and belief, and enhance the passion of seafaring culture. As the system construction, navigation colleges constantly create a nautical atmosphere and strengthen the construction of maritime culture. On the one hand, it needs to increase investment to provide a strong material basis. For example, the construction of marine teaching buildings, navigation museums, navigation fitness training centers, and water training bases, and the use of the "Xinghai" and "Fuhai" internships have provided powerful guarantees for marine students. The sense of professional identity of students has been enhanced, and the sense of mission of students dedicated to the shipping industry has been strengthened. On the other hand, teachers and students need to brainstorm and work together. For example, teachers and students actively collect iconic slogans, outstanding alumni and other forms of deeds, etc., and actively arrange campus environments with industry characteristics. Furthermore, in terms of creating classroom atmosphere, professional teachers must integrate the cultural characteristics and corporate spirit of the industry into classroom teaching. Strengthen the construction of industry culture from institutional culture, material culture, behavior culture, spiritual culture and other dimensions.

3) Further improve students' self-management skills. Through the establishment of platforms, thematic education, community organizations, etc., to enhance students' self-management awareness. Inspire students' collective awareness, competition awareness and awareness of urgency, so that students continue to become self-discipline, self-reflection, self-education, self-improvement in learning and life, and constantly cultivate and enhance self-management capabilities.

4) Further improve the scientific level of student management. Through the rational establishment of class organizations and sound class systems, the construction of classes is strengthened. Different levels, hierarchical management, play an overall role. Identify student party members, activists who join the party, cadres of cadets, and general responsibilities, play an exemplary lead role, highlight the

leadership role of student party members and key student cadres, give full play to the backbone of general student cadres and activists who join the party, and emphasize the general classmates' organization. Concepts and collective consciousness. Adhere to the problem-oriented and goal-oriented combination, through the target mechanism, assessment mechanism, supervision mechanism, reward and punishment mechanism to improve student management work of planning, pertinence and awareness.

3.3 Combination of semi-militarized management and services

1) Strengthen professional psychological quality training. The goal of nautical student graduate training is to engage in ocean-going work. The working environment is complex and closed. The cultural differences among seafarers, different lifestyles, and monotonous life make the crew's psychological problems prone to develop. The cultivation of psychological quality requires long-term training, nurturing and strengthening. Therefore, colleges and universities must strengthen the psychological health education of college students. Through psychological health education lectures, psychological knowledge tests, psychological fun activities, etc., it guides students to recognize the importance of mental health for growth and enable students to actively learn mental health knowledge. The combination of mental health knowledge popularization and mental health counseling, regularly conduct individual student psychological counseling interviews to identify problems and solve problems in a timely manner.

2) Strengthen career planning guidance. Career planning refers to the individual's combination of his or her own situation, immediate opportunities and constraints, setting career direction and career goals for himself, selecting career paths, determining education plans and development plans, and determining action time and action plans for realizing career goals. Nautical colleges and universities should strengthen students' professional cognition during career planning courses, professional introductions, and professional course education, and form a preliminary understanding of seafarers. By creating a maritime culture atmosphere, students develop good professional values. Through career planning and design competitions, students are encouraged to explore professional interests and professional characteristics and guide students in career planning.

3) Strengthen professional etiquette training. Workplace etiquette is a standard of behavior defined by people in professional activities. It has certain binding force on individual behaviors in the workplace, such as demeanor and grooming. Colleges and universities should continue to instruct students to enhance professional etiquette training such as dress etiquette, conversation etiquette, e-commerce etiquette, and catering etiquette through online admonishment, special lectures, and community activities, and guide students to learn how to use etiquette in a proper manner. Knowing, understanding, and saluting. Through the semi-militarized management of the military and military discipline system, students' professional etiquette is further strengthened.

4 Conclusion

The semi-militarized management of maritime colleges and universities serves as a management method between military management and general management. It is an important measure and approach to cultivate advanced seafarers. It will help cultivate students with good political quality, organizational discipline and teamwork spirit, and enhance the professionalism and leadership ability of the sailing students. Make students become highly qualified marine specialized talents with international competitiveness in terms of strong adaptability, strong working spirit, and strong sense of innovation.

This paper surveys and analyzes the status of current professional careers of sailing students through questionnaire surveys and interviews, pointing out that the semi-militarized management of maritime colleges and universities is a management method between military management and general management. It has positive significance in the promotion of students' professional qualities and further proposes ways and paths to cultivate professional qualities.

Fully understanding the significance of semi-militarized management, further optimizing semi-militarized management. We should continue to strengthen the professional accomplishment of nautical professional students and cultivate a group of high-quality integrated maritime professionals who can meet the requirements of international conventions. They have high comprehensive quality, a strong sense of safety, environmental protection and international market competitiveness, which can promote the development of the shipping industry.

Acknowledgement

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Literature Review on the Impact of Intercultural Contact on Intercultural Competence of College Students

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Abstract: Eversince the birth of the term, intercultural competence, it has been a hot issue in the fieldof linguistics both at home and abroad.Substantial research on intercultural competence has hence been carried out and turned out to be fruitful. The present paper，after employing the method of literature investigation, reviewsthis research field related to the definition of intercultural competence and intercultural contact, and the relationship between them. Some analysis of concepts and implications for English teaching are presented as well. Thus, this paper aims at stressing that it is necessary for college English teachers to integrate intercultural contact with English teaching.What's more, this paper also hopes to give some insight into later scholars who carry out cultural research.

Key words: Intercultural competence; Contact hypothesis; Intercultural contact; Review

1 Introduction

With the development of economic globalization, China has more chances to engage in international affairs, and the huge potential of the Chinese market hasattracted a large number of foreign-funded enterprises to invest. Meanwhile, there are an increasing number of intercultural activities. However, in the model of traditional college English, more emphasis has been put on the cultivation of students' language knowledge so that college English teachers neglect the development of students' intercultural competence. For the reform of personnel training model in college, it is urgent to cultivate international talents who analyze some issues with international lens and are equipped with good intercultural communicative competence. What's more, with the popularization of the Internet, more and more college students have opportunities to interact with foreigners and contact with cultural products from other countries. Based on this, these different intercultural manners and paths have largely influenced the intercultural communicative competence of college students while there are a few studies on it, especially the research on the influence of intercultural indirect contact. Therefore, this article will comprehensively review the theory of intercultural competence, intercultural contact and intercultural indirect contact and relevant research in order to give some sights for later scholars to carry out research activities in this field.

2 The Study of Intercultural Competence at Home and Abroad

2.1 The study of intercultural competence abroad

For the purpose of cultivating international talents, domestic and foreign scholars have made great progress in intercultural research. In order to define the ability of international talents who can adopt to the international market, scholars have made a series of explanations on it, such as intercultural communicative competence, intercultural competence, intercultural sensitivity, cultural competence, global capabilities, and intercultural regulation (Chen & Starosta, 1996; Byram, 1997; Fantini, 2000; Porter, 2004: Deardorff, 2004; Yang Yang, 2009; Xu Lisheng, 2011; Behrnd & Porzelt, 2012).Although the expressions of these terms are different, scholars stillhold the same view on the detailed contents of these terms.

When it comes to the definition of intercultural competence,intercultural competence, as a special interpersonal communicative capability, should include five basic elements, namely, motivation, knowledge, skill contextand effect (Spitzberg&Changnon, 2009). Furthermore, intercultural competence requires adequate knowledge, appropriate motivation and well-trained actions (Lustig& Koester, 2007).Spencer-Oatey and Franklin define this as the ability of communicators from different cultural backgrounds to implement effective and appropriate verbal or non-verbal communication behaviors and to deal with the psychological and communicative consequences of communicative behaviors (Spencer-Oatey&Franklin, 2009). Perry and Southwell point outthat intercultural competence refers to the ability of people with different cultural backgrounds to interact effectively and appropriately(Perry&Southwell, 2011).Johnson et al. defined the intercultural competence from the perspective of international business. Intercultural competence in international business means that an

individual can use a set of knowledge, skills, and personal attributes to succeed in working with people from different cultural backgrounds in different countries (Johnson et al, 2006). From the above discussion, it indicates that intercultural competence needs to be reflected in certain contexts and emphasizesthe characteristics of communicating with members of other cultures. Then, the achievement of intercultural communication needs to equip interlocutors with the motivation, knowledge, and some skills of communication. And finally, interlocutors show a series of behaviors that are consistent with the social norms.In order to draw an objective conclusion, intercultural scholar Deardorff, after collecting internationally renowned intercultural communicators' opinions on intercultural competence, findsthat the definition of intercultural competence with the highest academic acceptance is that communicators can carry out appropriate and effective communication activities based on their own intercultural knowledge, skills, and attitudes in anintercultural environment (Deardorff, 2006). In other words, under intercultural circumstance, it is necessary for communicators to master the cultural knowledge of other countries, to put the attitude right, and then to use appropriate language and non-linguistic skills in order to complete communicative activities.This coincides with the previous view. However, intercultural activities are not only the expression of external behaviors, but also the changing process of communicative mental activities.Therefore, in order to further elaborate and evaluate intercultural competence, Deardorff proposes the famous intercultural competence model ---- pyramid model in her recent research.

DESIREDEXTERNAL OUTCOME
Behaving and communicating effectively and appropriately (based on one's intercultural knowledge, skills and attitudes) to achieve one's goals to some degree

DESIRED INTERNAL OUTCOME
Informed Frame of Reference/Filter Shift
Adaptability (to different communication styles & behaviors; adjustment to new cultural environments);
Flexibility (selecting and using appropriate communication styles and behaviors; cognitive flexibility);
Ethno relative view;
Empathy

Knowledge & Comprehension:
Cultural self-awareness;
Deep understanding and knowledge of culture (including contexts, role and impact of culture & others' world views);
Culture-specific information;
Sociolinguistic awareness

Skill:
To listen, observe, and interpret
To analyze, evaluate, and relate

Requisite Attitudes:
Respect (valuing other cultures, cultural diversity)
Openness (to intercultural learning and to people from other cultures, withholding judgment)
Curiosity and discovery (tolerating ambiguity and uncertainty)

Figure 1   Pyramid Model of Intercultural Competence (Deardorff, 2006, 2009, 2017)

This model shows the communicators' psychological process and hierarchically explains the level of competence to be achieved in different stages.In her model, there is necessary attitude at the bottom of the tower, knowledge and understanding and skills at the second level. Moreover, the relationship between knowledge and understanding and skills is interactive (Deardorff, 2006&2009). From Deardorff's pyramid model, attitude is placed in the first place, aiming at emphasizing that intercultural competence training should start with attitudes in that positive attitude can promote the mastery of intercultural knowledge and skills. And then, a series of knowledge and skills will further intrigue interlocutors' positive intercultural attitude. Therefore, positive attitude is an effective guarantee for intercultural activities.Regarding the understanding of the term, knowledge, the knowledge not only

refers to linguistic knowledge, but also includes domestic cultural knowledge and the cultural knowledge of target language. In intercultural communication activities, it is very necessary to stress the mastery of the cultural knowledge of target language because it can avoid the inappropriate behavior of communicative activities and directly affect their success. As for domestic cultural knowledge, it should be pointed out that communicators are representatives of the entire group behind them and influence other people's judgments on them in the process of communication. Therefore, they need cultural knowledge as a support to promote their own culture.The so-called skills mainly refer to the communicators' ability to handle cultural conflicts and differences in intercultural activities. They use some linguistic or non-verbal strategies to achieve the purpose of communication.Knowledge and skills are interactive. When knowledge is not enough, communicators will take advantage ofsome skills to make up for deficiencies in knowledge to complete communicative activities. This model puts forward some feasible suggestions for the assessment of intercultural competence, but intercultural activities are very complex in nature. The individual's intercultural competence does not always follow this model. In contrast to this model, Byram combines cultural teaching with intercultural competence. He proposes that intercultural competence consists of three elements, including, knowledge, skills, and attitude (Byram, 1997). Furthermore, this model has further differentiated the intercultural competence and intercultural communicative competence.In his model, intercultural communicative competence coversintercultural competence. After being equipped with basic intercultural competence, communicators still need to use the abilities of language knowledge, discourse and sociolinguistic knowledge that interact with each other, finally, cultivating the intercultural communicative competence. This model systematically explains the intrinsic relationship of each part of the intercultural communicative competence and has an impact on the curriculum of foreign language teaching. Intercultural competence is a concept often used by foreign scholars, but scholars also use the term "intercultural communicative competence" to express a series of behaviors in intercultural activities.For example, Ting-Toomeyintegrates theory with practice, arguing that intercultural communicative competence refers to the method by which the communicators can use intercultural knowledge to communicate sensitively and consciously (Ting-Toomey, 2007). After reviewing previous research findings, Wiseman believes that intercultural communicative competence refers to the knowledge, motivation, and skills needed to properly and effectively communicate with people from different cultural backgrounds (Wiseman, 2004). In Gudykunst's view, intercultural communication is defined as communication with people from different national cultural backgrounds, and scholars also limit this communication to the level of face-to-face communication (Gudykunst, 2003). Therefore, on this basis, Gudykunst (Gudykunst, 2004) proposes that intercultural communicative competence consists of three indispensable elements, namely, knowledge, motivation, and skills (Gudykunst, 2004). Spitzbergdefines the intercultural communicative competence as follows: "In general, intercultural communicative competence can be understood as a type of impression that this behavior is appropriate and effective in a particular context (Spitzberg, 2000). Imahori and Lanigan argue that intercultural communicative competence refers to the appropriate motivation, knowledge, and skill levels when native speakers and foreigners communicate. And then, these elements lead to effective interrelationships (Imahori& Lanigan, 1989). Regardless of intercultural competence or intercultural communicative competence, the above arguments correspond to Chen and Starosta's opinion thatintercultural competence emphasizes the importance of context in particular (Chen& Starosta, 2007). It is the result of the mutual influence of human beings and the social environment. Individuals cannot work alone to demonstrate the level of their intercultural competence.What's more, attitude, knowledge, and skillsare important elements consisting of intercultural competence.

2.2 The focus on intercultural competence at home

Although the domestic research on the intercultural competence started relatively late, it also makes some great progress.In the early days, domestic scholars also put forward different views on intercultural competence and intercultural communicative competence.Zheng Lihua proposes that intercultural competence mainly refers to the ability to communicate and cooperate with foreigners(Zheng Lihua, 2005).Liu Qisheng believes that intercultural competence is the ability to use language fluently (Liu Qisheng, 2004). That is to say, an individualis able to communicate in a foreign language context.Similar to foreign studies, the two statements all refer to the characteristic that people conduct communication activities with people from different cultural backgrounds.Regarding intercultural communicative competence, Wen Qiufang believes that intercultural competence ispart of intercultural communicative competence and that communicative competence is intertwined with intercultural competence to jointly form intercultural communicative competence (Wen Qiufang, 1999).

This view coincides with the model of intercultural communicative competence proposed by Byram (Byram, 1997). Chen Xin points out that, on the basis, intercultural communicative competence refers to the linguistic competence, pragmatic competence, and the ability of communicative practice necessary for thecompletion of communication in the process of intercultural communication (Chen Xin, 2004). Bi Jiwan believes that the focus of intercultural communicative competence lies in the three concepts, namely, intercultural competence, social cultural competence and intercultural communicative competence (Bi Jiwan, 2005). Zhang Hongling's opinion is that the ability of intercultural communicative competence can be defined as the fact that an individual masterssome cultural and communicative knowledge and employstheir knowledge to practical intercultural environment. Meanwhile, a person holds the attitude of tolerance and appreciation towards different cultures when coping with these challenges (Zhang Hongling, 2007). Chen Guoming argues that intercultural communicative competence is an ability to take appropriate and effective actions in a given environment and receive desired responses, including intercultural sensitivity, intercultural awareness, and intercultural skills (Chen Guoming, 1997). (Jia Yuxin, 1997) regards intercultural communicative competence as an organic entity, and believes that intercultural communicative competence includes the basic system of communicative competence, emotion and relationship, plot competence and communicative strategies (Jia Yuxin, 1997). However, with the continuous development of research, later scholars tend to understand the two as the same concept.Yang Ying and Zhuang Enping point out that the intercultural communicative competence is equal to the intercultural competence. They are the same concept because it is conducive to focusing on the development of communicative competence, intercultural awareness, thinking ability, verbal and non-verbal strategies in the process of intercultural communicative competence development (Yang Ying & Zhuang Enping, 2007). Furthermore, Hu Wenzhong is for this view, saying that these views aforementioned are theoretically valid. Given that most of the relevant academic literature does not distinguish between the two competnce, he tends to regard the two as the same ability. (Hu Wenzhong, 2013). However, in foreign language teaching, intercultural learning cannot be confused with intercultural communicative competence. (Wen Qiufang, 1999) thinks that the emphasis in foreign language teaching is to enable students to have the ability to handle cultural differences because of the cultural differences in intercultural communication, and to develop their language skills, pragmatic and strategic abilities, the sensitivity to cultural differencesand tolerance and flexibility in dealing with cultural differences (Wen Qiufang, 1999). It is undoubtedly overly simplistic to equate cross-cultural teaching with the entire content of cross-cultural competence in college English.Hu Wenzhong also points out that intercultural communicative competence consists of three parts, namely, knowledge, motivation, and skills (Hu Wenzhong, 2013).This means that communicators equip themselves with the ability of cognition, emotion, and behaviors, which is a big challenge for students to accomplish. Therefore, the intercultural communicative skills of Chinese students lag far behind their language skills (Chang Xiaomei, Zhao Yushan, 2012; Hu Yan, 2012, etc.). Integrating intercultural competence into English teaching has always been a hot topic in the reform of foreign language teaching in China, because in the traditional English teaching classroom, more emphasis is placed on the learning of language knowledge. As a result, there are a number of discussions about intercultural teaching models. (Hu Wenzhong and Gao Yihong, 1997) divide the purpose of foreign language teaching into three parts, including micro, meso, and macro levels. The first focuses on the language ability of students, which contains the development of language skills, such as pronunciation, vocabulary, grammar, and discourse knowledge, listening, speaking, reading, writing, and translation; The second, the communicative competence, which refers to the development of pragmatic competence, such as social language ability, discourse ability and strategic ability; The last one, the cultivation of social cultural competence, which includes language proficiency, pragmatic competence, and the ability of identification (this concept refers to the capability ofcomprehension, assessment, and integration). This training mode is based on language knowledge and finally accomplishes the goal of training students' intercultural competence as the course goes on (Hu Wenzhong & Gao Yihong, 1997). (Sun Shu-nu and Xu Li-sheng, 2013) emphasize that, from the perspective of constructivism, computer is used as a teacher-assisted tool to set specific cultural context and allow students to learn independently (Sun Shu-nu & Xu Li-sheng, 2013). Huang Wenhong uses empirical research to explore the cultivation of intercultural communicative competence in procedural cultural teaching, aiming at intriguing the enthusiasm of students and allowing students to actively participate in cultural teaching activities(Huang Wenhong, 2015).Li Yan and Zhang Weidong introduce the CDIO education concept into the intercultural competence training system and theoretically analyze the design of intercultural competence teaching (Li Yan& Zhang Weidong, 2013). Gu Xiaole, after discussing the model of

intercultural competence training in China, proposesanintercultural communicative competence and practice model, hoping to combine theory with practice and provide teaching ideas for the development of cross-cultural communicative competence of Chinese college students (Gu Xiaole, 2017). Domestic intercultural research is an extension of research abroad. On the basis of the actual situation in China, it integrates intercultural teaching into the classroom and cultivates students' language communicative skills.

Foreign research on intercultural competence makes full use of the mobility of population. Some developed countries need lots of labors from other developing countries, so international enterprise has the need to solve different cultural conflicts in order to achieve the mutual goal. Therefore, foreign research is closely related to business, and then extends to the language teaching.

Domestic research, different from foreign investigation, often links English teaching with the development of intercultural competence. With the policy of One Road, One Belt, it is very urgent for English teachers in college to change their teaching models and to incorporate intercultural competence into the class. In other words, college students, as the pillar of this country, should have the awareness to improve their intercultural competence. Thus, college teachers need to guide them.

3 The Study of Intercultural Contact
3.1 The concept and study of intergroup contact theory

With the acceleration of the global integration process, the people of the world are gradually living in the same village ---- the Earth. However, various ethnic groups are still relatively isolated.Frequent exchanges and contact are very necessary for us toachieve the purpose of mutual understanding. Only in constant contact can all groups of people be familiar with each other, become close and finally, establish a good friendship.Since the Second World War, the United States, as a multi-ethnic country, has deeply realized that it must make efforts to solve the internal contradictions amongethnic groups and eliminate prejudice among various ethnic groups, to realize the unification of the entire countryand to prevent the occurrence of separatist activities. For this, as early as the 1950s, social psychologist Robin Williams carried out a research on the social contacts and ethnic attitudes of four towns in different regions of the United States (Williams, 1964). It is shown that the contact between the mainstream whites and members of one or more relevant minorities can significantly reduce prejudice against these minority groups. The research of Robin Williams and others lays the foundation for the formation of intergroup contact theory.Finally, in 1954, the famous American psychologist Allport proposed intergroup contact theory in his classic book *The Nature of Prejudice*.In his view, positive contacts between members of different groups can improve intergroup relationships and reduce negative group biases.Specifically, the main content of his intergroup contact theory is that, under best conditions, the main way to reduce intergroup bias is to contact with external groupsthat people do not belong to. The best intergroup contacts must meet the following four conditions, namely, equal status, common goals, inter-group cooperation and the support of authorityand law. Based on the Allport's contact hypothesis, other scholars conduct detailed studies on the four conditions and interpret them as follows: (1) Equal status: In intergroup contact, both groups are expected to have equal status (Cohen & Lotan, 1995), and the contact with outsiders in an equal atmosphere will be more productive (Brewer & Kramer, 1985). (2) Common goal: With the positive attitude and clear goal, the two groups need to pay their joint effortsto reduce prejudice by means of contact.For example, in a team composed of athletes of different races, team members must cooperate with each other to achieve the common goal of winning. Meanwhile, the realization of this common goal has also strengthened the process of cooperation (Chu & Griffey, 1985).(3) Intergroup cooperation: The common goal plays a vital role in a situation in which there is a cooperative relationship, not a competitive relationship between groups (Gaertner et al., 1999). (4) The support of authorityand law: Both groups are more likely to contact with each other with the support form authority and government. Such contacts are also more effective (Landis, Hope, & Day, 1984; cited in Pettigrew, 1998).The four conditions aforementioned are all proposed on the basis of the best contact conditions.As research goes on, Pettigrew and Tropp (2006) proposes that intergroup contact does have the effect of reducing intergroup bias, but the best conditions for intergroup contacts proposed by the intergroup contact theory are not necessary conditions for good intergroup contacts (Pettigrew & Tropp, 2006). The existence of these conditions is indeed conducive to better inter-group contacts. The support of authority and law is the most important elementof them. However, without these conditions, intergroup contact can still play a role in reducing intergroup bias. (reference to Li Sensen, Long Changquan, Chen Qingfei, Li Hong, 2010). Although this analysis raises questions about Allport's

optimal contact context, it also proves that contact does reduce group bias and regulate inter-group relationships. In addition to the exploration of the context of contact hypothesis, some scholars have discussed the mechanism of contact to reduce prejudice.For example, Dovidio believes that the mechanism for reducing bias in intergroup contact theory includes four aspects: interdependence among groups, intergroup interactions, emotional factors, and cognitive factors (Dovidio, 2003). Among them, Sherif et al. (Sherif, Harvey, White, Hood, & Sherif, 1961; cited in Dovidio et al., 2003) believes that the interdependence among groups has a direct effect on attitudes and behaviors among groups.Positive intergroup interaction can also enable both groups to face the entire external community in a positive manner (Dovidio et al., 2003) and to adapt to the new environment. Emotional factors include both positive and negative emotions. The meta-analysis of Pettigrew and Tropp proves that such emotional factors as media play an important role in the course of reducing bias.(cited in Li Sensen, Long Changquan, Chen Qingfei, Li Hong, 2010). Pettigrew points out that understanding others is an important step in intergroup contact to improve intergroup relationships (Pettigrew, 1998). Even though the intergroup contact hypothesis has been proved to have some effects on reducing intergroup bias, it also has its limitations.Amir suggests that contact under optimal contact conditions would reduce bias, but he also emphasizes that such reduction is unlikely to influence the entire group.Furthermore, Amir believes that contact under adverse conditions may increase prejudice and intergroup tension (Amir, 1969&1976).Forbes, a political scientist, believes that intergroup contact can only reduce biaswhen the analysis is conducted to individual (Forbes, 1997). (Stephan, 1987) acknowledges that intergroup contact may potentially reduce bias, but he stresses thatthe influence of intergroup contact on prejudice is complex (Stephan, 1987).The above scholars believe that the communication itself is very complicated, and the theory that is verified in individuals does not have the same effect on the entire group.What is more, in real life, people rarely have the desire tointeract.In the United States, for example, blacks and whites still live in their own communities, go to different schools, and have their own social networks.Based on this phenomenon, scholars have expanded the forms of intergroup contact from the initial face-to-face contact directly to the subsequent indirect contact, and finally included the indirect contact in the form of imaginary contact.In this regard, Taylor, Pham, Rivkin, & Armor find that psychological imagination has a positive effect on academic and athletic performance (Taylor, Pham, Rivkin, & Armor, 1998). Turner et al. proposed that imaginary intergroup contact has a positive effect on intergroup attitudes. In a series of strategies to improve intergroup relationships through contact, imagining contact as the first step in continuum contact will more effectively mitigate and reduce prejudice (Crisp & Turner, 2009). Yu Haitaoholds that imaginary contact is more indirect in nature than contact forms such as face-to-face contact and extended contact (Yu Haitao, 2013). Its indirectness not only makes imaginary contact challenging, but also enhances the practicality of imagining contact and expands the scope of application of intergroup contact theory.

3.2 The oversea focus on intercultural contact

The intergroup contact theory itself belongs to the category of social psychology. With the background of the United States, it is characterized by inter-culture because of its birth for the purpose of solving the conflicts among races. Foreign scholars have always conducted a lot of research on intercultural contact.Smith designs an experiment before the intergroup contact hypothesis is formally put in place. He makes a group of white students from Columbia University conduct a series of social contacts with the leaders of the New York black community over the weekend. The results show that college students who had social contact with black people has improved their attitudes towards blacks and are more willing to communicate with them.Deutsch M. and Collins M. E investigate cross-racial apartments and apart-mixed apartments, and find that white people living in a mixed-living community are more likely to engage in cross-racial communication with blacks.Similarly, Nesdale and Toddcarry out a survey on the intercultural contact of 76 Australian and international students in a dormitory at an Australian university.Through interventions, they find that the intercultural contact of the same dormitory would affect the students' intercultural knowledge and the degree of openness (Nesdale &Todd, 2000). R.T. Halualani interviews80 students from a multicultural university in the United States and askes students to describe their definition of cross-cultural contacts by means of qualitative method.The results show that the atmosphere of a multicultural university has an impact on students' cross-cultural awareness (R.T. Halualani, 2008). Van Laar, Levin, Sinclair, & Sidanius, 2005; Shook &Fazio find that students of different races or beliefshelp reduce prejudice among groups by virtue of living in the same dormitory, regardless of whether they are randomly assigned or willing to choose. And the attitude toward roommates will gradually improve with the increase in grades.This direct contact with roommates is helpful to reduce not only cultural bias against roommates but the prejudice

against students of other races if a school or dormitory has students of other races (Van Laar, Levin, Sinclair, & Sidanius, 2005; Shook & Fazio, 2008). And their hold more tolerance to other ethics (Pettigrew &Tropp, 2000; Van Laar et al., 2005). This shows that if the learner has always lived with people from other cultural backgrounds, his attitude toward other groups that his roommates does not belong to will also be improved. When he interacts with people from more cultural groups in real life, he can quickly adopt to the new cultural context. In this process of psychological adjustment, foreign roommates acted as an intermediary, and learners extended personal direct contact experience to other groups.In addition to the above intercultural contact on multicultural campuses, foreign scholars have also combined intercultural contact with second language acquisition in order to explore the impact of cross-cultural contacts on learning attitude and motivation.Studies by Clément and Kruidenier have shown that positive and enjoyable contact experiences can enhance the self-confidence of language learners, and thus increase learners' lasting learning motivation on second language learning (Clément and Kruidenier, 1983). Noels et al. examines the relationship between intercultural contact and the learning self-confidence of second language acquisition in terms of identity and psychological adjustment (Noels et al., 1996). The studies of Clément et al. also confirm that frequent and positive contact not only can improve the confidence of language use, but also can affect the language learners' identity and accelerate their cultural adaptation process in multi-group context (Clément et al., 2001; cited from Xu Zhixin, 2017). At beginning, Drnyei and colleagues explore the impact of intercultural contact on second language learners' motivation and behavior (Drnyei& colleagues, 2006). They conduct a survey on language learning, including more than 13,000 Hungarian 13-14-year-old foreign language learners in 1993, 1999 and 2004, respectively. On the basis of survey results, they construct the attitude-motivation chart. This chart describes the impact of cross-cultural contact on language propensity and motivational learning behavior of foreign language learners in the context of language globalization.In fact, language and culture are intertwined. Culture can cultivate the learners' interest in language learning from the perspective of culture teaching. Students can acquire languagewhile also instilling cultural knowledge. This has implications for foreign language teaching.

3.3 The focus on intercultural contact at home

Domestic research on intercultural contact is relatively rare. In this regard, well-known intercultural researcher Hu Wenzhong proposes that direct contact with local culture and direct communication with native speakers is the most effective way to improve intercultural communicative competence (Hu Wenzhong, 1999). Liao Cihui and Li Xiangqi link cultural contact with language contact to explain the types and mechanisms of American English evolution.They define the cultural contacts as follows: Cultural contact refers to the process of changing one's or both cultural systems due to the contact of different culture and traditions.This kind of cultural contact can be divided into three types, namely,acculturation, assimilation, andAmalgamation.Accumulation refers to the fact that when two groups come into contact, one group directly or indirectly intervenes in another group's material civilization, traditional customs, beliefs, and language. Assimilation refers to the process in which different individuals or groups of national traditions are integrated into the dominant culture of the society. Usually, they are immigrants or isolated minorities.Thorough assimilation is rarely seendue to contact with major cultureand the inclusion of major culture in their lives. And they lose most of the original cultural features and embrace new culture. Therefore, the changes are so large that they cannot be distinguished from the other.Amalgamation refers to the fact that when the two cultures come into contact with each other, the cultural factors of each other are combined in the mixing process instead of being eliminated (Liao Cihui&Li Xiangqi, 2009). Chen Hui, Che Hongsheng and Zhu Min comment on the intercultural adaptability of people living abroad.In the study, they talk about the problem of cultural distance (Babiker, Cox and Miller, 1990). The culture distance hypothesis predicts that the greater the culture distance between the occupant's culture and the country of residence is, the more difficult their cultural adaptability is (Chen Hui, Che Hongsheng &Zhu Min, 2003). Then, in intercultural communication, communication between communicators who are in Asian cultural circle is more effective than that of Asians and Europeans.Wang Tianjun uses qualitative analysis method to study the development of intercultural competence of Chinese students and international students in China by observing students of Fudan university.The study is different from other studies focusing on Chinese students' intercultural communicative competence. From the interaction between international students and local Chinese students, itis found that the longer international students stay in China, the higher their Chinese language ability is and the more adaptability to Chinese culture (Wang Tianjun, 2010). Peng Renzhong and Wu Weiping use empirical analysis to explore the intercultural contact paths of Chinese college students.The study finds that Chinese college students' intercultural contact can be summarized

as two types, namely, direct contact and indirect contact (Peng Renzhong & Wu Weiping, 2016). Xu Zhixin analyzes the structure of college students' English learning behavior from the perspective of intercultural contact. He draws on the following conclusions: (1) Learners believe that intercultural contact can improve learning motivation; (2) Intercultural contact can help learners to understand English native speakers; (3) Intercultural contact can ease learner communication anxiety (Xu Zhixin, 2017).

4 The Focus on the Relationship between Intercultural Competence andIntercultural Contact

At first, the contact hypothesis is proposed to eliminate intergroup prejudices, aiming at the constant understanding between different ethnic groups in the process of communication, establishing a good inter-group relationship, and eventually resolving conflicts and conflicts and reaching consensus.In the early days,intercultural researcher Hu Wenzhong proposes that direct contact with local culture and direct communication with native speakers is the most effective way to improve intercultural communicative skills (Hu Wenzhong, 1999). In the study of Hungarian students' language learning, Kormos and Csizér define theintercultural contact as follows: For most students, intercultural contact includes not only direct and indirect contact with native speakers or non-native speakers of the target language, but also the contact with cultural products of target language (Kormos & Csizér, 2007). What's more, the research results show that intercultural contact promotes students' intercultural competence development and improves the motivation of language learning.This set of intercultural contact theoryis used by Peng Renzhong and Wu Weiping to study pathways for Chinese college students' intercultural competence. After dividing ways of direct contact and indirect contact, a factor analysis method is adopted to explore the impact of six key factors on the intercultural competence of college students, namely, domestic social media, foreign social media, domestic intercultural activities, foreign intercultural activities, cultural products, and multimedia and multimedia courses. The validity of table and the analysis of final results are as follows

Table 1   Reliability Analysis of Chinese College Students' Cross-cultural Contact Scale
(cited from Peng & Wu, 2016)

Dimensions	The number of items	Combination reliability (CR)	Average extraction variance (AVE)	*Cronbach's a* dimension	entity
Domestic social media（DSM）	8	0.898	0.525	0.881	0.892
Foreign social media（FSM）	3	0.865	0.682	0.869	
Domestic intercultural activities（DICA）	6	0.858	0.504	0.836	
Foreign intercultural activities（FICA）	6	0.869	0.527	0.836	
Cultural products（CP）	5	0.888	0.614	0.894	
Multimedia and multimedia courses（MMC）	3	0.821	0.605	0.823	

Table 2   Correlation Coefficient Table of six Chinese College Students' Intercultural Contact Pathways
(cited from Peng & Wu, 2016)

	Domestic social media	Foreign social media	Domestic intercultural activities	Foreign intercultural activities	Cultural products	Multimedia and multimedia courses
Domestic social media	1					
Foreign social media	0.514	1				
Domestic intercultural activities	0.338	0.288	1			
Foreign intercultural activities	0.454	0.386	0.254	1		
Cultural products	0.075	0.063	0.065	0.056	1	
Multimedia and multimedia courses	0.051	0.044	0.042	0.039	0.670	1

From the two tables, it shows that direct contact or indirect contact has a certain influence on the improvement of the cross-cultural competence of Chinese college students, but the difference lies in the

degree of influence of every pathway (Peng Renzhong & Wu Weiping, 2016). Intercultural contacts can also intrigue students' interest in English learning and promote the mastery of language knowledge (Xu Zhixin, 2017). And then, the improvement of language knowledge ability can also improve students' intercultural competence.

The intergroup contact theory that comes into being in America is from psychology. It is characterized by communication among different peoples by means of verbal or non-verbal behavior. In the process of scholars' investigation, they enrich the way of contact and combine intercultural study with this theory. What's more, there are different contexts in different countries. However, no matter how the contexts change, it aims at solving cultural conflicts and reaching the goal of peace. Even though it is applied to English teaching to cultivate global talents, it serves for effective communication. Furthermore, today's campus has more international students than before. The contact with other countries is also helpful to erase conflicts in college.

5 Conclusion

It is rarely seen that some research on the influence of intercultural contact on the intercultural competence of Chinese college students.After elaborating the details of intercultural competence and intercultural contact, thisarticle has also combed the relationship between the two.It is convinced that intercultural contact doesplay an important role in promoting intercultural competence of college students.Therefore, in today's foreign language teaching class, English teachers should take some measures related to intercultural contact to cultivate intercultural competence of college students. Although this paper has reviewed a lot of literature, it does not analyze some ways of intercultural contact on the impact of intercultural competence of college students. In the future, scholars can deeply investigate this.

Acknowledgement

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Influence of Perceived Organization Support on Airport Staff's Safety Performance: Deviation Behavior as a Mediator

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Abstract: This paper aims to find out the factors which affect safety performance of airport staff, discuss the influence mechanism of how perceived organization support acting on safety performance of airport staff. It studies on the impact of perceived organization support on safety performance and mediating effect of deviation behavior, SPSS 19.0 is used to do data analysis after recycling questionnaire data. Research result indicates that: Perceived organization support has a significant positive influence on safety performance, perceived organization support has a significant negative influence on deviation behavior, deviation behavior has a significant negative influence on safety performance,deviation behavior plays a significant partly mediating effect between perceived organization support and safety performance.
Key words: Airport staff; Perceived organization support; Safety performance; Deviation behavior

1 Introduction

With air travel increasingly welcomed by public, civilians' attention to aviation safety is continued rising as well. As a result, aviation insecurity incidents were highly exposed because of the widespread media coverage. The operation of the airport is very important for the development of the aviation industry. The safety problems of the airport can't be underestimated, and psychological safety of staff has a direct impact on the safety accidents (Yan Guiqing,2013).

At present, scholars pay much attention to the influence of perceived organization support on employee work performance, such as the summary of researches on the influence of perceived organization support on the performance of knowledge workers (Teng Ya, 2015). Safety performance of employees is divided into safety result and safety behavior, and to a great extent, safety performance of employees affects the safety performance of enterprises (Christian. M. S. Bradley. J. C. Wallace J C.et al, 2009). Foreign scholars have been maturing their research on safety performance. Domestic scholars have studied the relationship between perceived organization support and safety performance (Liu Zude, Wu Fei, Chen Yang, et.al, 2016). Workplace deviation behavior is a kind of spontaneous behavior, if members of the organization violate the existing system of policies, which will make the benefits of members of organization or the organization itself damaged, this behavior is defined as deviation behavior, including absenteeism, late, negative work, verbal attacks on colleagues, framed colleagues, verbal abuse and others (Robinson. S. L. Bennett. R, 2000). Domestic scholars haven't pay much attention to the influence of devotion behavior on safety performance, especially for deviation behavior as a mediator between two variables.

The purpose is to explore the impact of perceived organization support of airport workers on safety performance. Deviation behavior is selected as a mediator. It is aimed to provide reasonable and effective suggestions to improve the safety performance of airport.

2 Theoretical Basis and Research Hypothesis

2.1 Perceived organization support and safety performance

Employees form an overall feeling about whether the organization cares about their own well-being and whether their contributions to the organization are valued. Social exchange theory shows that employees who are motivated by perceived organization support will make more autonomous behaviors as rewards in support of the organization (Rhoades L, Eisenberge R., 2002). Foreign scholars have carried out a large number of empirical studies on enterprises and employees. The results show that perceived organization support has a significant influence on work performance of employees (Schermerorn. J. R. Gardner. W. L. Martin. T. N, 1990). Employees who think that organizations value and reward their contributions will perceive the organization's support which can be conducive to maintaining a better mental state, and improving their work performance, so we can see that perceived organization support has a positive influence on the work performance of employees (Eisenberger. R. Rhoades. L. Cameron. J, 1999).

Safety performance falls into the category of work performance. Safety performance can be

classified as safety result and safety behavior. Safety result refers to tangible results such as unsafe incidents or accidents. Safety behavior refers to employees' performance behavior (Christian. M. S. Bradley. J. C. Wallace J C.et al., 2009). This paper takes the airport staff as study object, and discusses the safety performance of airport staff. It is concluded that safety performance is the consequence of individual safety behavior. We argue that perceived organization support will have a positive influence on employees' safety performance. The following research hypothesis is proposed:

H1: Perceived organization support has a positive influence on safety performance.

2.2 Perceived organization support and deviation behavior

Previous studies have shown that perceived organization support has an impact on individual behavior. When employees feel perceived organization support, they will choose to enhance organizational citizenship behavior in return (Eisenberger. R. Armeli. S. Rexwinkel. B, 2001). Improving perceived organization support has good predictability on organizational citizenship behavior (Ling Wenquan, Yang Haijun, Fang Liluo, 2006). So the improvement of employees' perceived organization support has a positive influence on organizational citizenship behavior (Wei Jiangru, 2010). In addition, increasing perceived organization support can reduce the rates of employee turnover (Rhoades. L. Eisenberger. R, 2002). Social exchange theory also argues that employees can reap their work performance by retiring as a way of retiring in return for perceived organization support(Rhoades L,Eisenberge R, 2002).What's more, perceived organization support theory shows that, once employees feel that the organization values their contribution and employee welfare is concerned by the organization, they will increase the sense of organizational responsibility and tend to make various behaviors conducive to the development of the organization (Eisenberger. R. Huntington. R, 1986). The research shows that increasing of perceived organization support leads employees to make emotional commitment to the organization, and makes employees feel a sense of belonging (Chen. Z. X. Eisenberger. R Johnson. K. M.et al, 2009), which can reduce the generation of negative behaviors such as employee absence and negligent work (Tian Xizhou, Xie Jinyu, 2010), and it has a negative impact on employee's negative behavior (Rhoades. L. Eisenberger. R, 2002). We argue that the promotion of perceived organization support is conducive to reducing the incidence of employees' deviation behavior and has a negative effect on deviation behavior. The following research hypothesis is proposed:

H2: Perceived organization support has a negative influence on deviation behavior.

2.3 Deviation behavior and safety performance

Existing studies have shown that employees' unsafe behaviors will have an impact on safety performance (Yang Xiao, Luo Fan, 2017). Foreign scholars have proposed an effective method to solve the occupational safety and health challenge, which uses behavioral methods to improve the safety performance of employees in order to reduce the occurrence of employee unsafe behaviors. This method has great guiding significance on reducing the incidence of unsafe incidents (Krause. T. R. Seymour. K. J. Sloat. K. C. M, 1999).

Domestic scholars discuss the relationship between behavior and employees 'safety awareness, and propose the following views: As for enterprises which have better safety culture system, managers can effectively prevent employees' unsafe behaviors through behavioral corrections. In addition, safety awareness does not directly affect employees' safety behaviors, but indirectly influences them through mediators such as work pressure and safety knowledge (Zhang Jiang- shi, Fu Gui, Liu Chaojie, et.al, 2009).

After continuous theoretical and empirical researches, the influence of employee's unsafe behavior on safety performance of enterprises has been confirmed by domestic and foreign scholars. Deviation behavior belongs to unsafe behavior.We propose that reducing employees' deviation behavior can effectively improve their own safety performance.The following research hypothesis is proposed:

H3: Deviation behavior has a negative impact on safety performance.

2.4 Mediation test

When employees perceive the importance and support from their enterprise, they will give rise to the return of perceived organization support to the enterprise so as to enhance the organizational citizenship behavior (Eisenberger. R. Armeli. S. Rexwinkel. B, 2001), reduce their negative behaviors, deviation behaviors, regulate their own safety behaviors and ultimate their own safety performance and even improve the safety performance of enterprises.

Domestic scholars have less researches on the relationship between perceived organization support and safety performance, especially the research referring to deviant behavior of employees which is a mediator. It is aimed to explore the influence of airport staff's perceived organization support on safety performance, and select the deviation behavior as a mediator to explore the mechanism among the three

variables. The following research hypothesis is proposed:

H4: Deviation behavior has a mediating effect in the influence of perceived organization support on safety performance.

The theoretical model of this study is shown in Figure 1:
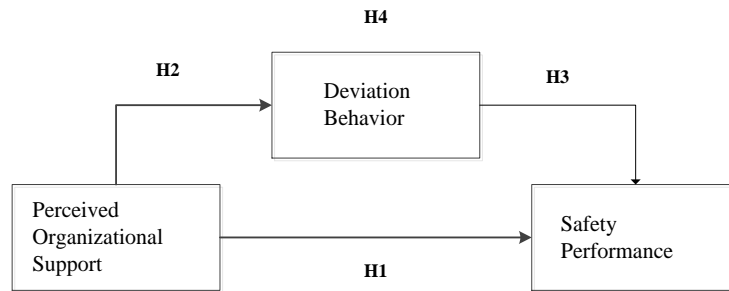
Figure 1   Research Hypothesis Model

3 Research Methods

3.1 Sample analysis

This study takes airport staff as the research object to study the influence of perceived organization support on safety performance and the mediating effect of deviation behavior in the mechanism. Questionnaire distribution channels mainly were mail commission and network questionnaire. A total of 230 questionnaires were distributed, and 210 questionnaires were finally returned, the questionnaire recovery rate reaches 91.3%. There are 190 questionnaires valid and effective questionnaires is 90.5%.

The proportion of men interviewed is 77.9%.The largest proportion of the population is 20-30 years old, accounting for 59.5%. The number of tertiary education holders is higher than that of other academic staff members, accounting for 40.5%."4 - 10 years" accounts the most. In terms of job categories, 53.6% of respondents were professional technicians.

3.2 Variable measurement

The 36-item perceived organization support questionnaire developed by Eisenberger et al has received extensive attention which is adopted in this paper. However, due to the large number of entries in this scale, Eisenberger's six-item short form was proved to be a good fit by meta-analysis (Eisenberger. R. Armeli. S, 2001). The reliability of perceived organization support scale is 0.832.

The scale of deviation behavior which was developed by Robinson et al. includes two dimensions of organizational deviation behavior and interpersonal deviation behavior (Robinson. S. L. Bennett. R. J, 2000), which includes eight question. The reliability of deviation behavior scale is 0.861.

This paper adopts the safety behavior scale (Neal. A. Griffin. M. A. Hart. P. M, 2000) for the safety performance measurement scale. The reliability of safety performance scale is 0.872.

4 Research Results and Analysis

4.1 Correlation analysis

In this part, Pearson coefficient, the correlation between the five variables were analyzed, and the results are shown in Table 4.1.

Table 1 Correlation Analysis

		Perceived organization support	Interpersonal deviation behavior	Organizational deviation behavior	Safety participation behavior	Safety compliance behavior
Perceived organization support	Pearson	1	-.530**	-.418**	.576**	.519**
			.000	.000	.000	.000
	N	190	190	190	190	190
Interpersonal deviation behavior	Pearson	-.530**	1	.577**	-.550**	-.476**
		.000		.000	.000	.000
	N	190	190	190	190	190
Organizational deviation behavior	Pearson	-.418**	.577**	1	-.517**	-.443**
		.000	.000		.000	.000
	N	190	190	190	190	190

Continual Table 1

		Perceived organization support	Interpersonal deviation behavior	Organizational deviation behavior	Safety participation behavior	Safety compliance behavior
Safety participation behavior	Pearson	.576**	-.550**	-.517**	1	.531**
		.000	.000	.000		.000
	N	190	190	190	190	190
Safety compliance behavior	Pearson	.519**	-.476**	-.443**	.531**	1
		.000	.000	.000	.000	
	N	190	190	190	190	190

**. Significant correlation at .01 level (bilateral).

Correlation analysis shows that there was a significant correlation between three variables. Perceived organization support is significantly and positively correlated with safety compliance behavior and safety participation behavior. Perceived organization support is significantly and negatively correlated with interpersonal deviation behavior and organizational deviation behavior. Safety compliance behavior and safety participation behavior are significantly positively correlated with interpersonal deviation behavior and organizational deviation behavior. This is in line with the previous theoretical assumption that employees perceive that the company's emphasis and support on their contributions will generate returns to the organization for perceived organization support so as to enhance the organizational citizenship behaviors and reduce their own negative behaviors and deviation behavior, which tends to be more safety, ultimately improving their own safety performance and even the safety of businesses.

4.2 Regression analysis

Regression analysis aims to analyze variables of gender, age, education level, years of working, work category. Analysis results are shown in Table 4.2:

Table 2　Regression Analysis

Variables	Safety performance		Deviation behavior	
Controlled variable	Model 1	Model2	Model1	Model2
Gender	0.121	0.069	-0.165	-0.169
Age	-0.233	-0.095	0.106	-0.020
Education	0.113	0.049	-0.155	-0.141
Years of working	0.367	0.226	-0.163	-0.056
Work category	-0.049	0.008	0.013	-0.052
Dependent variables				
Perceived organization support		0.403***		-0.497***
Deviation behavior		-0.337***		
R2	0.115	0.500	0.075	0.308
ΔR2		0.385		0.233
F	4.093**	22.282***	2.574*	11.664***

*. Significant correlation at 0.05 (bilateral); **. Significant correlation at the .01 level (bilateral); ***. Significant correlation at 0.001 level (bilateral).

SPSS 19.0 software is adopted to get the regression analysis, the results show that:
(1) Perceived organization support has a significant positive influence on safety performance, P <0.001, H1 is supported;
(2) Perceived organization support has a significant negative effect on the deviation behavior, P <0.001, H2 is supported;
(3) Deviation behavior has a significant negative effect on safety performance, P <0.001, and H3 is supported.

4.3 Mediation effect analysis

SPSS 19.0 is used to verify the mediating effect of deviation behavior between perceived organization support and safety performance.

(1) Whether the regression coefficient C of the influence of perceived organization support on

safety performance is significant?

(2) Whether the regression coefficient A of the influence of deviation behavior on perceived organization support is significant?

(3) Whether the regression coefficient B of the influence of safety performance on deviation behavior is significant?

(4) Whether the regression coefficient C 'of the influence of safety performance on perceived organization support and deviation behavior is significant. If the coefficient C'is not significant, then deviation behavior has a complete mediating effect. On the contrary, if the coefficient C' is significant and | C '| <| C |, deviation behavior has a partial mediating effect.

The results are as follows:

The regression coefficient C is 0.403, P <0.001, which is significant. The regression coefficient A is -0.497, P <0.001, which is significant. The regression coefficient B was -0.337, P <0.001, which is significant. The regression coefficient C' is 0.268, P <0.001, which is significant, and the regression coefficient decreases from 0.403 to 0.268, indicating that the deviation behavior has a significant partial mediation effect. This confirms H4: Deviation behavior has a mediating effect in the effect of perceived organization support on safety performance.

5 Conclusion

5.1 Analysis results

We take the airport staff as the research object to study its influence on the safety performance under the mediation effect of deviation behavior.

(1) Perceived Organization Support has a positive influence on Safety Performance. Perceived Organization Support has a significant influence on the Safety Performance of airport staff. Employees think that organizations value their contributions and reward their contributions, perceive the support of organizations and promote the performance of their work effectively（LIU Zonghua, LI Yanping, MAO Tianping，2015）. It helps to maintain a better mental state, enhance the safety of work, and enhance its own safety performance.

(2) Perceived Organization Support negatively affects Deviation Behavior. Perceived Organization Support has influence on the performance of airport workers, and Perceived Organization Support may choose to enhance Organizational Citizenship Behavior in return. In addition, the improvement of Perceived Organization Support will reduce the turnover rate of employees. The improvement of Perceived Organization Support will encourage employees to make emotional commitment to the organization, thus reducing the negative behaviors such as employee absence and negligence. In the meantime, airport staff will reduce their own Organizational Deviation Behavior and Interpersonal Deviation Behavior, avoiding Deviation Behavior from absenteeism, lateness and negative work, verbal attacks on colleagues, fraudulent efforts by colleagues, and verbal abuse of others.

(3) Deviation Behavior negatively affects Safety Performance. Deviation Behavior of airport staff will lead to some unsafe incidents, or even major accidents, such as Organizational Deviation Behavior from negligent sabotage, intentional persecution of public facilities and other acts will affect the smooth progress of airport security, which will not only affect the airport staff's safety performance, but also affect the overall safety performance of the airport.

(4) Deviation Behavior plays a part of the intermediary role in the influence of Perceived Organization Support on Safety Performance. Employees who perceive the importance and support of their contribution to the enterprise will generate return on perceived organization support to improve organizational citizenship behavior and reduce their own negative behavior and deviation behavior, and ultimately to make their own safety performance and even the safety performance of enterprises improved.

5.2 Suggestions

5.2.1 Stimulate the airport staff's Perceived Organization Support

Emotional managers need to communicate with the airport staff in time to inquire about their recent work status or confusion, take the initiative to solve their problems, make it feel the organization for his emotional support. In the material may be appropriate to give staff encouragement. By enhancing employees' sense of perceived organization support, employees' perceptions of emotional and material support come from the initiative provided by enterprises instead of being forced to improve the job satisfaction of airport workers(Tan Xiaohong, Qin Qiwen,Pan Xiaofu,2007)and make more contributions to the airport dedication.

5.2.2 Pay Attention to the Influence of airport staff's Deviation Behavior on Safety Performance

Airport managers should emphasize team building in reducing deviation behavior. Firstly, establish a sound system of work to ensure that the work started in an orderly manner to promote the consistency of the team. Secondly, the team should be stimulated awareness of cooperation, so that employees unimpeded exchange of information, coordination of staff behavior and improve the cohesion within the airport staff.

5.2.3 Improve the safety performance of airport staff

Firstly, the company out to create a safe atmosphere. For example, setting up safety warning signs in the working area of the airport to enhance their own safety awareness by strengthening the guidance on safety behaviors of airport staff so that they can comply with airport safety procedures and ensure their safety during work so as to enhance their own safety performance. The second is to build airport safety culture. For example, establish and improve the safety education system, carry out the safety concept to the airport staff, combine the theory and practice to convey the latest safety knowledge and lessons learned. An employee's understanding of safety improves their willingness to comply with workplace safety procedures and motivates them to proactively improve safety programs.

5.3 Research prospects

The innovation point of this paper is to strengthen the influence mechanism of perceived organization support on safety performance, and fill in the gap of the study of the deviation behavior as the mediator between the two variables.

In the future research perspectives: First of all, this study defines safety performance as an individual level, considers safety performance as an individual safety behavior and its consequences, according to which safety performance is divided into two dimensions: safety compliance and safety participation. Future research can define safety performance as a tentative study at the organizational level. Secondly, the self-assessment method adopted in this study for measurement of perceived organization support, deviation behavior and safety performance can be combined with self-evaluation method and others' evaluation method in the future study to measure the three variables again to make the measurement more accurate. Finally, the impact of airport staff support on safety performance may be affected by regulatory variables, such as the management level of the airport. Future research may be further investigated by incorporating regulatory variables.

Acknowledgement

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Factors Contributing to Employee Motivation Through Leaders' Emotional Intelligence Competence

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Abstract: Emotional intelligence of a leader may play a significant role in employee's motivation and the overall success of an organization. The goal of this study is to find the factors of leaders' emotional intelligence that contribute to employee motivation within an organization. From the review of existing literature, the following five factors were identified to influence employee output: Self-awareness, Self-regulation, Motivation, Empathy and Social skills. A questionnaire was designed to capture the above factors, and this was administered to 375 secondary school teachers and their leaders, selected from eight institutions in the capital of Madagascar. These schools were selected since they were seen to be a representative sample due to their size and location. SPSS version 20 was used to perform correlation and regression statistical analysis. Results of the study revealed that there was positive impact of social skills, self-emotion and self-awareness on employee motivation.
Key words: Emotional intelligence; Motivation; Leadership; Factors

1 Introduction

Nowadays, emotional intelligence is attracting the public and private sphere, particularly since the relationship between emotional intelligence, employee's motivation and employee's performance has been clearer than ever. Emotional intelligence is an essential factor liable for determining success in life and psychological health seems to play essential part in shaping the contact between employees in their working environment. In the complicated environment of public and private organizations, change has to be managed in a very careful manner. Managers benefit greatly from emotional intelligence in coping with such unpredictable situations in the workplace. Managers are able to better understand and read emotional intelligence in others through the use of emotional intelligence. Emotional intelligence affects organizational areas as varied as selection of employees, teamwork, employee development.

In todays' context, motivation of employee is much essential for the success of any organization and leadership. Emotional intelligence is also a great contributor within different factors. Emotional intelligence plays a vital role in the development of an organization (Njoroge & Yazdanifard, 2014). Organizational performance and effectiveness greatly depend on leadership success.

The role of education in developing mental and physical faculties cannot be understated. For a teacher, it is a paramount to not have in depth knowledge of their subject, but also have the ability to convey this information to their students effectively. Educational institutions are bereft without the guiding hand of teachers. Teachers are of utmost important for an educational system. Trained teachers are much more likely to use emotional intelligence in imparting knowledge to students.

In order for educational institutions of Madagascar to function properly and provide a high standard education to students, it is important for them to identify the need for developing activities that improve emotional intelligence competence of the teachers and their leaders and equip them with the skills to deal with issues that requires high emotional intelligence. Ultimately, this will lead to the development of a stable and grounded society. The ability of an individual to respond favorably to working under pressure is significantly improved through having high emotional intelligence. In the light of this, it is necessary to conduct the study on the factors affecting employee's motivation through leader's emotional intelligence in the higher education institutions. There is a room for research in this particular area, mainly in the context of Malagasy public and private educational institutions.

2 Literature Review

Emotional intelligence has long been studied in the western countries. Emotional intelligence means an understanding for mental and physical growth and in various studies it is inter linked with job satisfaction, power to lead and achievement (Ruvalcaba-Romero, Fernández-Berrocal, Salazar-Estrada, & Gallegos-Guajardo, 2017). It is considered as an ability which has power to manage relationships and this term was used first time by Salovey in 1997 as cited by (Mayer, Caruso, & Salovey, 2016). Emotional intelligence is a combination of two types of intelligences i.e. inter personal and intra

personal intelligence. Some scholars consider that intra personal intelligence means an understanding about one's own capabilities, stimulation and passion (Mayer, Salovey, & Caruso, 2000). The power which demands abstract thinking in order to achieve and identify passion and the skill to be awarded about the fact that how the senses and emotions affect the understanding and motivation (Goleman, 2006).

Emotional intelligence is   inter linked with emotions, social abilities and different type of attitude in motivating individuals to manage themselves and other human beings in order to have cooperation with different type of difficulties in various situations (Roeser, 2012). Emotions and environment can't be parted to understand the basic abilities and to manage them for getting complete personal development.

By studying different researches, it was explored that these emotional competences develop from general level to more complicated level and with the development of human growth, they become better in implementation and functioning with various type of concern such as family and business. It is not easy to evaluate emotional intelligence and its components which were given by the different theories (Duncan et al., 2013).   Rauf, Tarmidi, Omar, Yaaziz, and Zubir (2013) found that emotional intelligence described an ability which is interlinked with those demonstrated competencies which are considered as basic requirement for constructing self-understanding, social management and psychological awareness to implement sufficient frequencies to be effective in various situations. In the current situation, emotional intelligence is evaluated as a factor which involves awareness about inner state and recognition of different resources, self-management, awareness about society and purposeful usage of different social skills (Schutte & Malouff, 2011). Accordingly, they established that emotional intelligence is inter related with social competencies and abilities that evaluate how effectively individuals understand their ability and demonstrate themselves, having awareness about others' feeling and try to handle different type of challenges with managed level of pressures, stress and routine of the daily life. On the other hand, emotion in relation with social intelligence effectively influence personal involvement, personal management and different environmental pressures with a natural and relax manner (Picard et al., 2004).

In a study conducted by (Batool, 2013), it explored the correlation between emotional intelligence and leadership for its effectiveness. On the basis of results, positive significant relationship was found between emotional intelligence and leadership.

2.1 Motivation

Motivation is a word originated from the Latin which means "Motives" and motives means a moving cause, which is the process of activating properties which are involved in psychological motivation of forces to arouse behavior acting either on or within a person. Along with the fact that motivation is an important component to instruction and learning, one standard definition for the hypothetical construct of motivation does not exist. A process that gives energy and directions along with sustained behavior involves motivation which is motivated behavior and it is described as guided, directed and sustained (Pratama & Corebima, 2016). Motivation state is often described as guided, directed and goal oriented. It can be described as an internal state of an individual that helps to arouse, directs and maintains behavior. It is called internal process which activates, guides, and maintain someone's behavior over time. Motivation provides energy for doing something or for desired results.

2.2 Five areas of emotional intelligence in leadership

For leaders, Emotional intelligence is an important variable for success and achievement. There are five areas of competencies and skills which are helpful in leadership performance. These areas are self-awareness, self-regulation, motivation, empathy and social skills (Goleman, 2006).

First, self-awareness is an individual' thoughts, feelings, goals, strengths and weaknesses to guide decisions and how these can affect the people of the surroundings. Self-awareness deals with how to behave with humility with other people of surroundings. A leader can improve his self-awareness by observing and slowing down his thoughts. The second is self-regulation which can be defined as the way to manage as well as direct an individual's emotions in different circumstances. In the view of Goleman, this element shows flexibility and personal accountability of the leader with commitment. It can be enhanced through observation of values and code of ethics. It is important for a leader to be accountable and have self-control even in a challenging situation. The third and important element is motivation. Motivated leaders may work consistently to their extreme standards. If any leader is self-motivated, he or she will make the employees motivated as well. Optimistic attitude leads to a betterment and positive work output. The next element contributing to social intelligence is described as empathy. Leaders with such quality think and put themselves to any others' situation. They listen from all perspectives and have

a constructive feedback. Empathy is of great importance to get respect and loyalty from the employees. This characteristic can be enhanced by putting a leader to someone else's position and feeling, i.e. the body language and response of the feeling. Social skills are the last element regarding social intelligence competence which deals and manages about other people's emotions for movement in desired direction. Such type of leaders are great communicators. This can be improved through learning conflict resolution, better communication skills, as well as praising others.

2.3 Model of the emotional intelligence

Model for the emotional intelligence was presented by (Goleman, 2006). Accordingly, there are five areas as self-awareness, self-regulation, social skill, empathy and motivation. These competencies are not innate rather are learned capabilities. These should be developed by outstanding performance. He argues that all the individuals have general abilities by birth which determine their emotional competencies.

Another concept explains that emotional intelligence is a combination of mental abilities, physical competencies and other skills which have power to influence success in cooperating with situational requirement and stress (Duncan et al., 2013). Emotional intelligence is a cognitive capability that is different from intelligence but it is closely related with general intelligence. Similarly, emotional intelligence was initially known as the power to monitor one's own feeling and reactions of others.

The ability to monitor one's own feeling and reactions of others also helps students to discriminate themselves from others. The usage of this capability guides them in keeping optimistic thinking and action. It is assumed that four inter related capacities are combined to build up emotional intelligence and these forces are known as capabilities which are helpful to understand one's own and other emotions (ERÖZKAN, 2013).
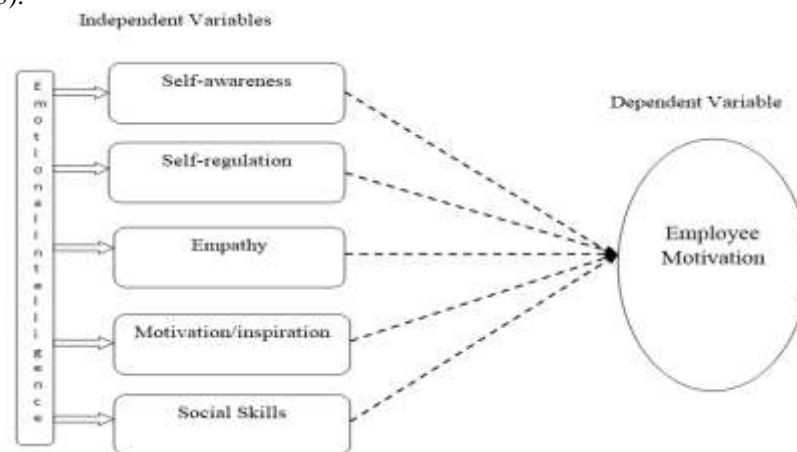
Figure 1　Research Model

Based on the above model, the following hypotheses are made:

H_1: Self-awarenesspositively influences employees' motivation,

H_2: Self-regulationpositively influences employees' motivation,

H_3: Empathypositively influences employees' motivation,

H_4: leader's Motivation/inspirationpositively influences employees' motivation,

H_5: Social Skillspositively influences employees' motivation.

3 Methodology

The current study was based on positivist paradigm. Quantitative data was used in this paper. Primary data was collected by administering questionnaires with 5-point likert scale questions. Convenient sampling technique was used for this research. 500 questionnaires were distributed to secondary school teachers and heads of institutions. The response rate was over 70%, 375 questionnaires were completed and returned. Descriptive statistics, correlation and regression methods were used to analyses the data in SPSS version 20.

4 Presentations and Analysis of Results

4.1 Correlation result

Table 1 below illustrates the results of Cronbach's Alpha, descriptive statistics and Pearson correlation analysis for the study variables. A Cornbrash's Alpha value of 0.7 implies an acceptable

level of internal reliability. In table 1, the results of the Cronbach's alpha analysis confirmed high correlation and reliability among items under each construct. The table also shows that the mean values for the variables are from 3.03 to 4.30, suggesting that the levels of Emotional intelligence of a leader's impact on employee's motivation are ranging between these values. The correlation coefficients for the relationship between the dependent variable (i.e., employee's motivation) and the predictors were less than 0.90, which signifies that the data was not affected by any severe problem of collinearity (Hair et al., 2005). Participants in the research reported a mean level of employee's motivation of 4.21. Bivariate correlations of four of the predictor variables with employee's motivation were statistically significant and in the hypothesized direction. As illustrated in table 1, Self-awareness was positively related to employee's motivation and highly statistically significant$(r = .734, p < .01)$. Thus, the first hypothesis (Hypothesis 1) was supported by the research. Similarly, Self-regulation in the emotional intelligence of the leaderin the selected schools was also positively correlated with employee's motivation with a statistically significant value $(r = .285, p < .05)$. Consequently, the second hypothesis was also supported by the research. However, the third, hypothesis was not supported as the correlation coefficient between Empathy and employee's motivation was negative and statistically insignificant $(r = -.164, p > .05)$. Further in this paper, reasons why are suggested.

Furthermore, motivation/inspiration and Social Skills in the intelligence of the leaderin the selected schools were also positively correlated with employee's motivation with statistically significant values of $(r = .307, p < .05)$ and $(r = .559, p < .01)$ respectively. Consequently, the fourth and fifth hypotheses were also supported by the research.

Table 1   Cronbach's Alpha, Descriptive Statistics and Correlation Results for the Study Variables

Variable	Mean	SD	Pearson correlation matrix					
			1	2	3	4	5	6
1 Employee Motivation	24.25	4.72	(.912)					
2 Self-awareness	20.02	3.96	.734**	(.853)				
3 Self-regulation	22.05	4.212	.285*	.432*	(.797)			
4 Empathy	22.18	4.546	-.164	.058	.101	(.937)		
5 Motivation/inspiration	21.39	3.976	.307*	.311	-.052	.113	(.820)	
6 Social Skills	20.42	3.742	.559**	.241**	.203	.184	.231*	1

Note: N = 375, Significant level: $*p < .05$, two-tailed, p <0.01** (2-tailed). Source: Authors computation from SPSS. Values in parenthesis are Cronbach's Alpha values.

4.2 Regression results

In a bid to reaffirm the test on the contribution of leaders' emotional intelligence competence on employee motivation, a regression model was assessed using the variance explained (R^2 measures) and the level of significance of the beta coefficients. Table 2 shows the model results. The results indicate that the effect of Self-awareness on employee motivation $(\beta_1 = .45, p<0.01)$ and Self-regulation on employee motivation $(\beta_2 = .13, p<0.05)$ are statistically significant. Thus, hypotheses *H1* and *H2* are supported. However, the beta coefficient of the variable representing empathy was not found to be statistically significant for the study $(\beta_3 = .03, p>0.05)$. Thus, hypothesis *H3* is rejected. The result further shows that the beta coefficients for Motivation/inspiration $(\beta_4 = .09, p<0.05)$, and social skills $(\beta_5 = .27, p<0.01)$ are statistically significant. This confirms hypotheses *H4*, and *H5*. The R^2 of the variables indicates that the model explains 72.63% of the variance in employee motivation.

Table 2   Result of the Regression Output

Model	Unstandardized Coefficients		Unstandardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.85	.42		9.27	.000
Self-awareness	.45	.06	.43	7.06	.000
Self-regulation	.13	.05	.15	2.44	.016
Empathy	.03	.11	.02	.29	.769
Motivation/inspiration	.09	.05	.12	1.94	.049
Social Skills	.27	.07	.25	3.85	.000

Note: N = 375, R^2 = .7263, Significant level: $*p < .05$, two-tailed, p <0.01** (2-tailed). Source: Authors computation from SPSS

The tables show the significant effect of emotional intelligence factors on employees' motivation. The results show that all the factors except for empathy have positive effect on employees' motivation. The most influencing factors are self-awareness followed by social skills and self-regulation.

5 Conclusion

Leadership plays a vital and significant role in any organization. Emotional intelligence and motivation are two important variables of contemporary research which contribute to the success of any organization. The current study found that four out of the five factors of emotional intelligence regarding leadership influence employees' motivation. These factors are self-awareness, self-regulation, motivation, empathy, social skills. The results of the present study imply that there is a significant relationship between leaders 'emotional intelligence and employee's motivation and performance in the secondary schools in the capital city of Madagascar. Whether employees or leaders, they all have great motivation towards teaching. In addition, when emotional intelligence is included in the leadership, it greatly enhances the employee's motivation which is needed for the progress of any nation.

This study is helpful for top managers in making decisions regarding inquiry of different dimensions which lessen employee's motivation to improve institution's performance working in the educational institutions. Better employee's job performance can be accomplished through identifying the factors which can create trouble in normal schedule of psychological working. In order to maintain and generate enthusiasm and motivation, they must be able to predict how to respond in different situations, changes, events and effectively handle these reactions. Top management must positively resolve the conflicts and maintain and create a sense generation to resolve disagreements, ensure trust and cooperation. Positive attitude and thinking can lead to the ideas to ensure trust and cooperation through an organization.

Emotional intelligence is an important area of human behavior, needs a lot of research study in developing countries like Madagascar. As emotional intelligence directly affects the employee performance in an organization. The abilities and decision-making power related to manage the contingence circumstances, which can arise out of blues.

- Further research study can be done on a sample of larger size for improved understanding of emotional intelligence among employees of educational institutions
- The study was conducted only in Antananarivo, further research can be conducted in other cities of Madagascar
- Research can also be carried out sector wise to check emotional intelligence impact on employee's motivation and job performance in various sectors in Madagascar.
- Further research can be conducted to see emotional intelligence effect on different dependent variables such as job satisfaction, organizational productivity, employee morale, organizational climate, employee training.

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Countermeasures of Strengthening the Advanced Typical Model Education for College Students under the Network Environment

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Abstract: The widespread use of Internet along with the rapid development of Internet + pattern have both enriched and deepened the advanced typical model education among college students in both form and content. Based on the current situation of network culture education in colleges and universities, this paper believes that the concept of the network innovation of the advanced typical model education lags behind, mingled multiple values in society and rising self-consciousness of college students have all had negative influences on the actual effectiveness of the advanced typical model education. Hence, on the basis of traditional advanced typical model education, this paper puts forward some suggestions on using technology to strengthen the network education platform to guide students to improve their information discriminability and create positive campus atmosphere for them, with a view to promoting the new development of the advanced typical model education in colleges and universities.

Key words: Network environment; College student; The advanced typical model; Education countermeasure

1 Introduction

The Central Committee of the Communist Party of China on Strengthening and Improving Ideological and Political Work Several Opinions pointed out that we must pay attention to the application of the advanced typical model to influence and to spur the masses, forming a good ethos of advocating the advanced, learning the advanced, and striving to be advanced in the whole society. From this we can see that carrying out the advanced typical model excavation and cultivation among college students in colleges and universities can form a great atmosphere of common progress on campus to a great extent, enabling the majority of students to forge ahead, have the spirit of dedication and commitment. At the same time, it is also conducive to guide the majority of students in colleges and universities to learn the advanced typical models' deeds and then strive to catch up. This will be of great significance in strengthening and improving the ideological and political education of college students. (Fan Qingwen, Zhen Mi, Jin Bo, 2017)

"Expressway" of information provides us with all accesses to any information at any time, offering us endless knowledge. As network has gone deep into all aspects of the social life, the impact on social and ideological education has been more profound. The wide use of the Internet has not only enriched content of conducting the advanced typical model education for the educators, but also enriched the self-study content for the educated. Taking forceful measures to actively educate college students about the advanced typical model under the network environment is an inevitable direction for ideological and political educators in universities who are supposed to adapt to new situations and to solve rising problems, as well as an inevitable trend to digitalize the advanced typical model.

In response to the problem of "the advanced typical model education among college students", the academic community has proposed various theoretical perspectives based on different research perspectives. Some scholars put forward the value implication of college students' advanced typical models based on the cultivation perspective of college students' socialist core value system; (Hu Yunan, Luo Yinguang, 2013) some scholars put forward the innovation training pattern of the advanced typical model for college students based on the training and education pattern of the advanced typical model for college students. (Zhou Changming, 2013) Some scholars proposed that we must accurately grasp the discipline of cultivating the advanced typical model of college students, in which way we need to conduct effective guidance and to form an organic loop of "excavate the typical model - set the typical model - promote the typical model – learn from the typical model - care for the typical model - update the typical model". (Song Fangting, 2013) Based on the current situation of the advanced typical model cultivation of college students, some scholars explored the underlying causes of restricting the cultivation of advanced typical model of college students through questionnaires, proposing corresponding countermeasures and suggestions for the innovation of advanced typical model education for college students. (Lu Gang, Fan Jinfeng, 2016) Some scholars analyzed and compared the patterns of the advanced typical model education of college students and proposed a more targeted and effective

model education. (Yao Chunlei, Hou Wei, 2012) Some scholars put forward the research on the advanced typical training mechanism of college students based on social learning theory. (Zhang Jianqing, 2015) Last but not least, based on the theory of acceptability, scholars paid attention to the cognitive psychology of college students and let college students get comprehensive development and promotion under the inspiration and demonstration of the advanced typical models. (Xu Mingyu, Zhang Houjun, 2014)

In general, the research achievements of the academic community in the problem of the advanced typical education among college students has provided important academic resources for the selection of the topics, the construction of research ideas, and the focus of the research perspective.

2 Conception and Connotative Meaning of the Advanced Typical Model Education among College Students

Generally, a typical model is a representative person or project, which refers to be typical among the same kind of things. A typical model performs and describes the substantive characteristic, the growing trend and the rule, vividly illustrating the theory and theoretically embodying the practice. A typical character grows up in specific social environment which is also the specific relation in reality, and is influential. However, a typical character tends to surmount the limitation of time to be eternal. "An advanced typical model is anthropomorphized to be some core value of society. Its thoughts and actions, typical deeds bear the orientation of the mainstream value in society, represent the demand of the outlook on world, life and value, is visible philosophy. (Pan Yuteng, Chen Zhaoyang, 2011)

By utilizing the advanced typical models' behaviors, the advanced typical model education makes the abstract moral theory and the obscure moral propaganda anthropomorphic, specific and actual. Hence, this is a mode to drive college student groups around to enhance their self-knowledge, absorb inside information and conduct themselves. With the rapid development of information society and the wide application of new media, network has shown its significant effects as the platform and carrier, on people's thought interaction and information sharing. Network has also greatly expanded the communication channels in our society, which made it more convenient for the life of citizens. However, network is also a contradictory unity and a double-edged sword. With the explosive growth of the Internet's information amount and the tremendous effect of the superimposed public opinion, negative features showed, of which network perspectives become uncontrolled and out-of-order, information on the Internet is flooding and complicated as well as the content of information is difficult to distinguish the genuine and fake. All of these have created resistance on efficiently educating college students on the advanced typical model under network environment.

3 Dilemma the Advanced Typical Model Education among College Students Faced in the Network Environment

The domains of "Internet + (Internet Plus)" have been widened over these years, which has gradually been moulded as a brand new social life form and had profound influence on people's real lives. Accordingly, college student groups account for 90.3% among those with Internet access and the trend continues to grow. With the coming new 5G era, network project coverage of high schools will be in a new upsurge. The virtuality and versatility nature of the network has had promoted the development of campus culture construction of high schools, but also had impact on the advanced typical model education among college students running smoothly.

3.1 the advanced typical model education among college students lacks innovation

As the Internet has incorporated college students' life, the number of "net-worm" in college students has been increasing. According to CNNIC (China Internet Network Information Center), weekly time spent on network is abouttwenty-seven hours. Faced with such a large campus network frequency of use, the effectiveness of the advanced typical model education appears to be little. The first reason is that some colleges and universities ideological and political education workers are indifferent about the advanced typical model education, or insufficient or inappropriate to adopt the advanced typical model education. They have not reasonably integrated the advanced typical model education into the network information interaction platform, making the advanced typical network education float to the surface and form. Secondly, due to the influence of market-oriented economy, the hardware input and software development of colleges and universities in the advanced typical network are not enough, making the advanced typical network publicity of college students more than enough and unable to effectively support the effect and goal of educational propaganda.
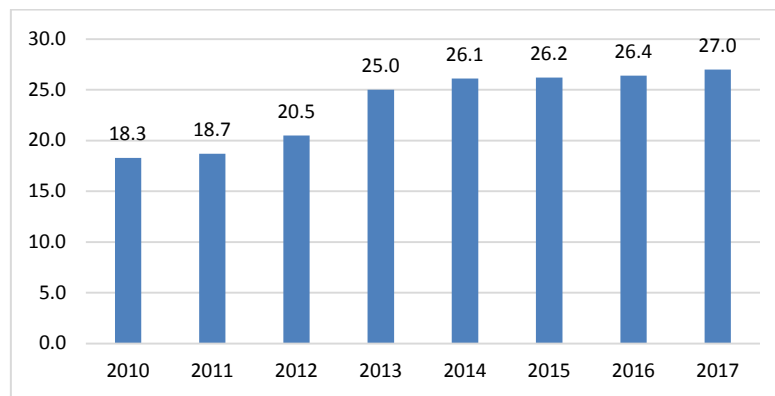
Figure 1   Data of Weekly Time Spend on Network of Undergraduates

Today's college students have undergone great changes compared with the past, and the state of the advanced typical model education has also undergone a marked change. However, the advanced typical model education in colleges and universities still lags behind the requirements and needs of the development of the times. "Virtual reality is a new application of human perception and operation capabilities. It is a human-machine interface technology that simulates human visual, auditory, and dynamic behaviors in the natural environment with high fidelity, which makes the educated focus on the virtual environment of simulation. In particular, advanced virtual reality technology can mobilize all sensory organs of the educated and provide an immersive experience for the educated." (Yang Liyan, Wang Qi, 2007) In the actual education process, it is easy to theorize and educate the value spirits of the advanced typical models, and while raising the specific advanced typical spirit to an abstract theoretical height, it also makes the advanced typical model education contents dogmatic and formatted. As a result, the advanced typical model training in universities has become theoretical learning and indoctrination learning, which has weakened the original vivid, flexible, and diverse advanced forms of education and results.

3.2 College students' advanced typical education environment is dispelled by multiple values

Before the popularization of the Internet, the source of information for the educated people, in other words, university students, were mainly the integrated education environment of the "trinity" of society, schools and families. The arrival of the Internet era has changed the state of the original education environment, bringing challenges to the credibility of school educators in terms of the diversity and complexity of the content and the widespread penetration of the media. This has caused impact on the advanced typical model education environment of college students.

On the one hand, the large number of network information, the rapid update frequency and the information sharing of borderless and non-local areas have all made college students in an over-informed space and an over-informed state, which has increased the difficulty of screening the typical model education information in resources for college students within enormous information. This has thwarted the enthusiasm and adaptability of the typical model education, making it difficult for college students to devote themselves fully to the advanced typical model learning, which indirectly affects the operation and controllability of the advanced typical education under the "three-in-one" education environment. On the other hand, the breadth and depth of network information content and the novelty of multi-media packaging technology have greatly stimulated the interest and enthusiasm of college students in exploring online content, making it possible for university students to devote a lot of time to browsing these complex web content. Thus, the time and depth of participation in typical model education information are correspondingly reduced. The purposeful and planned advanced typical education environment is naturally at a disadvantage, compared with the huge, random, and novel cyberspace. The typical model education received by college students requires long-term identification and cognition before they can finally settle into their own intrinsic value. In this process, it is very easy to be interfered with and hindered by the network information which reduces the effectiveness of typical model education.

4 Countermeasures of Strengthening the Effectiveness of Advanced Typical Model Education for College Students under the Network Environment

4.1. Strengthen the network platform and innovate the typical model education concept

With its high extent of openness, strong interaction and rich information resources, the Internet provides an excellent platform of advanced typical model education for college students. As one of the main groups in the network society, college students have deep and complex relationships with the network culture in their ideological and behavioral activities, as well as the controllability of their psychological values. The deep involvement of the Internet in the field of ideological education in colleges and universities has led to an unprecedented expansion of the space for the typical model education based on the Internet, and has made typical model education more effective. Therefore, we must pay attention to the exploitation of new areas of the advanced typical model education under the network environment, actively build an online education platform, innovative educational concepts and create a new image of typical model education.

First of all, from the technical view, we will increase the system maintenance and daily supervision of the typical model education websites. The key to establishing a network typical model education position is whether a typical model education website can attract college students' clicks and concerns and whether it can guide the physical and mental development and personal growth of college students. Therefore, the staff of the typical model education website must increase technical input, introduce talented people and promote the spread of mainstream value culture through the vivid and interesting educational content, in which way they can capture the interests of college students to enrich the content of education.Secondly, strengthen the site integration and improve coordination. In recent years, many colleges and universities have established their own typical model education websites and information platforms, but the problem of following the trend also become more serious, resulting in blind construction and repeated construction. In this regard, on the basis of giving full play to their respective advantages, relevant units must strengthen cooperation, improve overall strength, ensure the development prospects of typical model education websites, increase the authority of typical model education websites and increase the effectiveness of model education websites to make the typical model education network platform really run.

4.2 Regulate the network environment and improve the ability of college students to identify information

When the information network is a double-edged sword that affects the further development of college students' advanced typical model education, one of the most important measures to reduce their adverse effects and improve the effectiveness of education is to improve the college students' ability of identifying and absorbing information. In today's era, the typical model education must be centered around college students. Through demonstrations and incentives of advanced typical models, the main theme is promoted and disseminated. Clearly define the main mission of the typical education, build the main position of the typical education network, then we can achieve the purpose of the advanced typical education for college students under the network environment.

To improve college students' ability to identify and filtrate online educational information, we need to start from two aspects. The first is to mobilize external forces, strictly control the sources of information, and do a good job of "firewalls", so as to minimize the spread of bad information, and to fully integrate the advantages of different information filtering software in order to maximize results. Secondly, ideological and political workers in universities should establish awareness of network propaganda. Teachers should explain and interpret the advanced typical model spirit through their own teaching art and personality charm, so that students can fully feel the sublimity of the typical model spirit. Strengthen their own ideological tendencies, establish positive political attitudes, strengthen the internalization of mainstream values, and use their own example to demonstrate positive examples to college students are promoted. At the same time, it is necessary to use the advantages of the network to carry out typical model publicity and education from various network demonstration platforms to guide students positively and positively.

4.3 Create campus atmosphere and improve the typical model education form

Burrhus Frederic Skinner believes that people and the environment are inseparable. The environment has shaped people so people's thinking and behavior are closely related to the objective environment. Changes in the environment will affect the adjustment and change of people's value orientation. Environment can determine people's thinking and behavior. University is the second "weaning period" of life. During this period, the state of college students' ideology is unstable, and it is

easy to contradict lectures in classes and instinctively resist the rigid contents of political education. On the contrary, because of its strong curiosity, people around college students and the environment around them have great attraction and influence. Therefore, in the typical model education for college students, we should pay attention to the campus environment where college students live in, and strive to adopt some specific social scenes and create a cultural atmosphere, so that they can receive imperceptibly model education, so as to achieve a result with half the effect.

5 Conclusion

In short, in the context of the Internet at that time, in response to the requirements of the development of the era, we focus on highlighting the age of the Internet and enhancing the effectiveness of the advanced typical model education under the network environment for undergraduates, guiding them more in line with the needs of the times and realities of development. It will help to improve the science and practicality of college students' ideological and political education, further expand the space for the development of typical model education, realizing the new development of the advanced typical model education for college students under the network environment.

In the future, we will also conduct more in-depth discussions on the concept innovation, subject structure, strategy analysis and mechanism research for strengthening the advanced typical model education among college students in a network environment, thus leading to forward-looking thinking.

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Relationship Between Personality and Mobile Phone Addiction in College Students: Mediating Effect of Self-esteem

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Abstract: This study explored the mediating effect of self-esteem between personality and mobile phone addiction in college students. Eysenck Personality Questionnaire-Revised Short Scale for Chinese (EPQ-RSC), Mobile Phone Addiction Tendency Scale, Rosenberg's Self-Esteem Scale were administered to 591 college students. Results showed that extraversion was negatively associated with mobile phone addiction, and positively associated with self-esteem; Neuroticism was positively associated with mobile phone addiction, negatively associated with self-esteem; Self-esteem was negatively associated with mobile phone addiction. Extraversion, as well as neuroticism, could not only predict mobile phone addiction directly, but also by the mediating role of self-esteem indirectly. The present study can advance our understanding of how personalities affect mobile phone addiction.

Key words: Personality; Extraversion; Neuroticism; Self-esteem; Mobile phone addiction

1 Introduction

As the core media of Internet, mobile phones play an increasingly important role in people's lives. While mobile phones bring convenience to people, they also produce many negative effects. Mobile phone addiction refers to a new type of behavioral addiction to the mental and behavioral problems caused by the excessive dependence and abuse of the mobile phone (Chen, Liang, Mai, Zhong, & Qu, 2016). It is found that mobile phone addiction can affect self-regulated learning ability and interpersonal relationship, and bring about a series of adaptive behavioral problems (Sarwar, & Soomro, 2013). In recent years, mobile phone addiction has attracted the attention of researchers·They have carried out empirical studies on it, especially on the influence factors of mobile phone addiction (Toda, Monden, Kubo & Morimoto, 2006). Some researchers focus on the cognitive effect on mobile phone addiction (Wilmer, Sherman, & Chein, 2017), and some pay attention to the type of content which the mobile phone users addicted (Jeong, Yum, &Hwang, 2016).

Besides, personality is an important variable which may predict the behavior of mobile phone use and some studies have already explored the relationship. It found that extraversion and neuroticism were most closely related to mobile phone addiction. As far as extroversion is concerned, studies showed that people with higher extroversion score have more problematic mobile phone usage behaviors (Bianchi& Phillips, 2005). Igarashi et al. believes that highly extroverted people are cheerful and sociable, and they have a strong desire to communicate with their peers (Igarashi, Takai, & Yoshida, 2005).

However, previous research has also centered primarily on the direct association between mobile phone addiction and personality, and the underlying mediating mechanism (i.e. how personality influences mobile phone addiction) and moderating mechanism (i.e. when personality influences mobile phone addiction) involved in thisassociation are largely unknown. To fill these gaps, the presentstudy constructed a mediation model to test themediating role in the relation between mobile phone addiction and personality among Chinese college students. The findings would advanceour understanding of how personality could cause mobile phone addictionand how to protect adolescents from theimpacts of excessive mobile phone use.

Self-esteem is another important variable inaddiction area (Liu & Wang, 2011). Anumber of studies on self-esteem have found that low self-esteem is closely related to many kinds of addictions, such as alcoholism, drug addiction, Internet addiction, gambling addiction, and sexual behavior addiction, and so on. The mechanism of self-esteem and mobile phone addiction is similar to Internet addiction disorder (Chen, Liu, &Zheng, 2010). Low self-esteem individuals have more problematic mobile phones using.Self-esteem is significantly correlated with neuroticism and extraversion, which has been confirmed in many studies (Zheng& Gu, 2012). As a result, we chose the variable of self-esteem as the mediation factor and examined how personality affects mobile phone addiction through it. (See Figure 1)
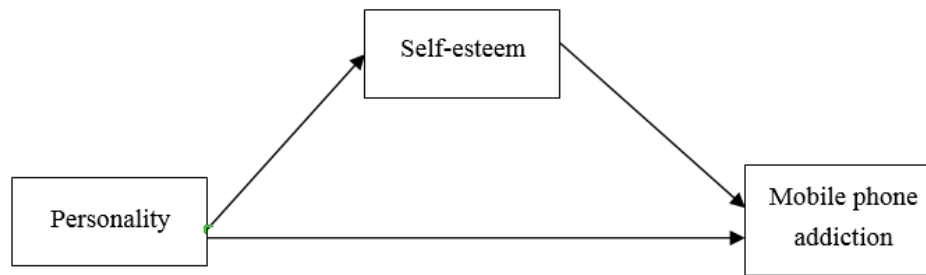
Figure 1　Conceptual Model

2 Methods
2.1 Participants
A total of 591 college students(53.8% girls) completed our survey that was designed to collect information including demographic variables，mobile phone addiction，personality，self-esteem. Participants ranged in age from 18 to 21 years (M=18.87, SD=0.75).
2.2　Procedure
We adopted the convenience sampling to select the target school. In the target school (a comprehensive university), we used cluster random sampling method to choose three to four majors in each school from freshman to grade 3. Students in the target majors were invited to participate in the survey in classrooms. The authenticity, independence and integral nature of all answers as well as the confidentiality of the information collected were emphasized to all participants by well-trained psychology graduate students. Participants completed the survey after informed consent was obtained from the schools, teachers and participants.
2.3　Measurements
2.3.1 Mobile phone addiction scale
The Mobile Phone Addiction Scale was used in this study (Xiong, Zhou, Chen, You, & Zhai, 2012). It assesses four factors related to mobile phone addiction including withdrawal symptoms, prominence behavior, social comfort, mood changes. Participants rated 16 items on a five-point scale (1=never, 5=always). Higher scores indicate greater smart phone addiction. The MPAS has been used in Chinese adolescents with good reliability and validity. Cronbach's for the MPAS was 0.88.
2.3.2 EPQ-RSC
The EPQ-RSC was used to assess personality (Qian, Wu, Zhu, & Zhang, 2000). Including four subscales of extroversion (E), neuroticism (N), Psychoquality (P), and polygraph (L), each subscale of 12 projects, with 48 items. This study only selects two subscales of extroversion (E) and neuroticism (N). The Cronbach's alpha of extroversion (E) and neuroticism (N) subscales were 0.74 and 0.78 respectively.
2.3.3 SES
The self-esteem scale was compiled by Rosenberg, consists of 10 items, and the score is graded by 4 grades. The higher the score, the higherthe self-esteem level is.
2.4 Statistical analyses
All the statistical analyses were conducted with SPSS 19.0 software package.

3 Results
3.1 Preliminary analyses
The one-way analysis of variance indicated that mobile phone addiction showed no grade and major differences. The descriptive statistics and correlation matrix were presented in Table 1. The correlation coefficient between neuroticism and the dimensions of mobile phone addiction is 0.317-0.423(p< 0.01). The correlation coefficient between extroversion and the dimensions of mobile phone addiction is between -0.092-0.295(p< 0.05). The correlation coefficient between extroversion and mobile phone addiction was -0.173(p< 0.01). The results showed that extroversion was negatively correlated with mobile phone addiction, and positively correlated with self-esteem, neuroticism was positively correlated with mobile phone addiction, and negatively correlated with self-esteem. And self-esteem was negatively correlated with mobile phone addiction.
3.2 Testing for the proposed model

Table 1   Descriptive Statistics and Inter Correlations Between Variable

ariables	M	SD	1	2	3	4	5	6	7	8
1 MPA	2.4774	0.596	1							
2 self-esteem	3.2603	0.424	-0.331**	1						
3 extroversion	1.6191	0.234	-0.173**	0.352**	1					
4 neuroticism	1.3785	0.259	0.423**	-0.424**	-0.252**	1				
5withdrawal	2.7659	0.713	0.876**	-0.251**	-0.098*	0.344**	1			
6 prominence	2.2503	0.735	0.821**	-0.257**	-0.125**	0.352**	0.573**	1		
7 social	2.2955	0.744	0.704**	-0.290**	-0.295**	0.317**	0.469**	0.475**	1	
8 mood	2.3850	0.744	0.804**	-0.302**	-0.092*	0.367**	0.597**	0.613**	0.481**	1

Note.N = 591. *p < 0.05. **p < 0.01.

Extroversion, self-esteem and mobile phone addiction were significantly correlated; Neuroticism, self-esteem and mobile phone addiction were significantly correlated. This satisfies the precondition of the analysis of the mediating effect. The mediator effect model M between personality (extrovert, neuroticism) and mobile phone addiction was established by using self-esteem as the intermediary variable, extrovert and neuroticism as the independent variable and mobile phone addiction as the dependent variable (Figure 2).

The 12 items of extraversion and neuroticism subscales were packaged into two factors by random combination. Each factor contained 6 items. The 10 items of self-esteem scale were packaged into two factors, each containing 5 items. Listel 8.70 was used to fit the model. The fitting index were $^2/df =$ 3.40, NFI=0.97, $NNFI$=0.96, CFI=0.98, IFI=0.98, GFI=0.97, $RMSEA$=0.064. The fitting indexes were very good, indicating that the model is fit well.

Figure 2 showed that extroversion and neuroticism had significant predictive effect on self-esteem, and the path coefficients are 0.34 and -0.48 (t=5.69, $P<0.001$; t=-7.80, $P<0.001$). The negative predictive effect of self-esteem on mobile phone addiction is significant, and the path coefficient is -0.23 (t=-2.80, $P<0.01$). After adding self-esteem as an intermediary variable, the predictive effect of extroversion on mobile phone addiction was no longer significant (t=1.52, $P>0.05$), while the predictive effect of neuroticism on mobile phone addiction was still significant (t=6.24, $P<0.001$). The results showed that self-esteem played a complete mediating role between extroversion and mobile phone addiction, and played a part role in mediating between neuroticism and mobile phone addiction, accounting for 20.0% of the total.
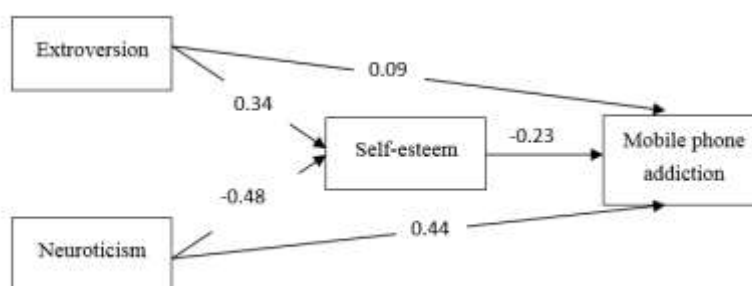
Figure 2   The Mediating Effect Model of Self-esteem betweenPersonality and Mobile Phone Addiction

4 Discussion

In this study, extraversion and mobile phone addiction were significantly negatively correlated, which is different from foreign research results.

The reasons may be in the following aspects: first, the outcome variables of research on personality and mobile phone use in foreign countries are either the problematic mobile phone use or one aspect of the mobile phone use(such as short message)(Bianchi,& Phillips, 2005), not mobile phone addiction.It's normal that extroverts are more likely to socialize, have more friends and networks, and use more text messages and mobile phones, but that doesn't necessarily mean that extroverts are more likely to become addicted to their phones. Second, the results are consistent with the relevant findings of Internet use.

Amiel et al. found that introverts express their "true selves" through online social interaction, while extroverts prefer to express their "true selves" through real-life interactions (Amiel& Sargent, 2004). Third, extraversion is negatively correlated with loneliness, and loneliness can significantly predict Internet addictionand mobile phone addiction (Zhou& Yao, 2011; Liu, Xu, &Hu, 2009). The more introverted people, the less real communication. As a result, they are more likely to immerse themselves in the virtual world. Therefore, extraversion significantly negative prediction of mobile phone addiction is acceptable and understandable

The results of the mediating effect test showed that self-esteem played a complete mediating role between extroversion and mobile phone addiction, and played a partial intermediary role between neuroticism and mobile phone addiction. First of all, it shows that the cognitive-behavior model of Internet addiction can also be used to explain the mobile phone addiction, which verifies the hypothesis of this paper. That is neuroticism and introversion as the susceptibility qualities are the far end of factors affecting mobile phone addiction while low self-esteem, as a kind of non-adaptive self-evaluation, is the proximal factor of mobile phone addiction. At the same time, it also shows that self-esteem has a different effect on the relationship between mobile phone addiction and extraversion and neuroticism. The social metering theory of self-esteem holds that self-esteem is an internal reflection of the good or bad interpersonal relationships, and that self-esteem is important not because of its own special intrinsic value, but because self-esteem plays an important role in helping people maintain good relationships with others(Zhang&Li, 2009).

From the point of view of interpersonal interaction and interpersonal relationship, extraversion is more closely related to interpersonal interaction than neuroticism. Extraversion tends to positively predict interpersonal trust, while neuroticism negatively predicts interpersonal trust. Highly extroverted individuals have better interpersonal relationships, gain more social support, have more positive emotions, while the neurotic individuals are less able to adjust their emotions and are often in a bad mood state. Therefore, extroverts are especially sensitive to interpersonal relationships, and the poorer their interpersonal relationship is, the lower their self-esteem level.

5 Conclusion

This study focused on the influence of personality (extroversion, neuroticism) and self-esteem on mobile phone addiction, and explored the correlation between these factors and the intermediary role of self-esteem between personality and mobile phone addiction in order to clarify the influence mechanism of personality on mobile phone addiction. The results showed that extroversion, neuroticism and self-esteem can significantly predict mobile addiction, extraversion and self-esteem had a significant positive correlation, and neuroticism and self-esteem had a significant negative correlation. That is, the more extroverted individuals, the higher the level of self-esteem, the lower the level of their addiction to mobile phones; the higher the score of the individual neuroticism, the lower the level of self-esteem, the higher the level of their addiction to mobile phones. Excepted for Extraversion, the other results were consistent with the related research results (Bianchi& Phillips, 2005; Zheng&Gu,2012).

This result indirectly supports the social metering theory of self-esteem, and has important implications for the influence of interpersonal relationship on mobile phone addiction. The limitations of the present study should be noted. First, this study is a survey research. The results should be interpreted with caution in terms of causality. Future studies may conduct experimental research to strictly confirm the causal relationships among these variables. Second, the self-report method restricts the validity of the data due to social desirability and other biases. Therefore, future research may try to collect data from multiple informants (e.g., adolescents, parents, teachers, and peers).

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Research on the Relationship Between Personality Traits and Subjective Well-being of Collepe Students: Focusing on College Students in Wuhan

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Abstract: The relationship between personality traits and subjective well-being(SWB) of university students is studied with the method of questionnaires and university students in Wuhan as subjects. Within the research area of the five dimensions of personality traits and the six factors of SWB, a correlation analysis and a regression analysis on the questionnaires are given and a structural equation model is established based on statistical principles. The results suggest that the SWB of university students is overall medium-high, and it has showed significant differences in the family structure facet and the marginal significance in the university grade facet. In terms of the variables of personality traits, the Openness dimension has suggested significant differences in the gender facet, and the Conscientiousness dimension and the Agreeableness dimension in the student-source place facet, and the Neuroticism dimension and the Agreeableness dimension in the family facet, and the Agreeableness dimension and the Openness dimension in the university grade facet. The overall SWB of university students is significantly related to the five dimensions of personality traits, which has demonstrated a profound meaning for guiding the improvement of the SWB of university students.

Key words: University students; Personality traits; Subjective well-being; Happiness

1 Introduction

What is happiness? This has always been an interesting topic that draws attention from the public. Aristotle, a famous thinker of ancient Greek times, once said: "Happiness is the meaning and the purpose of life, the whole aim and end of human existence"(Bertrand Russell, 2009). From ancient times to the present, discussions about happiness have never been stopped, and numerous scholars have proposed a concept called "subjective well-being" based on long-term researches. This is a pleasant subjective feeling brought by the element "happiness" to the bottom of people`s hearts (Wang Xinyi, 2018). SWB is one of the most important topics in the field of positive psychology. The study of SWB began in 1950s, and as psychologists have continued to study on SWB, they find that personality traits are the main factors affecting SWB, and are regarded as the best resources for prediction (Diener.E, 1999).

However, the complexity of personality leads to its uncertain definition yet. Generally, it can be described in the following ways:

a. Additive definition. It comes from ancient Roman times and psychologists believes that personality is the sum of the characteristics shared by individuals. This definition is helpful to determine the extension of personality and to explore the characteristics including in personality. Due to personality is not simply the sum of many traits but the organic integration of various traits, this definition is preliminary. It is possible to extend the concept of personality.

b. Generalization definition. This definition emphasizes the organization and completeness of various attributes of personality that constitute the elements of the overall personality, which are the components of personality. This definition emphasizes the organization and integrity of various characteristics of personality, which is much advanced than the additive definition.

c. Rational definition. The definition describes that personality traits are rational and being ordered in a certain manner so that they can be clearly organized and have a good internal identity. This definition regards the various characteristics of personality as being organized and arranged according to a certain hierarchical structure, so as to make the personality characteristics distinct and have inner unity. All things in my own experience that belong to "me" and are related to "me" are regarded as the contents of my own, confusing the boundaries between consciousness and matter, and treating many things of consciousness as material.

d. Adaptive definition. This definition is affected by Darwin's evolutionary theory, and regards personality as a special form of adaptation formed in the process of achieving harmony with the

environment of the individual. This definition focuses on the relationship between the individual and the environment and the adaptive ability of the personality, which is meaningful. However, it is not comprehensive to limit the human pattern to adaptation. This definition emphasizes the function of personality, and does not point out the inherent characteristics and essence.

e. Differentiation definition. It highlights the uniqueness of the individual but not the same as individual difference. (Beizhi Talent Research Institute, 2015).

Studying on the relationship between personality traits and SWB of university students has important theoretical and practical meanings for the completion of such domestic research theories and for contemporary university students to rationally handle their pressure and challenges. On the one hand, the domestic research on this topic has not yet reached the world-class level. Researchers usually study the impact of objective factors such as health state and social support on SWB, and seldom do they study that of subjective factors on SWB. On the other hand, university students shouldering the heavy responsibility for national development and the hope of future and society are confronted with strong pressure like job hunting and emotional attachment problems that have made a significant influence on the expectations for happiness of university students. Therefore, this study suggests diverse ways for university students with different personality traits to reasonably manage life pressure so as to achieve inner peace and harmony, which finally improves their SWB. And it also provides some suggestions and methods for university administrators to give different guidance help for university students with different personality traits when dealing with various events, leading them to become mentally healthy talents adaptive to modern society.

2 Research Methodology
2.1 Research method of SWB
Diener's definition of SWB is currently accepted by most researchers. It is characterized by subjectivity, integrity and stability (Diener E, 1984). Diener distinguished the external factors influencing subjective happiness from the internal factors, but the study found that the external factors did not have so much influence. Thus, the subsequent research focused on the internal factors, namely, the internal construction of individuals determines how life events are perceived, and thus affects the happiness experience. The current mainstream research theories are: Target Theory, Activity Theory, Expectancy Theory, Judgment Theory, etc. Considering that SWB is a relatively complex and non-objective concept, scholars often use the self-report inventory to measure individual SWB. With the deepening of research on SWB in recent years, domestic researchers have begun to introduce foreign measurement tools for study. However, due to the existence of certain cultural differences, foreign scales are not fully applicable to the Chinese people, thus causing the localization of foreign measurement and compilation by many researchers (Zhang Xinggui, 2004). Based on the previous studies (Qiu Lin, 2003), it is suggested that the self-report inventory is much more rational and also the General Well-Being schedule(GWB) is most frequently used to measure one`s happiness because of its relatively high reliability and validity. Consequently, this paper also adopts it to investigate and research the SWB of university students.

2.2 Theories of personality traits and their common research methods
Theories of personality traits focus on the characteristics contained in the proprium and the self as well as how they are formed with the self-development, including the following theories (Peng Tongling, 2011): G.W. Allport' theory of personality traits. In Allport' opinion, traits are the basis of personality and the basic construction unit of psychological organization, which have established the academic status of personality psychology in the United States and established a set of personality psychology theories. However, his personality theory lacks systematization and integrity, and ignores the social root of personality. The "trait" he describes is only a hypothetical thing and there is no statistical standard. Cattell's personality traits theory. Cattell agreed with Allport' argument that personality traits are divided into common traits and personal traits, but Cattell did not overemphasize the role of individual traits, and accommodated the influence of environmental factors on personality. Eysenck's theory of personality traits. This theory based on actual data from the personality test. After analyzing the factors of a large number of personality test data, Eysenck classified all personality traits into two dimensions with continuity. These two dimensions of continuity are emotional stability and introversion. However, he combined the personality type pattern and the trait pattern organically, which was more comprehensive, more systematic and more hierarchical than the previous personality theory. Guilford's theory of personality traits. It is a unique pattern of all kinds of traits, while personality traits are

identifiable and persistent characteristics that vary from person to person. Different traits can be observed from different angles. the five factor model——Agreeableness, Neuroticism, Openness, Extraversion, and Conscientiousness. The five factor model of structure is closer to the real dimension of personality, which can be said to be a strong support for psychological counseling and provide a theoretical basis for formulating intervention measures for developmental counseling.

As is described in the previous section, this paper mainly uses measurement as research methods. Measurement tools are generally divided into two categories: one is the self-report inventory with a clear structure, and the other is to a projective test with an unclear structure. The self-report inventory is easy to handle and its scoring system is also simple, and thus most scholars use it as the measurement for personality. This paper is decided to use the brief version of the Chinese Big Five Personality Inventory given that it is convenient and simple with relatively high reliability and validity. The NEO Personality Inventory was compiled by McCrae and Costa in 1987, and later scholars Wang Mengcheng and Dai Xiaoyang prepared a simplified version of the Chinese Big Five Personality Inventory based on the NEO Personality Inventory. It includes 40 items and has good reliability and validity with its psychological characteristics superior to foreign counterparts.

2.3 Specific research methods and tools

The object of study is university students in Wuhan, and the data are acquired through questionnaires. The first step is to set up the composition of participants, and then questionnaires are distributed among the selected university students in Wuhan via stratified random sampling. 510 questionnaires are handed out and 470 are recovered, 442 of which are valid with an 86.7% effective recovery rate. The basic composition of the study object is shown in Table 1.

Table 1   Composition of Participants（N=442）

Item	Classification	Amount	Percentage
Gender	male	235	53.17%
	female	207	46.83%
Grade	freshman	125	28.28%
	sophomore	125	28.28%
	junior	90	20.36%
	senior	102	23.08%
Major	liberal arts	184	41.63%
	science	258	58.37%
Student-Source place	urban city	271	61.31%
	rural area	171	38.69%
Family Structure	single-parent	31	7.01%
	non-single-parent	411	92.99%

The two test variables in this research are personality traits and SWB, and the GWB is adopted to assess the subjects` understandings of happiness (Zhang Xuejun, 2002; Xu Zhen, 2011). This questionnaire is divided into six sections and scores on the six factors of SWB, which are energy, worries about health, frustrating or pleasant mood, relaxation and tension, control of emotion and behavior, and satisfaction and interests in life. The Chinese scholar Duan Jianhua revised the scale in 1996, of which the correlation coefficient between the score of a single question and the total score ranges from 0.48 to 0.78 and between the subscale and the total scale from 0.56 to 0.88, and the α coefficient is 0.91 for male and 0.95 for female. This shows the scale has good reliability and validity (Li Meng, 2013). The scale has two scoring systems, one is additive and another is reverse. Specifically, question 1, 3, 6, 7, 9, 11, 13, 15, 16 is scored reversely, that is, questions from the right to the left of the scale accounts for 1 point, 2 points.... Finally, the more one scores, the higher level SWB reaches.

2.4 Test procedure and data processing

With the assistance of the university teachers, the author gives questionnaires to students in the classrooms, asks them to answer the questions and reads the instructions and precautions in front of them with the different grades and disciplines of tested students taken into consideration. The time for test is 20 minutes, and it should be answered anonymously on site. After the test, the questionnaires are collected in the classrooms.

Then the questionnaires are sorted out to screen out invalid ones. And the valid ones are input to the computer, and the data from questionnaires are counted with the method of descriptive statistics through SPSS19.0. Lastly, the data are analyzed and a structural equation model is established with the usage of T-test, regression analysis and correlation analysis through AMOS17.0.

3 Findings
3.1 Overall SWB of university students
The descriptive statistics of the overall SWB of university students tested are shown in Table 2 based on their GWB scores. It is indicated that regarding dimensional factors of SWB of university students, the overall SWB averages 78.92 points, and its minimum is 46 points and maximum 117 points while the norm for domestic overall SWB is 71 points for female and 75 points for male. Therefore, the overall SWB of Chinese university students are much above the norm. Additionally, the score rank of each factor is shown in the following table.

Table 2　Overall SWB of University Students

Item	Max	Min	M	SD
Satisfaction and Interests in Life	6.00	1.00	3.04	1.05
Worries about Health	16.00	2.00	11.13	2.43
Energy	30.00	6.00	17.50	3.81
Frustrating or pleasant mood	28.00	4.00	18.81	4.14
Control of Emotion and Behavior	17.00	5.00	11.97	2.19
Relaxation and Tension	26.00	9.00	16.41	3.07
Overall SWB	117.00	46.00	78.92	10.96

3.2 Demographic differences in SWB among university students
In this study, first, the subjects are divided into two groups based on their majors whether they are literal arts or science to study their SWB scores, and the data differences between the two groups are analyzed by independent sample T-test, of which the results are shown in Table 3. From the Table results the conclusion that there are little differences in the SWB of university students in spite of their different majors(p>0.05).

Table 3　Differences in SWB of University Students and Its Factors due to Their Majors

Item	Science（n=258）（M±SD）	Liberal Arts（n=184）（M±SD）	Sig	T
Satisfaction and Interests in Life	3.05±1.04	3.02±1.07	0.737	-0.336
Worries about Health	11.17±2.50	11.07±2.33	0.654	-0.449
Energy	17.74±3.82	17.15±3.78	0.104	-1.628
Frustrating or pleasant mood	18.82±4.25	18.97±3.99	0.708	-0.374
Control of Emotion and Behavior	11.90±2.22	12.06±2.14	0.447	0.761
Relaxation and Tension	16.46±3.19	16.35±2.90	0.726	-0.351
Overall SWB	79.14±11.23	78.61±10.60	0.616	-0.501

Second, the subjects are divided in to the female group and the male group to study their scores through independent sample T-test so that the impact of gender on SWB can be observed, of which the results are shown in Table 4. Thus, it is summarized that gender has a slight influence on the SWB of university students(p>0.05).

Table 4　Differences in SWB of University Students and Its Factors due to Their Genders

Item	Female（n=207）（M±SD）	Male（n=235）（M±SD）	Sig	T
Satisfaction and Interests in Life	3.06±1.04	3.02±1.06	0.683	-0.409
Worries about Health	10.94±2.37	11.29±2.47	0.124	1.542
Energy	17.36±3.57	17.61±4.01	0.491	0.689
Frustrating or pleasant mood	18.93±4.18	18.84±4.11	0.821	-0.226
Control of Emotion and Behavior	11.82±2.08	12.10±2.27	0.177	1.352
Relaxation and Tension	16.53±2.90	16.31±3.22	0.452	-0.754
Overall SWB	78.63±10.69	79.17±11.21	0.608	0.514

Third, the subjects are divided into two groups based on the location of their families whether they live in rural areas or urban cities to study their SWB scores via independent sample T-test, of which the results are shown in Table 5. it suggests that the SWB of university students from rural areas is not

obviously different from that of students from urban cities(p>0.05).

Table 5　Differences in SWB of University Students and Its Factors due to Their Family Structures

Item	Non-Single-Parent（n=411）（M±SD）	Single-Parent（n=31）（M±SD）	Sig	T
Satisfaction and Interests in Life	3.06±1.05	2.68±0.94	0.048	-1.981[*]
Worries about Health	11.18±2.47	10.35±1.70	0.016	-1.184[*]
Energy	17.57±3.86	16.49±2.92	0.125	-1.535
Frustrating or pleasant mood	18.98±4.20	17.58±2.86	0.016	-1.818[*]
Control of Emotion and Behavior	11.99±2.21	11.55±1.88	0.270	-1.104
Relaxation and Tension	16.39±3.06	16.77±3.19	0.499	0.677
Overall SWB	79.18±11.11	75.42±8.18	0.021	-1.848[*]

(Note: the symbols of "*", "**" and "***" refer to "<0.05", "<0.01" and "<0.001" respectively)

At last, to study the differences of SWB of university students in university grade, four groups including freshman, sophomore, junior and senior students respectively are tested and the one-factor analysis of variance is performed on their scores, of which the results are shown in Table 6. As is suggested in the Table, the factor of university grade plays an unimportant role in the SWB of university students(p>0.05), while it exerts a different influence in the factor of worries about health for SWB(F=2.356，P=0.071) , which results that the difference in SWB caused by university grade is close to the marginal significance.

Moreover, the posttest indicates that the difference in SWB of the senior group is much obvious than that of the other groups.

Table 6　Differences in SWB of University Students and Its Factors due to Their Grades

Item	Freshman（n=125）M±SD	Sophomore（n=125）M±SD	Junior（n=90）M±SD	Senior（n=102）M±SD	T
Satisfaction and Interests in Life	3.11±1.05	2.97±1.11	3.00±1.05	3.06±0.973	0.443
Worries about Health	11.29±2.44	11.30±2.36	11.30±2.26	10.57±2.60	2.356
Energy	17.46±4.04	17.51±3.97	17.71±3.76	17.33±3.39	0.162
Frustrating or pleasant mood	18.80±4.07	19.02±4.34	19.00±4.41	18.70±3.74	0.149
Control of Emotion and Behavior	12.34±2.26	11.75±2.12	11.80±2.17	11.92±2.16	1.790
Relaxation and Tension	16.20±2.94	16.58±3.12	16.70±3.20	16.22±3.07	0.730
Overall SWB	79.20±11.28	79.13±11.16	79.51±11.02	79.79±10.32	0.486

3.3 Overall situation of personality traits of university students

The analysis on the overall situation of personality traits of university students is shown in Table 7. It is suggested that the average scores in each dimension of personality traits of university students are very close, among which the scores in the Agreeable dimension are relatively higher while the scores in the Neuroticism dimension the opposite.

Table 7　Overall Situation of Personality Traits of University Students

Item	Amount	Average	Standard Deviation	Number of Items	Average Score per Question
Neoroticism	442	26.91	5.74	8	3.36
Conscientiousness	442	32.31	5.84	8	4.04
Agreeableness	442	33.73	6.32	8	4.22
Openness	442	32.67	5.99	8	4.08
Extraversion	442	30.45	6.10	8	3.80

3.4 Demographic differences in personality traits among university students

First, the subjects are classified into two groups based on their majors whether they are literal arts or science to study their SWB scores, and the differences in their score on personality traits between or

science to study their SWB scores, and the differences in their score on personality traits between two groups are analyzed by independent sample T-test. From the data in Table 8 results the conclusion that scores in each dimension of personality traits are similar in the university major facet(p>0.05).

Table 8 Differences in Personality Traits of University Students and Its Dimensions due to Their Majors

Item	Science（n=258） M±SD	Liberal Arts（n=184） M±SD	Sig	T
Neoroticism	3.39±0.75	3.33±0.67	0.353	-0.930
Conscientiousness	4.02±0.72	4.05±0.74	0.682	0.410
Agreeableness	4.21±0.83	4.22±0.74	0.862	0.173
Openness	4.09±0.76	4.07±0.74	0.832	-0.212
Extraversion	3.77±0.75	3.86±0.77	0.200	1.284

Second, the subjects are classified in to the female group and the male group to study their scores on the personality trait scale through independent sample T-test, of which the results are shown in Table 9. The data from the following Table proves that the differences of gender in the Openness dimension reach the significant difference(p<0.05), which indicates that the male and the female behave differently in the Openness dimension, and furthermore the male Openness is higher than the female through the comparison of their average scores. However, any obvious difference is not observed in other dimensions(p>0.05).

Table 9 Differences in Personality Traits of University Students and Its Dimensions due to Their Genders

Item	Female（n=207） M±SD	Male（n=235） M±SD	Sig	T
Neoroticism	3.34±0.65	3.38±0.77	0.526	-0.635
Conscientiousness	4.01±0.72	4.06±0.74	0.491	0.689
Agreeableness	4.23±0.77	4.20±0.81	0.722	-0.357
Openness	4.01±0.73	4.15±0.77	0.042	2.035[*]
Extraversion	3.85±0.72	3.77±0.80	0.263	-1.122

Third, the subjects are classified into two groups based on the location of their families whether they live in rural areas or urban cities, and the differences in their scores on the personality trait scale are analyzed via independent sample T-test. From Table 10 results the conclusion that in terms of the Agreeableness and the Conscientiousness dimensions, universities from different areas are dissimilar, and particularly the Agreeableness and Conscientiousness of students from rural areas are much higher than that of students from urban cities, showing a significant difference(p<0.05), however, with regard to the Neuroticism, the Openness and the Extraversion dimensions, no obvious difference is observed.

Table 10 Differences in Personality Traits of University Students and Its Dimensions due to Their Student-Source Places

Item	Rural Area（n=171） M±SD	Urban City（n=271） M±SD	Sig	T
Neoroticism	3.38±0.72	3.36±0.71	0.793	-0.263
Conscientiousness	4.14±0.70	3.97±0.74	0.017	-2.401[*]
Agreeableness	4.38±0.76	4.11±0.79	0.000	-3.598[**]
Openness	4.05±0.72	4.06±0.77	0.394	-0.854
Extraversion	3.82±0.74	3.80±0.80	0.848	-0.192

Fourth, the subjects are classified in to the single-parent group and the non-single-parent group due to their family structure, and their scores are analyzed through independent sample T-test. The results are shown in Table 11 that single-parent students score higher than non-single-parent students do in the Neoroticism dimension while the former scores lower than the latter in the Agreeableness dimension, a significant difference between the two.

Table 11   Differences in Personality Traits of University Students and Its Dimensions due to Their Family Structures

Item	Non-Single-Parent（n=411）M±SD	Single-Parent（n=31）M±SD	Sig	T
Neoroticism	3.34±0.73	3.63±0.48	0.030	2.176[*]
Conscientiousness	4.04±0.74	3.94±0.61	0.455	-0.748
Agreeableness	4.25±0.79	3.78±0.66	0.001	-3.231[**]
Openness	4.10±0.76	3.86±0.47	0.089	-1.704
Extraversion	3.82±0.78	3.65±0.55	0.223	-1.220

At last, the subjects are classified into freshman group, sophomore group, junior group and senior group due to their different university grade, and the one-factor analysis of variance is performed on their scores. The results are shown in Table 12 that there are significant differences in students of dissimilar grade in the Agreeableness and the Openness dimensions($p<0.05$), and specifically statistical scores in them are F=9.402，$P<0.05$ and F=3.536，$P<0.05$ respectively, however, there is no obvious difference in other dimensions. Moreover, the posttest indicates that scores of the junior and the senior are similar while that of the others opposite in the Agreeable dimension, and scores of the freshman are obviously different from that of the junior and the senior in the Openness dimension.

Table 12   Differences in Personality Traits of University Students and Its Dimensions due to Their Grades

Item	Freshman（n=125）M±SD	Sophomore（n=125）M±SD	Junior（n=90）M±SD	Senior（n=102）M±SD	F	Comparison Among Grades (Obvious Part)
Neoroticism	3.45±0.85	3.35±0.66	3.41±0.60	3.23±0.69	1.816	
Conscientiousness	4.12±0.72	4.04±0.78	3.99±0.72	3.98±0.70	0.823	
Agreeableness	4.49±0.78	4.24±0.83	4.00±0.75	4.04±0.69	9.402**	1>2>3,1>2>4
Openness	4.24±0.77	4.12±0.83	3.96±0.66	3.97±0.66	3.526*	1>3>4
Extraversion	3.87±0.86	3.82±0.79	3.74±0.71	3.77±0.64	0.576	

4 Analysis and Discussion

Based on statistical theories, the six factors affecting scores on SWB and the overall SWB mentioned above are considered as the statistical variable to analyze and predict the SWB of university students in several dimensions with the usage of regression theories.

4.1 Analysis on the overall SWB of university students

The descriptive statistics of the overall SWB of university students show that regarding the SWB variables, the overall SWB averages 78.92 points, and its minimum is 46 points and maximum 117 points while the norm for domestic overall SWB is 71 points for female and 75 points for male, which indicates that the overall SWB of Chinese university students are much above the norm. The major reasons for that conclusion are that university students are free from heavy college entrance pressure and homework burden so that they can enjoy their colorful campus lives both academically and culturally. And among the score rank of the factors, the factor of frustrating or pleasant mood scores relatively higher, which is a reflection of daily life of contemporary university students. Furthermore, university students care more about their moods, holding that their happiness depends on whether they are in good or bad mood. And generally speaking, mood is of great importance for one`s happiness. And it can be concluded from the analysis above that university students scores lowest on the factor of satisfaction and interest in life, which suggests that unsatisfactory feelings for current life of university students directly cause the decrease of SWB. The reason for this result, in the author`s opinion, is attributed to the fact that such pressures on contemporary university students as academic pressure, job-hunting, pressure and emotional pressure are overwhelming and competitions is increasingly fierce, which make the majorities of them exhausted and unsettled, thus leading to a lower score of SWB.

Gender has a slight impact on the SWB of university students. The possible reason for this result could be gender differences are narrowing down and they are related to emotional characteristics of the male and the female. Generally speaking, the female is more emotionally diversified than the male, which indicates that the female can experience more sense of happiness and satisfaction that the male

while in the meanwhile they are more emotionally vulnerable. Consequently, the differences in the overall SWB of university students are not obvious in the gender facet.

Both in the major and the grade facets, differences in SWB are not obvious. Still one point has to be stressed that SWB of students reaches the marginal difference in the factor of worries about health, and the posttests suggest that SWB of the senior is significantly different from that of the lower grades, for which the reason is that they are facing graduating, academic and job-hunting pressures and they work harder in their daily lives and thus they consider health more important and hold that a healthy body is the basis of consistent striving.

In the student-source place facet, the data analysis suggests that the overall SWB of university students from rural areas and urban cities is relatively similar. The possible reason for this result is that life in rural areas is improving and children in rural areas have access to everything that children in urban cities have, resulting the similar overall SWB. However, the former scores lower in the factor of satisfaction and interests in life than in other factors, which indicate that current university students are not satisfied with themselves and their lives, and they always have more desires, leading to a lower SWB. University students from urban cities scores slightly higher than those from rural areas in the factors of worries about health, control of emotion and behavior, and relaxation and tension. Perhaps, this can be ascribed to students from urban cities enjoy a relatively richer material life and focus more on their mental improvements, thus resulting in their higher scores than students from rural areas in these factors.

In the factor of energy, students from rural areas scores slightly higher than those from urban cities because it is possible that children in rural areas often help their families do some farm work and even walk an along way to school, which are like exercises so that the former has a vigorous energy while the latter lacks exercises and thus their physical condition drops and their SWB scores lower.

In the family structure facet, the overall SWB of university students differs obviously. Children in the single-parent family constantly feel that their lives are incomplete, because they lack the love from both parents. No matter how much love their single parents give them, they feel the insecurity in their lives and even hold a hostile attitude to society. They could not be raised in a healthy environment, and it can exert a great influence on children and the diverse influence could continue to exist in their university life and even worse, their whole life. That`s why children in the single-parent family score lower on SWB.

4.2 Correlation analysis and discussion on personality traits and swb of university students

The correlation analysis suggests that the statistical variables of the overall SWB is obviously correlated to those of personality traits. In particular, the overall SWB is negatively correlated to the Neoroticism dimension. If students' scores higher in the Neoroticism dimension, most of their emotions are negative emotions like depression and anxiety which will affect SWB without timely control and adjustment. The overall SWB is positively correlated to the other four dimensions, namely, if students' scores high in these dimensions, their SWB is better (Yang Xiujun, 2003). Therefore, every individual should positively cultivate good personality traits and try to shape themselves into a healthy and active individual in order to easily enjoy more happiness.

4.3 Regression analysis on personality traits for swb of university students

The one-dimensional regression analysis on SWB and several dimensions of personality traits shows that three of five dimensions of personality traits match the regression model, which are the Neoroticism dimension that is most effective for a reverse prediction of SWB with an 10.8% explanation rate, the Conscientiousness dimension and the Agreeableness dimension that are less effective for a direct prediction of SWB with an 7.5% and an 2.3% explanation rate respectively, and the three dimensions added together reach an 20.6% explanation rate for SWB. It is suggested that the integrated dimensions of the three can exert a desirable influence on SWB, in which case the lower scores on the Neroticism dimension are, the higher SWB will be. In fact, one`s personality usually tends to be stable. Although congenital genetic factors play an important role in that process, one`s acquired environment and education level also have a great impact. Therefore, good personality traits should be cultivated and people should keep calm and optimistic instead of being sensitive, anxious or depressed when dealing with obstacles and pressures, which is conducive to the improvement of happiness.

5 Conclusion

5.1 Conclusion

First, the overall SWB of university students is medium-high.

Second, SWB of university students has showed significant differences in the family structure facet and the marginal significance in the university grade facet. In terms of the variables of personality traits, the Openness dimension has suggested significant differences in the gender facet, and the Conscientiousness dimension and the Agreeableness dimension in the student-source place facet, and the Neuroticism dimension and the Agreeableness dimension in the family facet, and the Agreeableness dimension and the Openness dimension in the university grade facet.

At last, the overall SWB of university students are closely correlated to every dimension of personality traits, and personality traits have shown a significant regressive effect for SWB and it can be used for the prediction of SWB.

5.2 Outlook

First, this research has only tested students of several universities in Wuhan. Therefore, it is inevitable that the sampling is uneven and the data distribution is not balanced, which may lead to regional limitations on results. However, the data collection area can be expanded to verify the conclusions of this research in later studies so that it can make the conclusions more universal and representative. In addition, limited by objective conditions, data collection has not provided one-on-one instructions for the subjects, most of which answer their questionnaires at different times and under dissimilar circumstances, thus causing certain errors.

Second, the SWB of university students has multiple influences and relations among the factors affecting it are intricate. Although it is mainly attributed to personality traits, this research only focuses on the study on personality traits in which case there must be weaknesses and more directions should be selected to study SWB.

At last, educators need to further study and ponder over how to apply the conclusions of this research to practical demands, that is, how to cultivate university students of different personality traits in order to improve their SWB.

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University Students' Entrepreneurial Intention and Entrepreneurial Behavior: The Moderating Effect of Sense of Social Support

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Abstract: With the more support of country to university students' innovative undertaking in China, this paper addresses the effect of sense of social support on the relationship between university students' entrepreneurial intention and entrepreneurial behavior. Data were collected from 250 college students. Through the analysis of SPS22.0, the results suggested as the follows: (1)Entrepreneurial intention had a significant and positive impact on entrepreneurial behavior.(2)The sense of social support includes government support, school support, family support and social organization support.(3)All of the four dimensions of sense of social support were positively related to university students' entrepreneurial intention **and** entrepreneurial behavior relationship ,but their impacts were different.
Key words: Entrepreneurial intention; Entrepreneurial behavior; Sense of social support; Moderating effect

1 Introduction

Entrepreneurship is an important engine to promote social and economic development. Undergraduate entrepreneurship not only relieves the employment pressure of some college students, but also enables young people to fully develop their creativity.

In the middle of the last century, research on entrepreneurial behavior focused on a more general aspect (Penrose, 1959).After entering the 21st century, the definition of entrepreneurial behavior is more microscopic than before (McMullen, Shepherd, 2006; Kwatko, 2001; McMullen, Shepherd, 2006). On this basis, domestic scholars further defined the research object.Considering the particularity of university students, entrepreneurial behavior is seen as entrepreneurial preparation behavior(Chi Leidan,2010). In the study of entrepreneurial intentions, many scholars have discussed the definition of entrepreneurial intention in different ways (Bird, 1988; Krueger, 1993; Douglas, Fitzsimmons, 2008; Thompson, 2009; Fan Wei, Wang Zhongming, 2006; Jian Dandan, 2010).This paper agrees with the concept given by (Thompson, 2009) that entrepreneurial intentions are the psychological beliefs that individuals make plans for the creation of new businesses and the implementation time of plans is uncertain.The reason is that the entrepreneurial intention here is influenced by various external factors such as society and family.

Although the research indicated that the individual's entrepreneurial intention has a significant prediction of entrepreneurial behavior (Fan Wei, Wang Zhongming, 2006), there is still room for research.According to (Sun Zhiming's, 2011) survey, among the 1000 students from five different universities, the number of students who had considered entrepreneurship and did participate in self-employment after graduation was only 1.04% of the total number with entrepreneurial intention. It proves that the intention of individual entrepreneurship is not only derived from the entrepreneurial impulse of personal originality, but also influenced, to a large extent, by the surrounding social factors.Therefore,this paper introduces the sense of social support to explore the impact on college students' entrepreneurship of social support for different levels and dimensions.

2 Research Model and Hypothesis
2.1 Research model
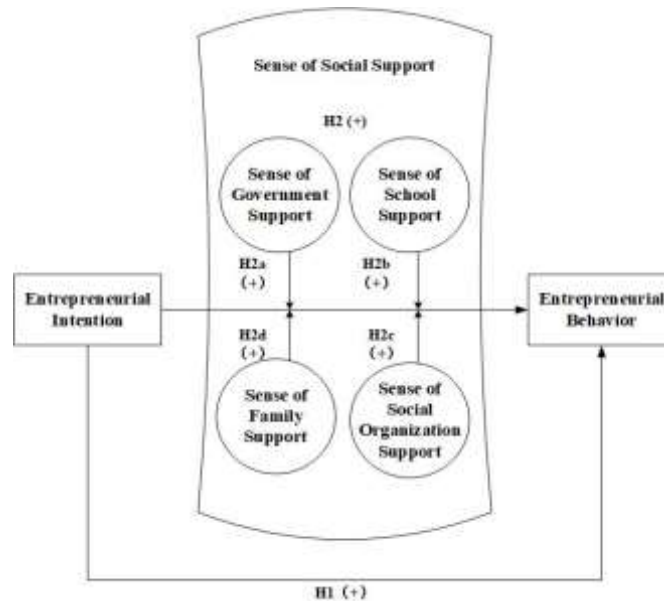
Figure 1   Conceptual Model

Figure 1 presents the conceptual model. The model presents entrepreneurialintentionwas positively related to university students' entrepreneurial behavior, and sense of social support plays a moderating role between entrepreneurial intention and entrepreneurial behavior It also posits the sense of social support as a moderator for entrepreneurial intention and entrepreneurial behavior relationship.

2.2 Entrepreneurial intention and entrepreneurial behavior

In the field of psychology, the most direct predictor of behavior is usually thought to be intention (Krueger, Reilly, 1993).Therefore, scholars have referred to the relevant achievements in the field of psychology, namely "in many cases, the known intention can well predict the unknown behavior, especially for some complex, invisible and unobservable behaviors". Finally it is concluded that entrepreneurial intention is the most direct objective predictor of entrepreneurial behavior, and this view has been widely accepted.What we can't ignore, however, is that the influence of entrepreneurial intention on entrepreneurial behavior is also restricted by various objective conditions. Even though intention can predict behavior to a large extent, it cannot indicate that entrepreneurial intention will definitely lead to entrepreneurial behavior.

Thus, the study formulated a hypothesis as follows:

Hypothesis 1. Entrepreneurial intention will positively affect entrepreneurship behavior.

2.3 Sense of social support

The concept of social support must be clarified before we define the sense of social support. Reviewing the existing studies, scholars used to study social support from different perspectives.Some scholars defined social support from the perspective of psychology (Gottlieb, 1981), while others define it from the perspective of sociology (Malecki et al., 2002). Domestic scholar (Liao Hejun, 2004) divided social support into institutionalized social support and non-institutionalized social support from the perspective of social support sources.Institutionalized social support, on the one hand, is the expression of national will. On the other hand, it comes from social for-profit and non-profit organizations while non-institutionalized social support is provided by family members, lovers, colleagues (classmates), teachers and other groups.In the context of social support, the domestic scholar (Wang Yanfei, 2004) has divided social support into four categories: physical support, emotional support, information support and partner support.

Based on the concepts of Liao Hejun and Wang Yanfei, this paper regards social support as a four-dimensional structure, which includes four dimensions: government support, school support, social support and family support.

2.4 Sense of social support and its moderating effect

So far, the research has shown that social support operates in two ways: the main effect model and the buffer model.The main effect model of social support holds that social support has a broad sense of gain effect, which means that individuals will not change in any situation, whether they are supported or

not.A good support system enables people to strive for better settlement of difficulties and to earn more social bonuses (Cohen, 2004).The buffer model points out that only when individuals are under pressure, will social support play a positive buffer role and protect individuals from being harmed by adverse factors.

Entrepreneurship is a potentially stressful thing.If an individual can feel enough support to start a new bussiness, he/she will not regard the entrepreneurial event as an unbearable pressure event, so he/she is more likely to put his/her entrepreneurial intention into practice.Even if the individual believes that a startup event is full of pressure,strong sense of social support will also prompt them to make a second evaluation of pressure, so as to avoid bad emotions generated by individuals.Based on the above analysis, the following hypotheses are proposed:

Hypothesis 2. Sense of social support will positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

Hypothesis 2a. Sense of government support will positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

Hypothesis 2b. Sense of school support will positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

Hypothesis 2c. Sense of social organization support will positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

Hypothesis 2d. Sense of family support will positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

3 Research Methods and Procedures
3.1 Design of research variables

There are three variables: entrepreneurial intention, entrepreneurial behavior and social support. They all used a 5-point Likert scale to measure responses to each item, ranging from 1(very little) to 5(a great deal).

Entrepreneurial intention. Considering that the research object of this paper is college students, this study, based on the *Individual Entrepreneurial Intention Scale* compiled by Thompson (2009), slightly modified and adjusted it to obtain a measure scale of entrepreneurial intention of college students with 8 items.

Entrepreneurial behavior. Yu Fumao and Zeng Ming (2015) designed a scale consisting of four items for entrepreneurial behaviors of college students which covers the preparation degree of entrepreneurs at four levels.This study extends the preparatory activities in the above scale to cover entrepreneurial activities and entrepreneurial activities that have been implemented. And eventually we obtained an entrepreneurial behavior scale with five items.

Social support. We used the *Perceived Social Support Scale* compiled by Jiang Ganjin (2007).The scale, with 12 items from four dimensions, measures the support that entrepreneurs have learned from governments, schools, social organizations and families.

3.2 Investigation subjects

The survey objects of this paper include two parts, one is the undergraduate students in Wuhan University of Technology, most of which have no entrepreneurial experience but some have already had entrepreneurial intention.The other part is the members of some entrepreneurial teams of Wuhan University of Technology.

3.3 Data collection

In order to ensure the validity and reliability of data in this study, some preliminary investigation was conducted, generating 35 usable responses. Through the analysis of SPSS22.0, each scale's Cronbach's α was over 0.8. Thus, each measurement item can be determined to have reliability.However, in the reliability analysis of the entrepreneurial intention scale, we find the Cronbach's α is higher than the original reliability coefficient after deleting the a7 and a8 items. Therefore, a7 and a8 items of the scale were deleted.In the formal survey stage, 218 questionnaires were recovered in total, of which 202 were valid and the effective recovery rate was 80.8%. After screening 58 unsatisfactory questionnaires, 144 questionnaires were finally obtained. Screening includes two cases: (1) Sample without entrepreneurial intention; (2)Social recruiters in the sample.

4 Data Analysis and Hypothesis Testing
4.1 Reliability and validity analysis

The study selected Cronbach's α to measure the reliability of each scale. Through the analysis of SPSS22.0, all scales' Cronbach's α were at 0.8 or more. Thus, each measurement item can be determined to have reliability. This study adopted content validity and discriminant validity. All items were based on published scale, modified with the actual situation, and got an adjustment through the preliminary investigation. So we can think data had a good content validity. Confirmatory factor analysis results showed KMO is greater than 0.8, and Bartlett's test (P<0.001) was significant. All the factor loading coefficient were between 0. 48 ~ 0.861. Hence, we determined that the measuring items of the study meet the criteria of the discriminant validity.

Table 1   Regression Analyses for TestingModerating Effect

Variable	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Constant	2.27***	1.824***	2.830***	2.085***	1.950***	1.980***	17.392***	5.392**	6.401**	7.319***
EI		0.602***	0.605***	0.604***	0.600***	0.601***	−2.937**	−0.201		−0.651
GS			−0.244				−3.654**			
SS				−0.089				−1.159**		
FS					−1.639***				−1.639**	
SOS						−0.051				−1.788**
EI * GS							0.833**			
EI * SS								0.260**		
EI * FS									0.39**	
EI * SOS										0.422**
ΔR²	0.04	0.306**	0.337**	0.314**	0.308*	0.308**	0.102**	0.019*	0.032*	0.032*
F	20.12	62.718	35.828	32.329	31.347	31.431	25.481	4.005	6.795	6.832

EI: Entrepreneurial Intention;GS: Sense of Government Support; SS: Sense of School Support; FS: Sense of Family Support;SOS: Sense of social organization support;   * p<0.05. ** p<0.01. ***p<0.001.

4.2 Correlation analysis

The study selected Pearson correlation coefficient to test the relationship between variables. Through the analysis of SPSS22.0,the correlation coefficient between entrepreneurial intention and entrepreneurial behavior is 0.554, and it is significant at the level of 0.01, which means that there is a strong positive correlation between the two. Therefore, hypothesis H1 in this study has been verified.There is also a significant correlation between the four dimensions of social support (p<0.01), and the correlation coefficient is above 0.4, which indicates that the four dimensions are strongly positively correlated.

4.3 Regression analysis

Test of main effect.Data (Table 1) shows thatthe entrepreneurial intention of college students has a significant positive influence on entrepreneurial behavior (β=0.554, the adjusted R square is 0.301), and the regression coefficient reaches a significant level (Sig=0.000<0.05,F=62.718). Therefore, it can be concluded that the fitting degree and explanatory power of college students' EI-EB model are relatively good. So hypothesis 1 is verified again.

Test of moderating effect.The regression coefficient of the interaction terms of social support and entrepreneurial intention of college students reached a significant level (Sig=0.01<0.05) and R square change was 0.052, indicating that the sense of social support moderates the relation of entrepreneurial intention and entrepreneurial behavior. Therefore, hypothesis 2 was verified.

The results (Table 1) show thatthe interaction regression coefficients of the four factors of social support are significant (Sig=0.000<0.05,Sig= 0.047<0.05,Sig=0.01<0.05,Sig=0.01<0.05).In addition, we also found that R square change with sense of school support, family support and social organization support was 0.019, 0.032 and 0.032 respectively, while R square change with sense of government support was 0.102. Obviously, compared with the first three factors, the sense of government support plays the most significant role in regulating the relation of entrepreneurial intention and entrepreneurial behavior.

5 Conclusion
5.1 Conclusions

From the perspective of social support, this paper discussed the influence of entrepreneurial intention on entrepreneurial behaviors under the different levels of sense of social support. The main conclusions are as follows:

(1) The entrepreneurial intention of college students plays a significant positive role in the entrepreneurial behavior. It can be concluded that the stronger entrepreneurial intention, the higher probability of entrepreneurial behavior.

(2)Data suggests that all of the four dimensions of sense of social support positively moderate the relation of entrepreneurial intention and entrepreneurial behavior.

(3) Among the four dimensions of sense of social support, the moderating effectof government support is the most significant. This is probably because the government's favorable policies (such as tax incentives, support funds, etc.) can provide much-needed financial support for the initial entrepreneurs, which will help entrepreneurs start their own businesses.However, the actual financial or material support brought by sense of school support, by contrast, will be greatly weakened.

Therefore, the entrepreneurial activities of college students require close cooperation from the government, schools, families and social organizations, especially the government.

5.2 Limits of research and future research direction

This study has several limits according to research environment.

First, the sample of the research has certain limitation. This study only chose students of Wuhan University of Technology as the research object, they are not able to represent the total college students. We need to expand the research objects to Hubei province and even the whole Central China.

Second, in this paper,the control variables such as family background, personal professional and educational level have not been dealt with too much, which should be considered on the next step..

Third, this study only introduced the sense of social support as a moderating factor in the process of Entrepreneurial intention - Entrepreneurial behavior. But actually, there are still many variables that may work, such as resource conditions, entrepreneurial environment and so on. These variables can be introduced in the future to further deepen and enrich our study.

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The Influence of the Reduplicated Names on the Interpersonal Perception and Attitude

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Abstract: In order to explore the effect reduplication names on interpersonal perception and attitudes, this study carried out two experiments to examine the relationship based on the stereotype content model, meanwhile tested the moderation of gender characteristics. The results show that: (1) reduplicated names will make people feel that the evaluation objects are more like children, warmer, but less competent. (2) the influence of reduplicated names on interpersonal perception is moderated by the gender characteristics of the names. For feminine names, the influence of reduplicated names on warmth and competence perception will be weakened. The present study can advance our understanding of how and when reduplicated names influence the interpersonal perception and attitude. Limitations and implications of this study are discussed. More related factors of reduplicated names will be explored in the future.
Key words: Reduplicated names; Interpersonal perception; Attitude; Gender

1 Introduction

Everyone has a name, and it's a symbol that distinguishes us from others, but it's not just a simple symbol. When we were born, our parents racked their brains to set up a good name for us, hoping to have a good life. It is true that people's name characteristics have an important impact on academic achievement, social behavior, mental health, interpersonal perception and attitude and on (Kalist & Lee, 2010; Erwin, 1993). In terms of interpersonal perception and attitude, researchers found that name titer, gender characteristics, ethnic characteristics (Zhao & Biernat, 2017), difficulty of identification and difficulty of pronunciation can play an important role (Laham, Koval, & Alter, 2012). Although previous studies have found many valuable research findings, no one has examined the effects of reduplication names on interpersonal perception and attitude so far. There are widespread reduplication names in China. Therefore, it is of great practical significance to study this problem. Based on the stereotype content model, the influence of reduplicated names on interpersonal perception and attitude is investigated, and the moderating effect of gender characteristics on names is examined.

1.1 The influence of name characteristics on interpersonal perception and attitude

There is a common saying in China that "people are like their names", which means that there is a certain degree of consistency between individual names and their psychological characteristics. People's first impression of other people often begins with the name, they will infer the psychological characteristics of others according to the characteristics of the individual name, and thus have a certain impact on interpersonal perception and judgment (Song & Schwarz, 2009). A review of the previous literature shows that although the influence of various names on interpersonal perception and attitude has been explored, no study has been conducted on the role of reduplicated names.

1.2 The influence of the name characteristics of the reduplication on the interpersonal perception

Children themselves are more likely to use reduplication, and people are more likely to use this form of speech when communicating with children. It can be seen that the phonetic characteristics of the reduplication are closely related to the children, and those who use the reduplication name may be considered more like children and have the psychological characteristics of children. According to the stereotype content model, although there are many contents of interpersonal perception, it can be classified into two aspects: warmth and competence (Fiske, Cuddy, Glick, & Xu, 2002). According to previous studies, children or individuals with characteristics of children (such as faces) give people the impression that they are warmer and less competent. For example, the baby face subjects are often considered to be kind (Gorn, Jiang, & Johar, 2008), honest and trustworthy (Zebrowitz & Montepare, 2008), but at the same time they are not competitive enough to be leaders (Poutvaara, Jordahl, & Berggren, 2009; Wei, Wang, Zhou, Feng, & Ding, 2016).

1.3 The influence of reduplication on the interpersonal perception: the moderating effect of gender characteristics

According to the above inference, the repetition of names may affect the warmth and competence of interpersonal perception. Is this effect applicable to all types of names? According to the theory of gender schema, people will form behavior norms corresponding to their own gender in the process of socialization, and enter the corresponding gender roles and also form some stereotypes about gender (Eagly & Karau, 2002; Qian, Zhang, 2000). Based on traditional gender roles, men often play the role of resource acquisition, while women often play the role of caregivers. These two roles emphasize different characteristics; for the resource recipients, competence is more important; for caregivers, warmth is more important. Therefore, in terms of the characteristics of gender roles, men will be required to be highly competent, while women will be required to be highly warm.

2 Assumption

Gender stereotyping studies have found that men are often considered to be highly competent and low warm, while women are often considered to be high warm and low competent. To sum up, compared with men, women can give people the feeling of high warmth and low competence. At the same time, reduplication can also make people feel high warmth and low competence. Therefore, for the feminine names, the influence of reduplication on interpersonal perception may be weakened. Accordingly, we come to the assumption that:

H_1: Reduplicated names make people feel more childlike, warmer, but less competent.

H_2: The influence of reduplicated names on interpersonal perception is moderated by the gender characteristics of the names. For feminine names, the influence of reduplication on warmth and competence perception will be weakened.

3 Method

3.1 Experiment1 The influence of the reduplicated names on the interpersonal perception

Participants and Procedure.

This experiment used single factor between-subjects design (non reduplicated VS reduplication). One hundred and fifty-nine undergraduate students (83 men and 76 women) from Hubei province participated in the study and randomly assigned to this two groups. The mean age was 18.30(M = 18.30，SD = 0.76).

First, participants were asked to imagine that "your class will turn to a new student. You only know the name is XX, imagine this person, then evaluate this person." The reduplicated name is "Li Weiwei" and the non reduplicated name is "Li Wei". Referring to previous studies, a project is used to measure the perception of children with 1-7 points. Such like" In real life, some people are more like children, some people are more like adults, and what about XX feels like". The lower the score is, the more like the child; the higher the score, the more the man looks like an adult. Referring to previous studies, four items were used to measure warm perception, and four items were used to measure competence perception. The higher the score is, the higher the awareness of warmth and competence. The internal consistency coefficient of warm perception is 0.85, and the internal consistency coefficient of competence perception is 0.86.

3.2 Experiment 2 the influence of reduplicated names on interpersonal perception: the moderating effect of gender characteristics

Participants and Procedure.

This experiment used two factors between-subjects design, every factor has two level of reduplication feature (reduplication VS non reduplication) and gender characteristic (male VS female). Two-hundred and sixty-three undergraduate students (124 men and 139 women) from Hubei province participated in the study and were randomly assigned to four groups. The mean age was 18.17(M= 18.17, SD = 0.75).

The procedure of the experiment was the same as that of experiment 1. They would see the name first, then let them evaluate the person. For example, the name is the male reduplication name "Zhang Taotao" and the male non-reduplicated name "Zhang Tao" and the female reduplication name "Zhang Tingting" and the female non-reduplication name "Zhang Ting". The subjects valued with 1-7 points, the higher the score is, the higher the awareness of warmth and competence.

The measurement of interpersonal perception is the same as experiment one. The coefficient of internal consistency of warm perception is 0.86, and the internal consistency coefficient of competence perception is 0.88.

4 Results

4.1 Experiment 1

The results of independent sample T test showed that reduplicated names made the subjects feel more childlike, warmer, but less competent than non-reduplicated names (see Table 1). It verified H_1, indicating that reduplicated names would make people feel that the evaluation objects were more like children, warmer, but less competent.

Table 1   Difference in Interpersonal Perception between Reduplicated and non-Reduplicated names

name	Child perception($M \pm SD$)	warm($M \pm SD$)	competent($M \pm SD$)
reduplicated	4.21±1.71	4.86±1.00	4.36±0.98
non reduplicated	4.84±1.58	4.48±1.11	4.83±0.92
t	-2.43*	2.27*	-3.07**
Cohen's d	-0.39	0.36	-0.49

Note：$^{*}p <0.05$; $^{**}p <0.01$.

4.2 Experiment 2

For warm perception, the results of two factor variance analysis showed that the main effect of the reduplication characteristics was significant ($F_{(1,259)} = 7.13, p < 0.01, \eta_p^2 = 0.027$), the main effect of sex characteristics was not significant ($F_{(1,259)} = 0.06, p > 0.05$), and the interaction between the reduplication and sex characteristics was significant ($F_{(1,259)} = 4.16, p < 0.05, \eta_p^2 = 0.016$). The results of simple effect analysis showed that there were significant differences in the warmth perception of male names, reduplication and non reduplication names ($F_{(1,259)} = 10.98, p < 0.01$; $M_{reduplication} = 5.01, SD = 0.80, M_{non-reduplication} = 4.47, SD = 0.86, \eta_p^2 = 0.041$), and the difference in warmth perception between female names, reduplication and non reduplicated brand names was not significant.($F_{(1,259)} = 0.20, p > 0.05$; $M_{reduplication} = 4.75, SD = 0.97, M_{non-reduplication} = 4.67, SD = 1.05$).

For competence perception, the results of two factor variance analysis showed that the main effect of the reduplication characteristics was significant ($F_{(1,259)} = 6.90, p < 0.01, \eta_p^2 = 0.026$), the main effect of sex characteristics was not significant($F_{(1,259)} = 2.99, p > 0.05$), and the interaction between the reduplication and sex characteristics was significant($F_{(1,259)} = 4.29, p < 0.05, \eta_p^2 = 0.016$). The results of simple effect analysis showed that there were significant differences ($F_{(1,259)} = 10.92, p < 0.01$; $M_{reduplication} = 4.05, SD = 0.99, M_{non-reduplication} = 4.59, SD = 0.93, \eta_p^2 = 0.040$), and there was no significant difference in the warmth perception of female names, reduplication and non reduplicated brand names($F_{(1,259)} = 0.15, p > 0.05$; $M_{reduplication} = 4.49, SD = 0.78, M_{non-reduplication} = 4.54, SD = 1.01$).

The result of study two verified H_2, and the influence of reduplication name on interpersonal perception was moderated by the gender characteristics of the name. For feminine names, the influence of reduplication on warmth and competence perception will be weakened.

5 Conclusion

Based on the stereotype content model, this study designed two experiments to examine the effects of the name characteristics of the reduplication on the interpersonal perception and attitude, and explored the effect boundary.

Firstly, this study extended the research of name characteristics to the field of speech structure characteristics and discussed its functional boundaries. It's the first time to investigate the influence of the phonetic features of the reduplication in the name on the interpersonal perception and attitude, which expands the category of the study of the name, and provides a new direction for the future research. On the other hand, we also examined the functional boundaries of the reduplication effect of names, and found that the feminine names weaken the reduplication effect. In real life, people's names often have many characteristics at the same time. It is of great significance to investigate the interaction of these characteristics. However, previous studies often focus on the role of certain characteristics of names, such as gender, race, difficulty of identification and difficulty of articulation (Zhao, & Biernat, 2017; Laham, Koval, & Alter, 2012; Yang & Ren, 2016). The interaction of multiple name features on interpersonal perception and attitude can be examined in future.

Secondly, this study introduced the stereotype content model into the field of name feature research. The stereotype content model points out that warmth and competence are the two basic dimensions of

interpersonal perception, and people judge others from these two aspects at the first meeting.

Previous studies have shown that many factors such as social structure (such as status and relationship), country, race, sex, expression and other factors have an impact on warmth and competence perception. The characteristics of other people's names often affect our first impression, which is theoretically reflected in two aspects: warmth and competence. However, previous studies have seldom studied the role of name characteristics from the perspective of stereotype content model. In the future, we will examine the interaction of reduplicated name features on interpersonal perception and attitude. Such like the type of work.

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Research on the Influence of Online Shopping Customer Experience on Repurchase Intention

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Abstract: The rapid development of the Internet has led to the rapid development of online shopping. As a subversion of traditional shopping methods, online shopping has more uncertainties. Now scholars are paying more and more attention to the customer experience of online shopping. Although scholars have realized the influence of customer experience, there are few studies on customer experience, customer engagement and customer repurchase intention. In this study, through empirical research on 114 college students in three universities, it is found that there is a significant positive correlation between customer experience and customer engagement and customer repurchase intention; at the same time, customer engagement plays a partial intermediary role between customer experience and customer repurchase intention.Our research enriches the literature on customer fit and provides useful insights for e-commerce management practices.
Key words: Online shopping; Customer experience; Customer engagement; Customer repurchase intention

1 Introduction

In recent years, with the rapid development of the Internet, e-commerce has grown rapidly. E-commerce hasbecome one of the most important channels for people to spend on shopping(Csikszentmihalyi,1977). According to the data from the Industry Research Institute, the online shopping market in China reached 6.3 trillion yuan in 2017, an increase of 30.3% compared to 2016, and the growth has rebounded. With the online and offline integration of the shopping market and the stable development of the industry, it is expected that the transaction volume of China's online shopping market will reach 7.7 trillion yuan in 2018.

Different from the traditional shopping methods, online shopping as a new way of consumption cannot provide customers with intuitive experience(Holbrook,1982), resulting in a decline in customer satisfaction, making the customer repurchase intentions greatly reduced. However, with the development of experience economy and experiential marketing, all major websites have started to focus on customers, focusing on the user experience, and improving the sales level by improving customer experience.

2 Theory and Hypothesis

2.1 Customer experience and customer fit

Yan Xiaosi (Yan Xiaosi, 2017) studied the theme marketing activities of shopping centers and divided the customer experience into emotional experiences, cognitive experiences, sensory experiences, and social experiences. Through empirical research, it was proved that they had a positive impact on customer fit, but only at different levels of relevance. Although this is a conclusion drawn under a specific situation, it is also applicable to online shopping (Vivek et al., 2011). In the era of experience economy, online consumers need more than just products, information and services on the website, but also want a better experience. The experience in shopping not only includes the experience of website cognition, but also the experience of the service in the process, the experience of the product and the experience of the brand and emotion will all influence the satisfaction of the customer and continue to purchase things on the website (Gentile et al., 2007). So, we propose the following assumptions:

Hypothesis 1: Performance pay has a significant effect on job involvement and its sub-dimensions.

H1a: Affective experience has a direct positive effect on customer fit

H1b: Cognitive experience has a direct positive effect on customer fit

H1c: Sensory experience has a direct positive effect on customer fit

H1d: Social experience has a direct positive effect on customer engagement

2.2 Customer Agreement and Customer Repurchase Intention

The customer agreement will not only make the customer have a valuable identity, emotional bias, and brand loyalty to online shopping, but also will publicize the word of mouth on the website (Brodie

et al.,2011). The next time there is the same need, the first consideration is the website. Therefore, the following assumptions are made regarding the customer's fit and the customer's repurchase intention:

H2: Customer fit has a direct positive effect on customer repurchase intention

2.3 Customer experience and customer repurchase intention

For shopping websites, providing customers with a good consumer experience is a key factor affecting customer satisfaction (Chen Ying, Z2013). Compared to ordinary websites, those sites that use multimedia technologies such as music, animation, and application imaging can better provide consumers with sensory enjoyment (Doorn et al., 2010), enhance customer perception of websites, and make the following assumptions:

H3a: Affective experience has a direct positive effect on customer repurchase intention

H3b: Cognitive experience has a direct positive effect on customer repurchase intention

H3c: Sensory experience has a direct positive effect on customer repurchase intention

H3d: Social experience has a direct positive effect on customer repurchase intention

From the above analysis of the relationship between customer experience, customer fit, and customer repurchase intention, it can be seen that the customer fits the intermediary to the relationship between the two. The following assumptions are made:

H4a: Customer fits mediation between emotional experience and customer repurchase intention

H4b: Customer fits mediation between cognitive experience and customer repurchase intention

H4c: Customer fits mediation between sensory experience and customer repurchase intention

H4d: Customer fits mediation between social experience and customer repurchase intention
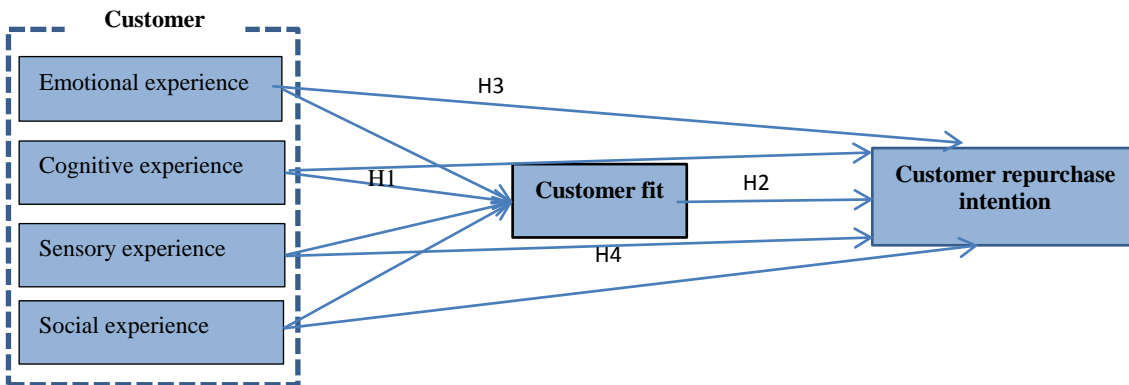
Figure 1   Hypothetical Model

3 Methodology

3.1 Data collection and instrument

According to the research purpose, this study is based on college students. Because this age group has the highest Internet penetration rate and is more likely to purchase online(Vivek et al.,2012), they are familiar with the online shopping environment and expect the student group to represent the target population. Using a convenient sampling method, we distributed electronic questionnaires to undergraduates from three universities, and distributed a total of 123 copies, and collected 114 copies. After eliminating 10 invalid questionnaires, the effective rate of questionnaire recovery was 78.2%.

3.2 Measures

Customer experience. This study made some modifications to the scale of customer experience in Sashi's research(Sashi,2012). Finally, a scale with 12 items was used to measure customer experience. The emotional experience was measured using 3 items, the cognitive experience was measured using 2 items, and the sensory experience and social experience were measured using 3 and 4 items, respectively. Adopt Likert5 (1 = completely disagree, 5 = completely agree).

Customer fit. Regarding the customer agreement, we mainly refer to the study of Vivek (Vivek, 2009) and Doorn (Doorn, 2010) on customer fit, and set up three items for testing. Adopt Likert5 (1 = completely disagree, 5 = completely agree). The Cronbach Alpha coefficient of the scale is 0.928.

Customer repurchase intention. Using the phrase "When I have the same needs again, I would like to repeat shopping on this site," this item is measured.

Control variables. In this study, gender, age, educational background, and income were selected as control variables to exclude the potential impact of these variables on online shopping reconfiguration

(Kong Dong at el.,2016).

3.3 Data analysis

Correlation analysis, as can be seen from Table 1, there is a significant correlation between emotional experience, cognitive experience, sensory experience, social experience, customer engagement, and customer repurchase intention. And, emotional experience, cognitive experience, sensory experience, social experience and customer engagement (b = .459**, .545**, .632**, .645**), customer engagement, and customer repurchase intention (b There is a significant positive correlation between =.649**).

Table 1 Correlation Coefficient Matrix

variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10
gender	1.37	.489	1									
age	2.00	.520	.000	1								
education	1.92	.359	.170	.145	1							
monthly income	2.45	.645	.320*	.242	-.077	1						
Emotional experience	2.9912	.78456	-.203	-.044	.125	-.206	1					
Cognitive experience	3.6842	.86541	-.197	.030	.048	.090	.673**	1				
Sensory experience	3.4737	.92230	-.278	-.019	-.020	-.033	.736**	.734**	1			
Social experience	3.4079	1.01579	-.311	-.102	-.002	-.111	.739**	.812**	.725**	1		
Customer fit	3.4912	.94515	-.363*	-.147	.038	-.163	.459**	.545**	.632**	.645**	1	
Customer repurchase intention	3.42	1.004	-.159	-.155	-.055	.035	.477**	.480**	.549**	.641**	.649**	1

For hypothesis testing, the statistical analysis software spss22.0 was used for regression analysis. The standardized regression coefficients obtained from Table 2 are 0.720 (P<0.05), 0.830 (P<0.001), 0.899 (P<0.001), and 0.921 (P<0.001). It can be seen that these four dimensions are consistent with the customer agreement. There is a significant positive correlation, assuming H1a-H1d is verified.

Table 2 Regression Analysis

variable	Customer fit					Customer rebuy experience	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model7
gender	-.389**	-.253**	-.157	-.109	-.082	-.212	.148
Age	-.168	-.142	-.140	-.128	-.057	-.195	-.040
Education	.129	.019	.033	.088	.061	.021	.099
monthly income	.012	.102	-.152	-.061	-.017	.152	.141
Continual Table 2	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Emotional experience		.720**					
Cognitive experience			.830***				
Sensory experience				.899***			
Social experience					.921***		
Customer fit							.924***
R^2	.169	.644	.805	.909	.922	.068	.778
AdjustedR^2	.068	.588	.744	.895	.909	-.045	.743
F	1.678	11.560***	26.365***	63.849**	75.240***	.604	22.394***

From Table 3, it can be seen that the regression coefficients of emotional experience, cognitive experience, sensory experience, social experience, and customer experience are respectively from the original 0.605, 0.790, 0.865, and 0.870 (P values less than 0.01). The decrease was 0.540 (P<0.01),

0.678 (P<0.01), 0.714 (P<0.1), 0.503 (P<0.1). Moreover, the regression coefficients of customer fit model 6 to model 9 are 0.890, 0.832, 0.613, and 0.724. This means that after the customer's fit is added, the four dimensions of the customer experience will have less influence on the customer's repurchase intention

Table 3　Regression Analysis

variable	Customer rebuy experience								
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Gender	-.212	-.097	.009	.058	.079	.165	.140	.125	.138
age	-.195	-.173	-.168	-.156	-.090	-.026	-.052	-.078	-.049
education	.021	.072	.071	.019	.044	.092	.099	.073	.088
monthly income	.152	.227	-.004	.081	.125	.122	.122	.117	.137
Emotional experience		.605***				.540***			
Cognitive experience			.790***				.678***		
Sensory experience				.865***				.714*	
Social experience					.870***				.503*
Customer fit						.890***	.832***	.613**	.724**
R^2	.068	.404	.645	.753	.740	.785	.780	.788	.781
AdjustedR^2	-.045	.310	.589	.715	.699	.744	.737	.747	.739
F	.604	4.331***	11.604***	19.557***	18.220***	18.913***	18.305***	19.163***	18.445***

*p<0.05,**p<0.01,***p<0.001

4 Conclusion

This study empirically explores the relationship among the three variables of customer experience, customer engagement, and customer repurchase intention. The customer experience is divided into four dimensions for independent analysis. Finally, there is a positive correlation between such variables. This study further explores customer experience in depth. It not only has significant implications for enriching relevant theories in the marketing field, but also learns some psychological and physiological changes after the customer experience, and improves the fit between the customer and the company and the performance of the company.

However, this study also has certain limitations. The research is based on online shopping, which has certain limitations and has no strong reference for other industries. Moreover, this study only meets the customer's mediation variables, and does not consider too much of the customer's own essential factors. Such as, the adjustment of customer personal characteristics, demographics and other aspects. Therefore, future scholars can further study the influence of regulatory variables on this basis.

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Study on Influencing Factors of Career Growth of Employees

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Abstract: The study constructs and tests a four-dimensional structure model of career growth, and develops a scale of career growth. Based on the reviewing and generalizing of the correlated literature,it analyzes the links and differences between career growth and other related concepts. The original data is required through interviews and semi-structured questionnaires.By reference to the relevant foreign research scales, the initial scale of career growth is made through several steps, including cataloguing, summarizing and revising. The formal scale is constructed through the research methods of the items analysis, exploratory factor test and other methods and so forth.Confirmatory factor analysis approach is adopted to verify the four-dimensional structure model of career growth.The results indicate that career growth is a four-dimensional concept, including career goal progress, professional ability development, promotion speed and remuneration growth.
Key words: Career growth; Employee; Career development; Career success; Scale

1 Introduction

The problem of career growth has been widely concerned. Ragins and Sundstrom(Ragins and Sundstrom, 1989) pointed out that employees' career growth is affected by a series of factors, including organizational factors, employee relationship and employee's own factors. Study on the influencing factors of occupation growth focuses on behind it, including demographic variables. However, it is found that there is a great difference in the understanding and operation of this concept by the students. For example, Chay and Aryee (Chay and Aryee, 2013) used two questions to measure career growth. Ellstrom (Ellstrom, 2012) believe that ability is the most stable variable for predicting employee career growth. Choy and Savery (Choy and Savery, 2014) believe that promotion and horizontal mobility can promote employees to achieve career growth. Fresh environment, more learning opportunities and interpersonal interaction are the elements to promote employee growth.

However, the current study specifically on the growth of the concept of occupation. The purpose is to conceptualize the term of career growth through empirical research, and to determine the structural dimensions and specific measurement indicators of career growth.

2 Introduction of Research Methods

2.1 Analysis of career growth and related concepts

The study of career growth can be divided into two main contents: the career growth within the organizationand the process of work conversion.employees should be responsible for their own career planning, and organizations should do their best to support the growth of their employees. There are two aspects of the concept of career growth. First, career growth is an incremental concept, and its corresponding stock concept is a career success. Second, career growth can be divided into organizational career growth and job conversion career growth.

At present, the academic circles pay more attention to the standard and the specific measurement of career success. Career success is divided into two categories: objective success and subjective success. They include: Status and title (rank position), material success (property, income), social reputation, renown and influence, knowledge and skills, friendship and social network, health and happiness.

2.2 Analysis of scale evaluationof career growth

This paper reviews the relevant concepts of the definition, structure and measurement, we found that there are some related links between the various concepts and vividly, but they have their focus on research, occupation success mainly analyzes accumulation based on a series of occupation experience, occupation opportunities focus on the internal career growth rather than present situation;

As for the measurement of career success, most scholars believe that job promotion and income should be chosen as a measure of objective success, and career satisfaction and career success should be chosen as the criteria of subjective career success. On the measurement of professional opportunities, it mainly involves the income, the employment opportunity, the training opportunity and the speed of promotion. To sum up, we should pay attention to the four parts of promotion speed, salary growth,

ability development and career goal development related to subjective perception.

3 Empirical Analysis of Structure Model of Employee Career Growth
3.1 Research method
The study is to identify and evaluate the problems of career growth, and further conclude the links between options, and determine the structural dimensions of career growththrough interview and questionnaire. The questionnaire consists of 15 items by Likert5 point method.
3.1.1Test objects
This study uses 15 questions compiled by the staff occupation growth measurement table of questionnaire survey in Guangdong Shenzhen and Zhongshan, Zhejiang, Hangzhou and Ningbo, Hubei, Kunming, Henan, Yunnan source of Zhengzhou and Luoyang, Fujian, Fuzhou, Changsha ten city 10-25 enterprises selected. Survey a total of questionnaires 1300copies, 1190 copies, 1000 valid questionnaires.
3.1.2 Statistical processing
The exploratory factor analysis was analyzed by principal component analysis, and the factor rotation adopted the maximum orthogonal rotation, and the calculation tool was SPSS13.0. The computational tool used for confirmatory factor analysis is Lise l8.70.
3.2 Data analysis
3.2.1 Project analysis
The first step of the index identification is the internal identification, which is called the project analysis. The analysis method of project is each participant in each questionnaire item and total score, and according to the level of the sort, take out of the top 27% for high score after 27% for low group, significant test level of two groups were tested in each score differences on average. Finally, check each question on whether the high score and low score has the difference. The discrimination analysis showed that each item has reached a significant level (such as Table 1), representing the scale problem has the ability to distinguish between high score and low score. The correlation between the items and the total score reached a significant level of 0.001, and the correlation coefficient was higher than0.03, the problem of discrimination is good, high internal consistency.

Table 1   Project Analysis Result

Title number	decision value(t)	correlation with total score(r)	standard deviation	Title number	decision value(t)	correlation with total score(r)	standard deviation
1	16.683***	.683***	0.75	9	25.748***	.575***	0.88
2	16.836***	.755***	0.80	10	21.667***	.561***	0.82
3	11.521***	.656***	0.73	11	18.858***	.527***	0.89
4	28.978***	.697***	0.84	12	21.124***	.498***	0.83
5	17.532***	.703***	0.81	13	23.452***	.577***	0.82
6	21.363***	.719***	0.82	14	18.956***	.632***	0.74
7	28.244***	.720***	0.83	15	18.531***	.618***	0.78
8	14.412***	.688***	0.89				

3.2.2 Exploratory factor analysis
1209 valid samples were randomly divided into two halves. Half of the samples were used for exploratory factoranalysis (n=604), and the other half were used as confirmatory factor analysis (n=605). The difference test shows that there are no significant differences in gender, age, working life, education, and post in the two parts of the sample(shown in Table 2).

Table 2   Factor Structure and Factor Load of Each Item

Title	Factor load			
	career goal progress	professional development	promotion opportunity	reward growth
Q1 job has made me further away from my career goals	.879	.145	.186	.126
Q2 job related to my career goals and career aspirations	.846	.232	.017	.023
Q3 work has laid the foundation for career goals	.768	.243	.024	.064
Q4 work with better development opportunities	.755	.197	.246	.121

Title	Factor load			
	career goal progress	professional development	promotion opportunity	reward growth
Q5 work to master new skills related to work	.209	.834	.176	.126
Q6 work masters new knowledge	.179	.812	.246	.018
Q7 work prompted more work experience	.169	.706	.017	.169
Q8 work has stimulated my professional ability	.134	.853	.023	.195
Q9 the job promotion speed of the working is faster	.097	.094	.835	.247
Q10my job promotion is very likely	.158	.009	.667	.241
Q11 my job is more ideal than the original unit	.026	.208	.604	.298
Q12 occupation increase fastercompared to colleagues	.006	.108	.716	.265
Q13 my salary increase faster	.148	.127	.235	.864
Q14 salary continued to be raised a great possibility	.034	.176	.216	.763
Q15 salary increase faster compared to colleagues	.069	.062	.196	.834
Explanatory variable(%)	27.1	20.5	17.8	10.7

The data were tested by Bartlett sphere test with a test value of 3069.063 and p=0.000, indicating the possibility of sharing factors among items. The KMO value of the sample is 0.872, indicating that the data sample is suitable for factor analysis.

3.2.3 Confirmatory factor analysis

The sample of confirmatory factor analysis was 605. The variable load situation of the confirmatory factor analysis is shown in Table 3 which shows the variables have sufficient convergence validity.

Table 3   Thegoodness of Fit of the Structural Equation Model

X2/df	RMSEA	GFI	AGFI	NNFI	NFI	CFI	PNFI	PGFI	IFI
0.062	0.94	0.92	0.96	0.95	0.94	0.98	0.83	0.75	0.98

3.2.4 External identification andreliability analysis

In order to fully identify the scale, we first examined the correlation between four dimensions of career growth, and tested the correlation between career growth and career success. It is necessary to analyze the correlation between the two. This study used Greenhaus to measure career success, and analyzed the correlation between five items of career satisfaction and four dimensions of career growth, as shown in Table 4.

In order to ensure all topics were in a high degree of consistency, the study followed the Cronbach's α reliability, and the spearman sub-reliability analysis. The Cronbach's α coefficient of career goal progress, professional ability development, promotion speed, and reward growth is respectively in table 5.

Table 4   Correlation Between Career Growth and Job Satisfaction

	1	2	3	4	5	6	7	8
1. the success ofcareer								
2. progress of overall goals	0.681							
3. satisfied income	0.605	0.670						
4. satisfied promotion	0.543	0.613	0.732					
5. satisfied skills learned	0.443	0.503	0.512	0.526				
6. Career goal progress	0.382	0.456	0.367	0.375	0.472			
7. Professional development	0.246	0.247	0.083	0.257	0.396	0.447		
8. Promotion speed;	0.378	0.433	0.367	0.512	0.338	0.334	0.267	
9. Reward growth	0.352	0.385	0.382	0.432	0.334	0.456	0.268	0.483

Table 5   The Internal Consistency Reliability and Split Half Reliability of Subscales

Subscales	internal consistency reliability	half reliability	Subscales	internal consistency reliability	Subscales
occupation development goals	0.864	0.842	promotion speed	0.788	0.765
occupation ability development	0.838	0.786	Reward growth	0.784	0.734

4 Conclusion

Based on the above research, we can draw the following conclusions: employee occupation growth is a parallel to four factors, there is no causal relationship between the four factors, is related to the four factors including occupation goal progress, ability development, promotion speed and wage growth; Employees' understanding of career growth is associated with changes in people's professional values. The psychological contract between organizations and employees has changed.

In the new environment, employees must get long-term employment opportunities and market competition force through different organizations of knowledge, skills and experience. On the other hand, in the absence of boundary occupation career period, people of their own occupation success criteria began to change, the subjective satisfaction, the realization of personal occupation target has become one of the main goals, and occupation target progress, or that the current work associated with their occupation target become an important occupation content.

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Study on the Effect of Electronic Communication during Nonwork Time on Employees' Proactive Behavior

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Abstract: This paper starts from the theory of ego-depletion and studies the influence mechanism of electronic communication on employee'sproactive behavior during nonwork time, examining the mediating role of morning depletion in this relationship and the moderating role of employees' collectivism tendency. Data from 170 employees and their supervisors indicates that the affective tone of electronic communication has a significant negative impact on employees' next morning depletion and has a significant positive effect on proactive behavior. Morning depletion mediates the relationship of affective tone and proactive behavior; employee collectivism tendency moderates the relationship between morning depletion and proactive behavior, and moderates the indirect relationship between affective tone and proactive behavior via morning depletion.
Key words: Electronic communication; Proactive behavior; Ego depletion; Collectivism tendency

1 Introduction

Electronic information technology is changing the way people live and communicate (Derks, van Mierlo & Schmitz, 2014). On one hand, instant messaging can promote the establishment of employees' relationship networks, thereby improving individual job performance (Ou, Sia & Hui, 2013); on the other hand, communications technology make it difficult to separate life from work (Butts, Becker & Boswell, 2015). Electronic communication is a form of electronic communication and consists of language (affective tone) and non-verbal (time required) elements, it can stimulate people's emotional reactions and stress experiences. Employee proactive behavior is an important extra-role behavior. Positive emotions can motivate employees' initiative and encourage employees to engage in more proactive behaviors(Fritz et al, 2009); but stress sources such as time pressure and situational pressure always reduce employees' proactive behaviors. According to the ego depletion theory, electronic communication during nonwork time brings positive or negative emotions and time pressure to employees, which may affect their sleep and hinder the process of supplementing resources, causing next morning depletion and reducing people's willingness to engage in proactive behaviors. In this process, higher collectivism tendency makes employees think of themselves as part of the organization, leading to higher attachment, mission and responsibility. Therefore, the tendency of collectivism may weaken the effect of depletion on employees' proactive behaviors. Specifically, this study proposes a model as shown in figure 1 below:
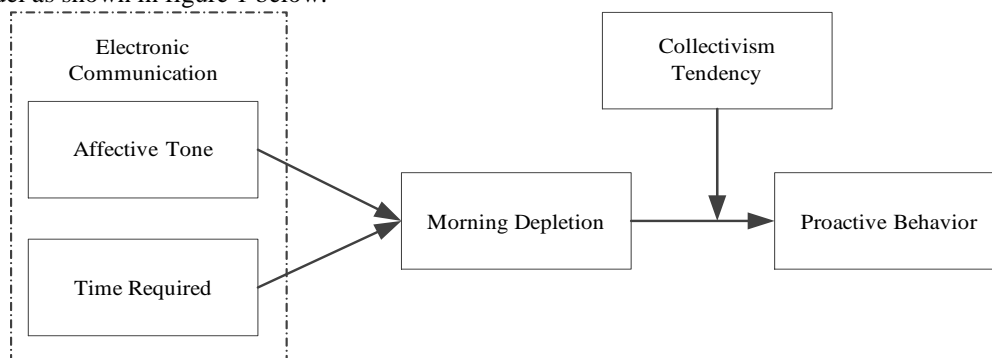
Figure 1   Research Model

2 Theoretical Background and Hypotheses

2.1 The influence of electronic communication on active behavior during non-working hours

Electronic communication during nonwork time brings convenience to people, but also brings a series of negative effects, such as work-family conflict (Jarvenpaa & Lang, 2005; Butts et al, 2015) points out that the affective tone and time required for electronic communication have an impact on employees' emotions.Research shows that positive emotions motivate individuals to take action. On the

one hand, it leads individuals to actively invest in problem solving and responsibility-taking behaviors (Ohly, Sonnentag & Pluntke, 2006); on the other hand, positive emotions can also promote individuals' willing to take risks that may be brought by proactive behavior. Positive affective tone will prompt people to invest in proactive behavior, but the time required to conduct electronic communication and accomplish tasks will bring time pressure and negative emotional impacts, which will hinder employees' proactive behavior. In summary, we put forward the following hypothesis:

Hypothesis 1: Affective tone (a) of electronic communication during nonwork time positively affects employees' proactive behaviors; Time required (b) has a negative effect on employees' proactive behaviors.

2.2 The mediating role of morning depletion

The theory of ego depletion believes that mental energy is indispensable to self-execution; mental energy is limited, and only a limited number of self-controls can be performed in the short-term; the process of self-control is the process of consuming mental energy and it takes some time to recover after consumption (Baumeister, Muraven & Tice, 2000). Sleep is particularly important for supplementing individuals' self-control resources, but work activities often interfere sleep (Barnes, Wagner & Ghumman, 2012). Late night work will prevent employees from getting adequate rest and restoring exhausted resources. On the one hand, electronic communication during nonwork time brings time pressure, which will destroy people' sleep. On the other hand, positive emotions lead to high quality sleep and "build" resources, promote investment and reduce ego depletion. When an individual depletes, the energy required for self-activity is in a state of shortage, making it difficult to control oneself and fail to produce a series of proactive behaviors. Based on this, we put forward the following hypothesis:

Hypothesis 2: Morning depletion mediates the relationship between electronic communication during nonwork timeand employees' proactive behavior.

2.3 The moderating role of collectivism tendency

Collectivism manifests itself as a collectivism tendency on a personal level. As a work value at the individual level, it has a profound influence on employees' thinking patterns and behaviors. Employees with a collectivism tendency often attach themselves to organizations to establish self-identity and have emotional and cognitive dependence on their organizations (Felfe, Yan & Six, 2008). The collectivist's goal is based on collective interests. Based on the emphasis on the overall interests, individuals with high collectivism tendencies tend to be more able to execute. Based on the theory of ego depletion, employees experiencing morning depletion cannot display a series of positive behaviors due to the loss of self-control resources, while those with high collectivism tend to regard themselves as members of the collective and have more positive energy and behaviors. Therefore, the following hypothesis are made:

Hypothesis 3: The collectivism tendency of employees moderates the relationship between morning depletion and proactive behavior. The higher the employee's collectivism tendencies, the weaker the negative relationship between morning depletion and proactive behavior.

Hypothesis 4: The collectivism tendency moderates the indirect relationship between electronic communication during nonwork time and proactive behavior via morning depletion. When the level of collectivism tendency is high, the mediating effect is weak.

3 Method

3.1 Procedures and sample

The data comes from multiple companies in multiple regions in China. The research objects are the company's employees and their direct supervisors. The participants completed the initial survey at time one, which included background information and collectivism tendency. A week later (time two), participants measured their electronic communication the night before and morning depletion in the morning at 8 am, and the day's proactive behavior at 5 pm. Finally, 170 valid questionnaires were recovered, the effective recovery rate was 85%.

In terms of the sample, 50.9% of males and 49.1% of females are in this survey; 33.1% of married persons; most of the respondents are under 30 years of age, accounting for 75.7%; the average working time per week in 40-50 hours is most, accounting for 49.7%.

3.2 Measures

1) Electronic communication. This study used the two-dimensional scale of Butts et al (2015).

2) Morning depletion. This study used the 5-item scale of Twenge et al (2011). Self-assessed by the employees on the Likert 5-point scale (All of the following continuous multi-items scales were

measured using the 5-point scale, "1" to "5" means from "strongly disagree" to "strongly agree"). α = 0.83.

3) Proactive behavior. This study used the 8-item scale of Parker et al (2010), which was evaluated by the supervisor. α = 0.92.

4) Collectivism tendency. This study used the 6-item scale of Doney et al (1998). α = 0.92.

5) Control variables. We controlled for age, gender, marital status, working hours and responsibility. Responsibility was measured using the 10-item scale of Goldberg (1999). α = 0.94.

4 Results

4.1 Measurement model testing

Before testing our hypotheses, we first performed a series ofconfirmatory factor analyses (CFA) using Amos 22.0to assess the measurement validity of our proposedmodel.The CFA results suggested that our four-factor model produced acceptable fit:χ^2(106) = 1464.172；RMSEA = 0.066；TLI = 0.883；CFI = 0.908；SRMR= 0.057.

4.2 Hypotheses testing

Table 1 shows the mean, standard deviation, and correlations of the variables. Table 2 shows that affective tone has a significant positive effect on proactive behavior (M5, β =.17, p < .05), and the required time has no significant effect on proactive behavior (M6, β = -.08, p > .05). Hypothesis 1a is supported; for the mediating effect, referring to the Bootstrap method, the sample size was chosen as 5000. In the 95% confidence interval, the result did not include 0 (LLCI = .0634, ULCI = .2031). Hypothesis 2 was supported.

Table 1 Descriptive Statistics and Correlations

Variable	M	SD	1	2	3	4	5	6	7	8	9
1.Gender	--	--									
2.Marital status	--	--	-.04								
3. Age	--	--	-.02	-.70**							
4. Working time	--	--	-.22**	-.03	.06						
5. Responsibility	3.39	0.90	.07	-.02	.07	-.02					
6. Affective tone	3.04	1.14	.07	-.07	.13	-.03	.44**				
7. Time required	1.82	1.20	-.09	.18*	-.15*	.16*	-.12	-.17*			
8. Morning depletion	2.51	0.89	.05	.01	-.10	.15*	-.28**	-.33**	.19*		
9.Proactive behavior	3.50	0.95	.14	-.02	.19*	-.18*	.08	.25**	-.15	-.48**	
10. Collectivism tendency	3.04	1.05	.03	.32**	-.30**	-.12	-.54**	-.23**	.01	.10	.19*

n=170, ** p<0.01, * p<0.05

Table 2 Regression Analysis Results（1）

Variable	Morning depletion			Proactive behavior			
	M1	M2	M3	M4	M5	M6	M7
Gender	.22	.23	.23	.18	.17	.18	.29*
Marital status	-.79**	-.72**	-.82**	.87**	.80**	.90**	.49
Age	-.05	-.04	-.04	.34*	.32*	.33*	.31*
Working time	.21*	.20*	.18	-.21*	-.21*	-.19	-.11
Responsibility	-.26**	-.17*	-.24**	.04	-.05	.03	-.08
Affective tone		-.17**			.17*		
Time required			.10			-.08	
Morning depletion							-.49**
R2	.18**	.21**	.20	.13**	.17*	.14	.30**
F	5.91**	6.31**	5.60**	4.13**	4.58**	3.78**	10.05**

n=170, ** p<0.01, * p<0.05

Table 3 shows that the interaction between morning depletion and collectivism tendency has a

significant positive effect on proactive behavior (M4, β =.59, p < .05), Hypothesis 3 is supported. Figure 2 shows the influence pattern of this interaction.

Table 3　Regression Analysis Results（2）

Variable	Proactive behavior			
	M1	M2	M3	M4
Gender	.10	.15*	.13	.12
Marital status	.43**	.24	.22	.23
Age	.27*	.25*	.26**	.26**
Working time	-.16*	-.08	-.05	-.05
Responsibility	.04	-.08	.13	.11
Morning depletion		-.46**	-.42**	-.82**
Collectivism tendency			.38**	-.01
Morning depletion×Collectivism tendency				.59*
R2	.13**	.30**	.38**	.41*
F	4.13**	10.05**	12.49**	12.23**

n=170, ** p<0.01, * p<0.05
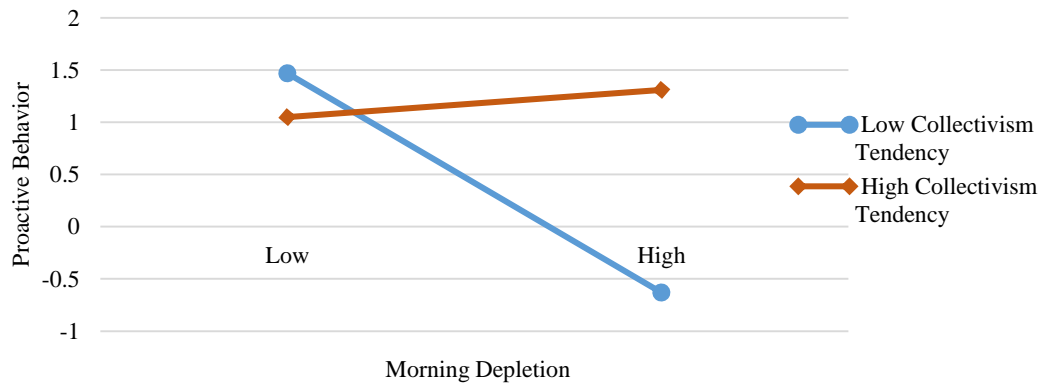
Figure 2　The Moderating Effect of Collectivism Tendency on the Relationshipbetween Morning Depletion and Proactive Behavior.

For Hypothesis 4, using the Bootstrap method for conditional mediation tests. The data shows that under the high collectivism tendency, the indirect effect of electronic communication (affective tone) on proactive behavior (through morning depletion) is 0.0744, 95% confidence interval does not include 0 (LLCI = .0247, ULCI = .1442); at the low level of collectivism tendency, the indirect effect is 0.1684, 95% confidence interval does not include 0 (LLCI = .0852, ULCI = .2735); and the indirect effects of high and low collectivism tendency have significant differences, 95% confidence interval does not include 0 (LLCI = -.0940, ULCI = -.0124). Therefore, Hypothesis 4 is supported.

5 Conclusion

This study is based on the paired data of 170 employees and supervisors obtained through multi-time surveys. Based on the theory of ego depletion, we find that the affective tone of electronic communication during nonwork time has a significant negative impact on the next morning's depletion; morning depletion has a significant negative effect on employee's proactive behavior; affective tone has a significant positive effect on the employee's proactive behavior, and morning depletion mediates their relationship; collectivismtendency moderates the relationship between morning depletion and proactive behavior, and moderates the mediating effect of morning depletion.

According to the research results, the following practical recommendations are proposed:

Firstly, the organization should provide certain training and guidance for the use of employees' electronic communication, including proper communication style, correct expression of emotions, and

reasonable time application.Secondly, we can use various ways to careemployees, encourage employees to participate in social activities, and increase communication and contact between the superior and subordinates in order to promote mutual understanding, forming a good atmosphere for communication.

Research limitations:

Firstly, electronic communication includes different channels, such as mobile phones and computers. We does not distinguish the effect of different channels. Secondly, although the longitudinal study design of multi-temporal, multi-source data (employees and supervisors) was used in this study to overcome the limitations of cross-sectional studies, we could not learn the causal relationship between variables.

Future research directions:

Firstly, different forms of communication tools may have different effects on employees' emotional experience and physiology. Therefore, future research can measure the influence mechanism of different communication tools on employees' proactive behavior.Secondly, future studies should confirm the causal relationship between variables by rigorous research design.

Acknowledgement

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Proposing a New Model on Asymmetric Outcomes
of Helping Behaviors at Work in Multi-stakeholder Perspective

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Abstract: Organizational citizenship behaviors (OCB) with a particular emphasis on helping behaviors at work are getting increased attention of researchers. Although much of the early empirical research in this domain was directed at the individual level of analysis, more recently, researchers have focused their attention on identifying the outcomes of group-level or unit-level OCBs. Also till now most of the research was focused whether on benefits or on costs of exhibiting helping behaviors. We propose to look at asymmetric outcomes of OCBs and helping behaviors at work (positive and negative) for multiple stakeholders (organization and individual). Also we propose cases under which OCBs may more likely result in negative outcomes, in other words, in what cases refusal to provide help will increase employee well-being, life satisfaction level and positive organizational outcomes.

OCB and helping behaviors are mostly related by researchers to employee well-being. We propose to move attention of management research from job satisfaction and employee well-being concepts to concept of life satisfaction which is an ultimate goal of human existence and proposed to be a better predictor of number of organizational outcomes (i.e., job performance, organizational commitment, turnover, etc.)

Key words: Helping behaviors; Decision-making; Life satisfaction; Organizational citizenship; Organizational outcomes

1 Introduction

Imagine that your colleague has asked you for help at work. You consider yourself not competent enough in this field, or you do not have enough time available (therefore assistance may influence your job performance). What would you do? Would you agree to provide help or say "no" to the help-seeker? What would you feel if you are lacking resources but still decided to provide help: satisfaction or stress or maybe discomfort? Would you be stressed about the quality of help you provide while lacking resources? How would it influence your job satisfaction? Would you feel yourself a happier person after making that decision? Would it influence your job performance and commitment to the organization?

Why in some cases refusal to provide help is the best way to increase employee well-being, life satisfaction level and outcomes for the organization?

In this conceptual paper we provide a model to answer this question.

2 Literature Review

2.1 "Dark" and "bright" sides of individual level OCB and helping behaviors in multi-stakeholder perspective

Organizational citizenship behavior (OCB) refers to discretionary acts that promote organizational functioning by supporting the social and psychological environment in which task performance occurs (Organ, 1997).

According to Podsakoff, et al., 2014 this Organ's definition of OCB assumes that these behaviors are: (1) positively related to organizational performance and (2) not necessarily related to outcomes for the individuals exhibiting them. Therefore growing body of research concentrates nowadays on the potentially important effect of these behaviors on group-level and/or unit-level outcomes. In the recent meta-analysis Podsakoff et al (2009). found that the correlations between OCBs at the unit level and organizational productivity, profitability, product quality, efficiency, turnover, and reductions in waste tended to be positive. Therefore, it seems that OCBs are important for the organizational success (Podsakoff, et al., 2014).

However we tend to think that individual level outcomes of OCB are still a matter of a great importance either for employee well-being or for an organization. Employee well-being includes such constructs as job satisfaction, career satisfaction, perceived job stress, perceived competence etc. Ellingson, Gruys, and Sackett (1998) reported an uncorrected job satisfaction-job performance correlation of .30 (.32 if corrected for internal consistency or .44 if corrected for interrater reliability)

(Judge, et al., 2001). Therefore we can make a conclusion that individual level outcomes of OCB positively correlate with organizational outcomes and in some cases they are prerequisites of an organizational success.

We focus our theorizing on interpersonal OCB (i.e., OCB-I or helping; (Williams & Anderson, 1991) due to its prevalence in organizations (Grant & Hofmann, 2011).

OCBs reflect to behaviors employees enact in the workplace that are not formally specified in their job descriptions but are thought 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, et al., 1983). It is not surprising then that researchers have mostly focused on positive outcomes of OCBs while neglecting to consider potential negative outcomes and how these can impact the organization and its members.

However, in past years scholars have questioned the prevailing belief that OCB is uniformly beneficial, instead suggesting that it may have a "dark side" (Bolino, et al., 2013). For example, OCB 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). These competing streams of research highlight a fundamental tension that exists in the OCB literature exemplified by the question: Is OCB good or bad? (Bhatnagar & Manchanda, 2013).

We suggest modifying that question: in what cases and for whom OCB good or bad, and why?

Speaking about "For whom OCB are good or bad?" the literature overall has rarely specifically considered when these behaviors might be good or bad for different stakeholders.

Reynolds, C.A., et al., 2015 suggests a multi-stakeholder perspective of organizational citizenship with positive and negative outcomes of OCB for different stakeholders (individual, co-workers and organization). For instance, positive outcomes for individual are career success and perception of control, negative: increased workload and stress, lower job satisfaction; positive outcomes for an organization: increased organizational commitment and improved performance, negative: insubordination, reduced performance, etc. (Reynolds, et al., 2015).

Therefore we propose investigating OCB and helping behaviors through multi-stakeholder perspective   (organization and individual) and both sides ("bright" and "dark") to understand for whom, whyand in what cases OCB are good or bad and what are the reasons why they may have good or bad consequences.

2.2 Decision-making process in helping behaviors

Every decision we make based on 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.

Recent researches on OCB are drawing from theories of resources: conservation of resources theory (Koopman, et al., 2016), resource drain theory (Deery, et al., 2017).

According to resource drain theory (Edwards &Rothbard, 2000) personal resources such as time and energy are finite and resources expended in one domain are not available in another. In the work environment, individuals are often required to undertake a number of roles and tasks. The time, attention, and energy devoted to completing tasks in one work domain will, however, reduce the resources available for tasks in another domain. Resource drain can occur in the face of competing responsibilities and multiple role demands, which can result in stress-related outcomes such as burnout and work-family conflict. In the context of finite resources employees must therefore make decisions about how they allocate their time. Both in-role and extra-role behavior compete for the limited time resources available to employees (Deery, Rayton, Walsh & Kinnie, 2017)

Therefore every decision-making process includes the choice of an alternative (in our case: to help or do not help) based on availability of personal resources.

Our question is: why in some cases when individual is experiencing lack of resources (time, competence, desire to help, energy, etc.) they still chose to exhibit helping behavior?

Previous research on estimating the likelihood of saying ''yes'' 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).

We insist that decision to help based on lack of resources is influenced by discomfort associated with refusal and affects employee well-being and organizational outcomes. In other words, if individual is lacking resources it is better to refuse to provide help, it will increase employee well-being level and positive organizational outcomes.

Also we would like to find an answer to the following question: why some people are experiencing

high discomfort associated with refusal to provide help when having lack of resources while others may not experience that discomfort? What are the factors that mediate the discomfort?

2.3 Life satisfaction vs Employee well-being

Although the management literature has largely ignored the concept of life satisfaction, the life satisfaction literature has similarly tended to ignore the work domain. According to Erdogan, B., et al., (2012) the scant attention paid to the concept of life satisfaction in the management field is a critical research gap (Erdogan, et al., 2012).

Instead of including to our model well-developed concept of employee well-being or "happy worker", we would like to use a broader concept of life satisfaction or "happy person".

The bottom-up approach regards life satisfaction as a function of satisfaction with life domains (Pavot&Diener, 2008) such as work, family, health, and leisure.

Erdogan, B., et al., (2012) suggested a Process Model of the Relationship between Work-Related Antecedents and Life Satisfaction. They define proximal mediators of work domain to life satisfaction and its outcomes for the organization　(Table 1).

Table 1　Process Model of the Relationship between Work-Related Antecedents and Life Satisfaction (Erdogan, Bauer, Truxillo & Mansfield, 2012)

Proximal mediators of work domain to life satisfaction	Outcomes of life satisfaction
Quality of work life	Organizational performance
Job satisfaction	Organizational comittment
Career satisfaction	Turnover intentions
Perceived job stress	Turnover
Feeling of self-worth	
Perceived competence	
Perceived control	

Interestingly, Erdogan, B., et al., (2012) suggests to consider life satisfaction as a predictor of number of organizational outcomes as job performance, organizational commitment, turnover intentions and turnover. Jones (2006) showed that the correlation of life satisfaction with performance was stronger than that of job satisfaction, and life satisfaction predicted these behaviors beyond job satisfaction and organizational commitment (Jones, 2006).

3 Research Gap

Recent competing streams of research highlight a fundamental tension that exists in the OCB literature exemplified by the question: Is OCB good or bad? (Bhatnagar & Manchanda, 2013).

We suggest modifying that question: in what cases and for whom OCB good or bad, and why?

Speaking about "For whom OCB are good or bad?" the literature overall has rarely specifically considered when these behaviors might be good or bad for different stakeholders (Reynolds, Shoss & Jundt, 2015).

Therefore we propose investigating both sides of OCB and helping behaviors ("bright" and "dark") through multi-stakeholder perspective (effect on organization and individual). It will provide understanding for whom, whyand in what cases OCB are good or bad and what are the reasons why they may have good or bad consequences.

Also OCB and helping behaviors were mostly associated with employee well-being (job satisfaction, etc.). We suggest taking into consideration a broader and newer for management field concept of life satisfaction which is the ultimate goal in human existence and antecedent for number of organizational outcomes (performance, commitment, turnover, etc.).

The issue we would like to address in this research paper: What are the reasons that in some cases helping behaviors make individuals satisfied with their career and life and lead to positive organizational outcomes (i.e. higher organizational commitment, performance and lower turnover intentions) and in others cases - they lead to the asymmetric outcomes for an individual and organization?

We propose the following model (Figure 1) to explain when OCB and helping behaviours may lead to asimmetric outcomes (positive and negative) for different stakeholders (the individual (employee) and organisation).

4 Research Methodology

Helping behaviours and discomfort associated with refusal to provide help will be measured by adapted story design used by Newark, 2017 (Newark, et al., 2017). Example items include "Imagine that [you are/a colleague of yours is] an event manager preparing to mail out information about an important upcoming event. [You are/Your colleague is] running behind schedule, and so [you ask a colleague if he or she would help you/asks you if you would help him or her] stuff and address envelopes. [Your colleague agrees/You agree], etc.

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 questionnaries.

To measure life satisfaction as recommended by Erdogan, B., 2012 we are planning to utilize the five-item Satisfaction with Life Scale (SWLS) by Diener et al., 1985 (Erdogan, Bauer, Truxillo & Mansfield, 2012).

5 Conclusion

To conclude our idea we would like to emphasise that helping others which is considered as positive action that leads to many positive outcomes is not always the best way to do in order to enhance employee well-being, life satisfaction level and organizational outcomes. In some cases (like making decision to help on the basis of discomfort of saying "no"), 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.

We would like to test this idea in the future research.
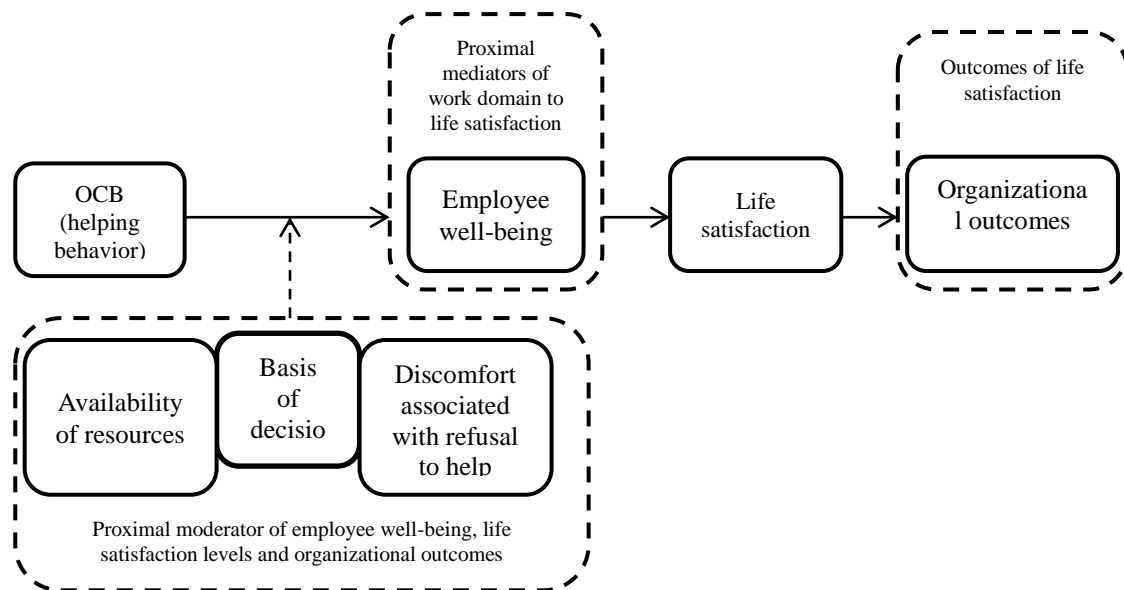
Figure 1   Conceptual Framework

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Consequences of Downward Envy: A model of Employees' Counterproductive Work Behavior and Impression Management

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Abstract: It is common for leaders to develop downward envy towards their subordinates when they have excellent quality and leadership potential. We invoke theory and research on the social functional view of envy to propose a novel theoretical framework of supervisory leader envy of direct reports. Supervisor-subordinate dyads provide support for the theses that (1) when leaders cause downward envy against subordinates, they will develop abusive supervision or self-improvement. (2)When subordinates perceive leader produces downward envy and take down abusive supervision, employees are more inclined to take counterproductive work behavior in response to the downward envy, when the subordinate perceived leadership create downward envy and use self-improvement, subordinates tend to lead impression management to respond. This paper provides a complete explanation of the theoretical framework of leadership and subordinates by proposing two different paths.
Key words: Downward envy; Abusive supervision; Counterproductive work behavior; Self-improvement; Impression management

1 Introduction

Envy is one of the social emotions that prevails in everyday life. It refers to the kind of contradiction or negativeness emotions that an individual produce when a person lacks another's superior quality, achievement, or property (Parrott & Smith, 1993). The existing research literature focuses on the flaws between co-workers or subordinates to supervisors. There is no formal theoretical reference for explaining how leaders manage and treat the direct subordinates when they experience downward envy (Duffy, Shaw, and Schaubroeck, 2008. Yu & Duffy, 2016). This is because there are many advantages in being in a leadership position, including controlling the allocation of resources, sharing exchanges with other power holders, obtaining valuable rewards, etc. (Vecchio, 2007; Yukl, 2012), so they may not be able to have such feelings toward their own subordinates, but at the same time, studies have shown that when subordinates have a certain leadership potential, are good at innovation, have strong social and managerial abilities, and are sought after by other employees, the leaders may feel threatened by their own status, thus creating downward envy.

The literature on envy described the strategy of coping with envy as two strategies: "decrease the level of others" and "elevate one's level." First of all, the enviers may express their own pain by destroying and injuring their own targets (Smith & Kim, 2007). For example, they put them in an unfavorable position and reduce the gap between themselves and others. The envied may berespond to this behavior by adopting a series of measures. For example, they will reduce their own work performance or intentionally or unintentionally violate organizational norms, making themselves look less outstanding to reduce the likelihood of being envied by leaders (Jensen, Patel, &Raver, 2014). In addition, some scholars have shown that envy will increase the motivation for individuals to pursue self-improvement, and that envy may increase job performance (Schaubroeck & Lam, 2004), increase work motivation (Cohen-Charash, 2009), and strengthen the links with the beheaded (Vecchio ,2005), they reduce the gab with envied by increasing their own strengths (Dineen et al, 2017; Yu & Duffy, 2016). At the same time, the envied can reduce their leadership downward envy in order to improve their environment. They will engage in impression management behaviors, such as concealing ideas that may appear before the leader or crediting individual achievements to their leaders (Nickerson, 2014), this is typical ingratiation in impression management.

Therefore, this paper proposes a theoretical framework that explains how leaders use two different strategies to express the downward envy of subordinates and how subordinates respond to downward envy. According to the existing literature, this article defines the downward envy feeling that the leader thinks that the subordinate has something he wants but lacks, resulting in a sense of suffering and inferiority. The behaviors that leaders can generate as a result of downward envy include abusive supervision that reduces the level of others and self-improvement in self-enhancement. Employees respond to the abusive supervision of leaders due to downward envy through counterproductive work behaviors, and respond to leader self-improvement through image management.

The main contribution of this article is to reveal how employees respond to downward envy. Existing theories and studies have not shown the possibility of leaders experiencing and expressing envy, Descriptive evidence suggests that downward envy in the workplace may have perverse consequences. Recent research suggests that envied may have different responses, ranging from pleasure at their achievements and strengths to fear of the envious. In order to explore the subordinate on how to deal with downward envy, we quoted the social functional view of envy. We found that how employees respond to downward envy was linked to abusive supervision and self-improvement of leader.

2 Literature Review

2.1 Envy

Envy is one of a complex emotions existing in a wide range oflife. It is a kind of uncomfortable psychological complex emotions such as hate, hostility, sadness, revenge and so on through social comparison. From the perspective of social function, both passive and positive emotions have the function of social security, when individuals lack strength in an important area compared with others, they will constantly monitor their societyEnvironmental information and various efforts have been made to counteract the stigma caused by blemishes (Hill & Buss, 2006). The existing research on envy includes: From the perspective of gender differences, Gold (Gold, 1996) found that men are more likely to be embarrassed than women. From a cognitive process point of view, Crusius (Crusius, 2012) found that self-control ability is related to the expression and intensity of envy. At the organizational level, Li Qianqian (Li Qianqian, 2013) studied the negative relationship between corporate employees' envy in the workplace and organizational citizenship behaviors. In summary, the relevant literature is mostly focused on the psychological level. Envy is based on social comparisons. In the organization, individuals will experience comparisons with colleagues and other groups of colleagues, and are more prone to envy. Therefore, it is worth to study envy in the organization.

2.2 Abusive supervision

Abusive supervision refers that subordinates perceive leaders' persistent linguistic or non-verbal hostile behaviors, but do not include physical contact violations (Tepper, 2000). Abusive supervision will cause continuous damage to the subordinate's feelings, which will lead to subordinates' dissatisfaction. This kind of dissatisfaction has a great destructive effect, such as employee turnover tendencies. The existing research on abusive supervision includes: From the perspective of cognition, employees' awareness of leadership abusive supervision will change employees' perceptions and influence their work behavior. Yan Aimin (Yan Aimin, 2010) studied the relationship between abusive supervision and employee deviation based on social exchange theory and social identity theory. From a sentimental perspective, Aryee et al. (Aryee et al., 2008) showed that abusive supervision led to emotional exhaustion of subordinates, which in turn reduced the peripheral performance of subordinates and reduced their extra-role behavior. Wang Hongqing, Peng Jisheng studied the negative effects of abusive supervision on employee mentality (emotional commitment, emotional exhaustion). In summary, the existing research is based on the outcome variables of abusive supervision. There is less research on the antecedents of abusive supervision. In this paper, the downward envy is added as the leading factor of abuse supervision.

2.3 Counterproductive work behavior

The study of counterproductive work behavior originated from Kaplan's investigation of employee misbehavior in the workplace. It refers to the behavior of employees deliberately damaging the interests of others or organizations in the workplace, including attacks within the organization, anti-social behavior, violations of law, and other actions. Current antecedents of counterproductive behavior include individual variables, such as personality traits, individual cognition variables, situational variables, including organizational factors, and leadership factors. It is widely believed that the abusive supervision of leaders has a positive effect on employees' counterproductive work behavior. Detert et al. (Detert et al., 2007) found that empirical research shows that there is a significant positive correlation between leadership abusive supervision and employee counterproductive work behavior. Outcome variables include impact on organizations and individuals. Bowling and Beehr (Bowling and Beehr, 2006) pointed out that employees' work stress may cause counterproductive work behavior, which in turn significantly affects employees' job satisfaction and organizational performance variables.

2.4 Self-improvement

Self-enhancement is universal in human society; it is a motive to pursue positive self. Motivation for self-improvement causes individuals to have a positive self-biased attitude. Alicke (Alicke, 2003)

proposes that individuals think their own perspectives, characteristics, and their future are better than others. Dong Yan (2005) proposes that individuals strive to maintain and promote self-esteem in social comparisons. he hopes to have a sense of satisfaction and effectiveness through self-improvement. In a word, self-improvement is an important self-motivation, which makes individuals produce a positive bias in the process of self-cognition and evaluation. The definition of self-improvement in this article is: Self-elevation is a universal self-motivation. It encourages people to have a positive tendency to think that they are better than the average person. This bias may be affected by the situation.

2.5 Impression management

Impression management isa process in which people try to control others to form an impression on themselves (Rosenfeld, 1995). People control other people's opinions and behaviorsby controlling other people's information.Individuals will use appropriate image management strategies based on context, and then influence others' opinions on him in social interactions. The impression management strategy includes self-promotion, ingratiation, intimidation, exemplification,supplication.Studies on impression management include: In terms of job performance, Wayne (Wayne, 1990) found that a leadership-centered impression management strategy can positively predict job performance; in organizational citizenship behavior, Guo Xiaowei (Guo Xiaowei, 2006) found that an impression management strategy can significantly enhance supervisors assessing employees' organizational citizenship behavior.In summary, impression management is an individual's desire to be able to be treated in his own way in any situation in the organization. In this context where the organization suffers from downward envy, leadership uses self-improvement, and employees apply an impression management strategy. Put yourself in a relatively safe environment.

3 Hypothetical Development

Being in a leader position has higher rights, status, and material advantages. They can arbitrarily allocate control resources, manpower, and material resources. When their subordinates have rich social networks and capabilities and certain influence, leadership will produce a kind of feeling-threatened, because individuals often like to see themselves better (Leary, Tambor, Terdal, & Downs, 1995) and perform an act designed to preserve and enhance self-worth (Crocker & Park, 2004). Leadership experience downward envy and self-motivated opinions are attacked. Therefore, leaders will respond to reduce and eliminate gaps between envied. As mentioned above, leaders may adopt ways to destroy and reduce the advantages of others. Duffy (Duffy, 2012) pointed out that the envy person would undermine the perceived advantage of the envied target through social silence, and Gino & Pierce (2009) reduced the advantage of the deafness through unethical behavior. A large number of studies have shown that abusive supervision will hurt the target person, because they use a method of howling, accusing, and exclusion of subordinates. According to social exchange theory, abusive supervision can bring helplessness, frustration, and alienation to employees, which in turn leads employees to take revenge in the form of counterproductive work behaviors. Therefore, this paper proposes:

Hypothesis 1: Downward envy leads to employee counterproductive work behavior through leadership abusivesupervision.

The second response of leaders in coping with downward envy is self-improvement, aiming to increase their ability and level to reduce the gap between them and the envied ones. For example, Cohen-Charash (Cohen-Charash, 2009) proposed that envy people will work hard to obtain the success that comparable to their envy of individuals. Because leaders will pay social costs when using abusive supervision, such as their credibility is reduced, employees' counterproductive work behavior will bring certain losses to the organization and cause certain negative impacts on other employees. Therefore, leaders should use Self-improvement opportunities, participation in advanced training programs, and the use of various resources to promote career development, studies have shown that individuals who participate in these activities can achieve rewards and status enhancement (Day, 2000). At the same time, employees adopt image management strategies, such as concealing ideas that may appear in front of leaders or crediting their personal achievements to their leaders (Nickerson, 2014). On the one hand, they are conducive to satisfying leaders' sense of self-improvement and on the other hand, to change the leadership's perception of him, avoiding being too successful to suffer from leadership's downward envy. Therefore, this paper proposes:

Hypothesis 2: Downward envy leads to the impression management behavior of employees through leadership self-improvement.

4 Model Construction

Leading officials have become downward envy by their subordinates. They will reduce the gap between their subordinates and treat their subordinates through the two strategies of "decreasing others' levels" of abusive supervision and "enhancing self-improvement". When employees feel the abusive supervision of leaders, counterproductive wokbehaviors will be taken to cope with the downward envy of leaders. When leaders take self-elevation actions, employees will adopt an image management strategy, hoping to be viewed positively by the leaders in the context of the organization rather than by envied. The research model of this paper is as follows:
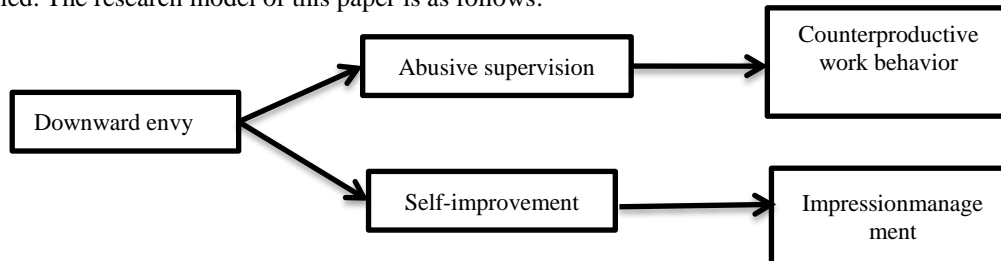
Figure 1   The Model of Downward Envy

5 Hypothesis Testing

The paper selects 120 leadership - subordinates matching data, a total of three times of the data collection, at time 1 complete of the evaluation of personal statistics and downward envy, at time 2 subordinate evaluation the abusive supervision and self-improvement, at time 3 subordinates complete own counterproductive behavior and impression management behavior, the interval is two weeks. Questionnaire after statistical analysis, the results showed that there was a significant relationship between the downward envy of the abusive supervision and self-improvement behaviors. The abusive supervision mediated the relationship between the downward envy and counterproductive behaviors, self-improvement mediated the relationship between the downward envy and management behavior, P values are less than 0.05, and the research hypothesis is testing.

6 Conclusion

This study explored two different paths that employees responded to leadership downward envy, explainingwhen subordinates have a specific reaction, downward envy cause employees' counterproductive work behavior through abusive supervision, and downward envy leads to the impression management behavior of employees through leadership self-improvement. This article explores the behavior of leadership downward envy through two adaptive behavioral responses, namely, elevating one's self level and lowering one's self level, and expanding the related research on the envy in the organization, that is, envy does not produce bad results; secondly, the research on abusive supervision in work organizations has been promoted. In the past, abusive supervision was used as an antecedent variable. Few studies have investigated the antecedents of abusive supervision. This paper explains the causes of abusive supervision through downward envy. Third, this article enriches the research on impression management. Impression management is intended to be viewed positively by others in any situation in the organization. This article employs an impression management strategy designed to reduce the likelihood of downward envy.

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Research on the Causes and Countermeasures of Entrepreneurial Mentors Negative Mentoring Behavior

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Abstract: Under the background of national innovation-driven development strategy and encouraging "innovation and entrepreneurship", the role of entrepreneurship mentors in promoting innovation and entrepreneurship has attracted more and more attention. However, the focus is mainly on the positive aspects of the guidance effect of the entrepreneurial mentor, not paying sufficient attention to the negative guidance behavior in the mentoring relationship, this paper makes a systematic study on the causes and solutions of the negative guidance behaviors of entrepreneurial mentors. This paper first elaborates four aspects of the negative guidance behavior of entrepreneurial mentors, then analyses three bad results the negative guidance of entrepreneurial mentors may result in. On the basis of this, this paper deeply analyzes the four causes of the negative guidance behavior of the entrepreneur mentor, and finally proposes three targeted countermeasures to reduce the negative guidance behavior of the entrepreneur mentor. This paper enriches the research on the guiding behavior of the entrepreneurial mentor, and provides a theoretical research foundation for the research of mechanism exploring and systematic prevention of the negative behavior of the entrepreneurial mentor.
Key words: Entrepreneurship mentor; Negative guidance; Causes; Countermeasures

1 Introduction

With the rising of innovative entrepreneurial zeal in China from "torch mentors action plan" of the National Ministry of   Science and Technology and "national excellent innovative teacher talent pool" construction of the Ministry of Education, to the government's entrepreneurial management departments at all levels, the communist youth league, universities, incubator, the gen space, and other institutions have established an entrepreneurial mentor support system, to guide the business practices of entrepreneurs. Many researches shows that entrepreneurship mentors have a positive influence on entrepreneurs in many aspects, such as career support, social psychological support and role models. Entrepreneurial guidance to entrepreneurs can effectively increase the survival rate of venture enterprises and contribute to its development (Sullivan R, 2000). Therefore, in the construction of entrepreneurial promoting environment of the world, entrepreneur and entrepreneurial company's mentors is an important part of the entrepreneurship supports environmental construction (Long et al., 2013). Now, entrepreneurship guidance activities have begun to receive big attention from scholars, and entrepreneurship mentor research has become an important topic in the field of entrepreneurship research (Liu Feng et al., 2016). A large number of scholars have conducted studies on guiding function, guiding relationship and influencing factors of guiding effect of entrepreneurship (El Hallam H&St-Jean, 2016).

However, the current study focuses on the positive guiding effect of entrepreneurial mentors, ignoring that mentors in the entrepreneurship practice exists negative guidance. Some scholars have found that the negative guidance behavior of the entrepreneur mentor will lead to the failure of the entrepreneur to improve his skills, and entrepreneurs may even suffer emotional damage (Eby, 2010). At present, a small number of foreign scholars have noticed some phenomena that are contrary to the original guiding purpose in the guidance process of entrepreneurial mentors. There is a lack of systematic research on the representations, causes and solutions of the negative guiding behavior of the entrepreneurial mentor. This paper takes the negative guidance behavior of the entrepreneur mentor as the research object, discussing the representations and reasons of the negative guidance behavior of the entrepreneur mentor and the countermeasures to reduce the negative guidance effect of the entrepreneur mentor.

This paper is divided into five parts. After proposing the research object, this paper describes the manifestation of the negative guidance behavior of the entrepreneur mentor, and then analyzes the possible results of the negative guidance behavior of the entrepreneur mentor. Based on the reasons of negative guidance behavior of the entrepreneur mentor explored, the corresponding countermeasures are proposed.

2 The Appearance of Negative Guidance of Entrepreneurial Mentor

The negative guidance behavior of the entrepreneurial mentor refers to the behavior that hinders the effective implementation of the guidance in the mentoring relationship and has a negative impact on entrepreneur' psychological and behavioral mode. In the practice of entrepreneurship guidance, there are four appearances of the negative guidance of entrepreneur mentor.

(1) Entrepreneurial mentor conceals the key information needed for entrepreneurship to entrepreneurs. It is one of the responsibilities of an entrepreneurial mentor to complete the entrepreneurial guidance process, and an essential element for entrepreneurial guidance. However, some entrepreneurial mentors are too focused on their own development and are afraid to create more competitors for themselves. In the process of guidance, the entrepreneurial mentor intentionally conceals the key information needed to start a business for entrepreneurs, which leads to negative guidance.

(2) Entrepreneur mentor provide wrong guidance. The wrong guidance behavior of the entrepreneur mentor to the students refers to the fact that the entrepreneur mentor lacks knowledge in some aspects, however, in order to maintain his own authority or fear losing face, he still guides the entrepreneur, which leads to the wrong guidance for the entrepreneur.

(3) Entrepreneurial mentor interferes in entrepreneurial behavior of entrepreneur too much. Some entrepreneurial mentors are so strong that they place too much emphasis on their own ideas which did not think about the willingness of entrepreneurs or make decisions for entrepreneurs, making entrepreneurs lack of training and difficult for entrepreneurs to grow up.

(4) Entrepreneurial mentor insult entrepreneurs. In the process of communication and interaction between the entrepreneurial mentor and the entrepreneur, the entrepreneurial mentor may damage the spirit and body of the entrepreneur with language or behavior which is beyond the psychological and emotional acceptance of the entrepreneur and make the entrepreneur feel insulted. There are also some abusive languages or bad gesture which makes the entrepreneur feel embarrassed. More seriously, the entrepreneurial mentor conducts sexual harassment to the entrepreneur.

3 The Bad Effects of Negative Guidance of Entrepreneurial Mentor

Negative guidance of entrepreneurial mentor may have influences on entrepreneur in both behavior and psychology. The negative effects on the psychology of entrepreneurs are mainly reflected in the pressure and negative emotional impact, the perception and cognition impact, and the influence of attitude intention on entrepreneurs. The bad influence on entrepreneurs' entrepreneurial behaviors leads to entrepreneurs being at a loss and making mistakes frequently in the process of entrepreneurship.

3.1 Create psychological pressure and negative emotions for entrepreneurs

The negative guidance behavior of the entrepreneur mentor will make the guiding relationship between the entrepreneur mentor and the entrepreneur abnormal, and dealing with this relationship will deplete the emotional resources of the entrepreneur, thus increasing the psychological pressure of the entrepreneur. Moreover, negative guidance will make entrepreneurs shrink psychologically, leading to negative emotions such as depression, anger, anger and sadness (Kumar, 2014).

3.2 Cause bad perception and cognition to entrepreneurs

Entrepreneurs must have a positive attitude and perseverance to succeed. The negative guidance behaviors of the entrepreneur mentor in terms of intentional rejection and abuse of authority, weaken the guiding effect on career support and psychological support. At the same time, it can reduce entrepreneurs to positive perception of self. Moreover, entrepreneurs will attribute this experience to their own lack of ability and personality problems, and reduce their own cognition, so that they will easily give up in the process of starting a business, finally leading to the failure.

3.3 Results in bad influence on the attitude and intentions of entrepreneurs

The influence of negative guiding behavior on the attitude and willingness of entrepreneurs can be divided into two aspects. On the one hand, it will reduce positive attitudes and intentions. In an entrepreneurial mentoring relationship, if entrepreneurs to accept guidance from mentors are positive, he will give a positive evaluation on the whole process of guidance, making entrepreneurs owning higher satisfaction, and this experience will further stimulate the student own growth becoming a mentor in the future. However, negative mentoring experiences will reduce the satisfaction of entrepreneurs in the whole or part of the dimension (Haggard, 2012), and to some extent weaken the tendency of entrepreneurs to become mentors (Green&Jackson, 2014).

On the other hand, it leads to the negative attitude and willingness of entrepreneurs. When the negative guidance has an impact on entrepreneur to a degree that is not acceptable in spirit and

psychology, the entrepreneur will not continue to maintain such a guiding relationship, thus causing the entrepreneur to end the mentoring relationship.

3.4 Cause a bad effect on the behavior of entrepreneurs

The behaviors of entrepreneurs include the identification of entrepreneurial opportunities, entrepreneurial management, learning behaviors and organizational citizenship behaviors. Negative guidance behavior will make entrepreneurs producing aversion to mentors, thus entrepreneurs will reduce dependence and trust on entrepreneurs. Moreover, they even think that the mentor can't give full play to the guiding function and meet their own needs, which leads to a significant reduction in entrepreneurs' learning behaviors (topa&pez-larrazabal, 2016). Meanwhile, the negative guidance behavior leads to negative emotions of entrepreneurs, which in turn inhibits them from organizing civic behaviors in their original organizations (Bushardt et al., 2016).

4 Causes Analysis for Negative Guiding of Entrepreneurial Mentors

In order to give effective guidance to entrepreneurs, entrepreneurial mentors should have good theoretical and knowledge background, rich entrepreneurial experience, correct matching between entrepreneurial mentors and entrepreneurs, and correct guiding behaviors of entrepreneurial mentors. There are four main reasons leading to the negative guidance: the ability gap between the two parties, the mismatch between the two, the lack of professional skills of the mentor, and the specific personality traits of the entrepreneurial mentors and entrepreneurs.

4.1 The ability gap between entrepreneurial mentor and entrepreneur

Entrepreneurial mentors are usually elite people who have made some achievements in the management of enterprises, and the entrepreneurs who receive their guidance don't have any foundation in entrepreneurial experience (Ashforth, 2016). Entrepreneurs choose entrepreneurship guidance. First, they hope to learn the entrepreneurial skills and experience of entrepreneur mentors through guidance；Second, they expect the entrepreneur mentor to introduce relevant resources needed for entrepreneurship, such as contacts or capital. Given these motivations of entrepreneurs, they place themselves low in face of a mentor, and this can fuel the arrogance of the mentor and cause manipulative behaviors of entrepreneur mentor. manipulative behaviors will lead to entrepreneurial mentor's excessive motivation and even enslavement on entrepreneur to achieve goals unrelated to the guidance process, such as self-improvement and other negative behaviour.

4.2 Mismatch between entrepreneurial mentor and entrepreneur

The mismatch between entrepreneurial mentor and entrepreneur is reflected in gender mismatch, background environment mismatch and other aspects. When it comes to gender matching, entrepreneurial mentors tend to choose people of their own gender to establish mentoring relationships. Only gender matching according to the same gender principle can give full play to the effect of entrepreneurship guidance. However, not all mentoring relationships follow the principle of voluntariness，there are a lot of bad matching between entrepreneur mentor and entrepreneur in entrepreneurial practice; In terms of background matching between entrepreneurship mentors and entrepreneurs, people with different background environments are bound to differ greatly in personality traits, attitudes, values, beliefs and interests, and this will directly lead to a different way of handling things, thus increasing the chances of conflict and leading to the negative guidance.

4.3 Entrepreneurial Mentor's lack of mentoring skills

Effective entrepreneur guidance requires good professional quality, communication and interaction skills, and the ability to analyze and solve problems of entrepreneur mentor. If there is a lack of guidance skills, it is very easy for a mentor to conduct negative guidance. In a survey, 12% of people believe that the negative guidance they encounter is related to the lack of guidance skills of the mentor.

4.4 The specific personality traits of mentor and mentee

The personality traits of entrepreneur mentor and entrepreneur do not match each other, which will easily lead to negative guiding behaviors. For example, entrepreneurs with narcissistic personality traits are extremely sensitive to negative evaluation information. When entrepreneurial mentors have critical feedback and suggestions to entrepreneurs, they will think that this is unfair and offensive to them, which leads to the failure of their instructions to be recognized and implemented; entrepreneur mentors with Machiavellianism personality, tend to take the way of deception, concealing entrepreneurs to control interpersonal interaction with entrepreneurs, which easily cause entrepreneurs to have negative perception of the wrong guiding behavior of entrepreneurial mentor. Meanwhile, the entrepreneurial mentor neglects to provide professional development and psychological guidance for entrepreneurs.

causing entrepreneurs negative psychology of alienating their entrepreneurial mentors.

Based on the analysis of the causes and results of the negative guidance behavior of the entrepreneur mentor, the negative guidance behavior of the entrepreneur mentor is generated in the following way as shown in figure 1.
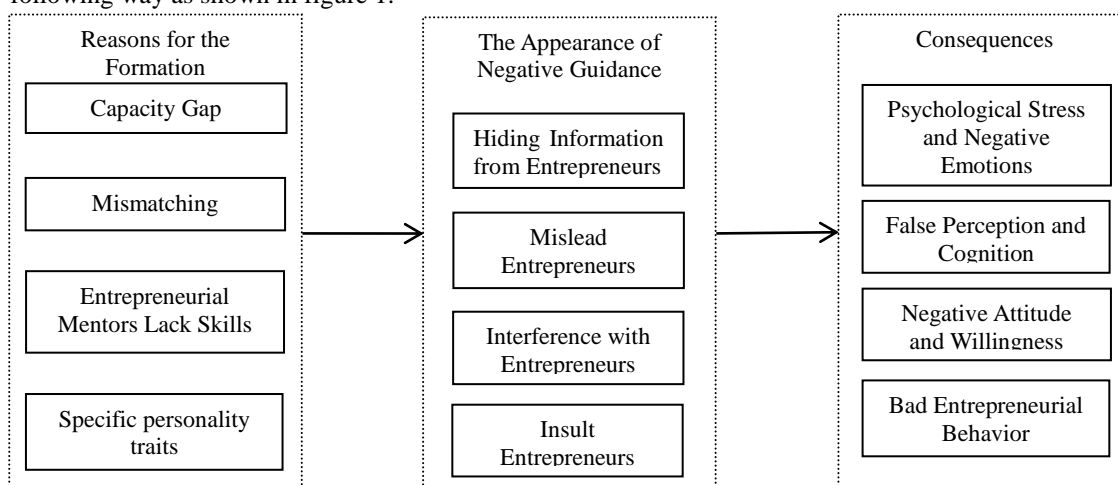
Figure 1   Reasons, Representations and Results of Negative Guidance of Entrepreneurial Mentors

5 Countermeasures to Decrease Negative Guiding of Entrepreneurial Mentors

According to the above analysis on the causes, representations and results of the negative guidance behavior of the entrepreneurial mentor, it can effectively reduce the negative guidance behavior of the entrepreneurial mentor from the following three aspects.

5.1 Improve the ability gap between entrepreneurial mentors and entrepreneurs

First of all, the management organizations of the entrepreneurial mentor and the entrepreneurial mentor should recognize that there exists negative guiding behavior in the relationship between the two parties or the behaviors of entrepreneurial mentor. Secondly, the management department of entrepreneurial mentor needs to strengthen the supervision of the guidance process of entrepreneurial mentor. The third way is to provide an effective feedback channel for entrepreneurs to feedback problems and guiding situation. Fourthly, there should be an exit mechanism. When entrepreneurs believe that there are bad guiding behaviors in mentor and entrepreneurial mentors cannot improve effectively, the guiding relationship between entrepreneurial mentors and entrepreneurs should be dissolved.

5.2 Strengthen the matching between entrepreneurial mentor and entrepreneur

The formation of the guiding relationship should not be based on the principle of the organization's coercive force, and it should be based on the comprehensive evaluation of both parties in various aspects of personality and values to make effective matching between the entrepreneurial mentor and the entrepreneur. When the matching degree is more appropriate, the satisfaction of the guiding relationship will be higher.

5.3 Improve the mentoring skills of entrepreneur mentor

First of all, relevant departments set the entry threshold for entrepreneurship mentors and conduct qualification certification for the mentor's guiding skills to ensure the quality of the selected mentor resources; At the same time, the corresponding training institutions should be set up to provide targeted guidance for different purposes of guiding in different processes of entrepreneurship. Secondly, the content of the training should also include publicly informing them of the possibility and various forms of negative mentoring, as well as managing the boundaries of the mentoring relationship.

6 Conclusion

Entrepreneurial mentors play an important role in the process of mentoring, but the current study focuses more on the positive aspect, with less attention paid to negative guiding behavior research. This article, based on the macro environment of innovation, starting from the real phenomenon in reality, first discusses four aspects of negative guiding behaviors of mentors, then analyzes four kinds of bad effects on mentees led by negative guiding behaviors, and then dug the reason in four aspects. On the basis of

these work, the countermeasures for the service institutions and mentors to reduce or even to avoid the adverse consequences of negative guidance are put forward from three aspects. This paper will be a reference for reducing the negative guidance behavior of the entrepreneur mentor and improving the positive guidance effect of the entrepreneur mentor in the future.

It can be seen that research in the theoretical circle about qualitative aspects of the problem has achieved fruitful results, indeed this provide a theoretical reference basis for the study of related problems on the mentors, but the research about internal mechanism and evolution path in "cause-representation-result" is insufficient. In the future, more contributions should be done to offset this limitation. First, the antecedent variables that produce negative instructional behavior should be further explored; Second, In the special social and cultural atmosphere of China, the moderating effect of the negative guidance behavior of the entrepreneurial mentor on the outcome, such as traditionalism, moderate value, should be discussed.

Acknowledgement

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The Predicaments and Countermeasures of the Professional Development of University Administrators

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Abstract: This study examines the process of the evolution of the role of university administrators in China. Based on the surveys and analysis of relevant data, literature and interviews, this study summarizes the predicaments are faced by the professional development of university administrators in China. And put forwards some countermeasures such as strengthening role function orientation, attaching importance to top-level design, strengthening professional knowledge training and so on, to improve the management level and the efficiency of running a university.

Key words: University administrator; Professionalization; Predicament; Countermeasure

1 Introduction

China's research on the professional development of university administrators began in the late 1970s and early 1980s. Since the 1990s, China has successively introduced some measures to promote the professionalization of teachers, and then carried out the reform of teacher appointment system in the scope of colleges and universities. Studies on the professionalization of university administrators have appeared in various academic journals. Dong qi put forward in (Thinking on the professionalization of university management) that the goal of the professionalization reform of university administration personnel in China is to establish a standardized, coordinated and high-quality and efficient management system centering on teaching and scientific research by adjusting and optimizing the functional structure, power, responsibility, organization layout and leadership system. We need build a high-quality management team and improve the system of employment, assessment, rewards and punishments. Xue Xiaoping pointed out in (The discussion on the professionalization of university management team) that the reform goal of China's university administration personnel specialty is to establish five mechanisms, namely, to operate efficient organization mechanism, self-restraint management mechanism, employment mechanism to stimulate competition, guarantee strong distribution mechanism and control sensitive supervision mechanism. Some researchers also paid positive attention to the education staff system in the practical exploration of the professional construction of university administrators, which generally focused on the summary of school experience, achievements and existing problems. Through reading these articles, we can find that the difficulties and influencing factors of the professional construction of administrative personnel in Chinese universities are not deep enough. Foreign researches on the professional construction of administrative personnel in colleges and universities have been carried out at an early stage with high attention and wide coverage, including how to improve the professional knowledge and ability of administrative personnel in colleges and universities, the educational structure of members of professional associations, professional training, professional ethics. For example, the professional development of the staff of the university (Staff Development, SD for short) took the lead in the United States and gradually expanded to universities in many countries Charmaine Streharsky's "12 steps Toward Ethical Leadership -- A 12 Steps Plan" published in the Journal of Administration elaborated 12 steps to establish professional ethics ideas for university administrators. Published in Administrative Science Quarterly, Administration and administrator, this paper discusses in detail the roles and responsibilities of Administrative personnel in colleges and universities.

2 The Connotation of Professional Development of University Administrator

In Chinese, the term "professional" includes at least two layers of meaning: One is sociological significance, namely "professional occupation"; the other is meaning of higher education, referring to "specialized studies". Development refers to the constant updating and continuous changes of things. In this process, there are both quantitative and qualitative changes; there are both positive and negative changes. The core of the professional development of university administrators is that they regard management as a profession and carry out conscious, continuous and systematic development processes. Its connotation consists of three aspects. Firstly, the professional development of university

administrators is an autonomous process. It must have individual active and conscious active participation and efforts, have the right vision, clear goals, and also need scientific planning. Secondly, the professional development of university administrators is a continuous process. In the new era, new knowledge and new ideas emerge in an endless stream. In practice, university administrators need to continuously learn new knowledge and skills to improve university management capabilities, and eventually grow from a "management novice" to a "management expert". This process is both long-term and continuous. Thirdly, the professional development of university administrators is a systematic process. This is reflected in the professional development of university administrators not only includes the process of enhancing individual professional knowledge, professional competence and professional ethics, but also includes the necessary conditions for institutional guarantees and platform construction provided by the organization to support this process.

3 The Status of Professional Development of University Administrator

At present, the research on institutional improvement of university administrator's development mainly focuses on performance appraisal, salary system, career planning, job burnout and job satisfaction. However, there are relatively few studies devoted to the professional development of university administrators. Exploring the path of professional development and constructing a professional development system for university administrators is the trend of research, and it is the most important task to promote the construction of university administrators. Through questionnaires and interviews, a survey about professional development cognition of 272 managers from 9 universities in Hubei province was conducted, the status and demand of professional development was also investigated. It was found that 89.3% of administrators believed that professional development is required. As to the professional standards of administrators, 77.2%, 92.3%, 83.8.9%, and 88.2% of managers believed that political correctness, understanding education, major proficiency along with good management are essential respectively, see figure 1.When it comes to the status of their own professional development, 22.1% of managers believe that their own specialization is strong enough to be qualified for the job; 36.8% of the managers think that they are professional in general and could basically meet the needs of their work; 41.1% of the managers think that their specialization is not good enough to meet the needs of the work, see table 1.

Table 1　Survey About Professional Development Cognition

Options	Percentage (%)
Strong specialization and could be qualified for the job	22.1
General specialization and could be basically qualified for the job	36.8
Insufficient specialization and could not be qualified for the job	41.1
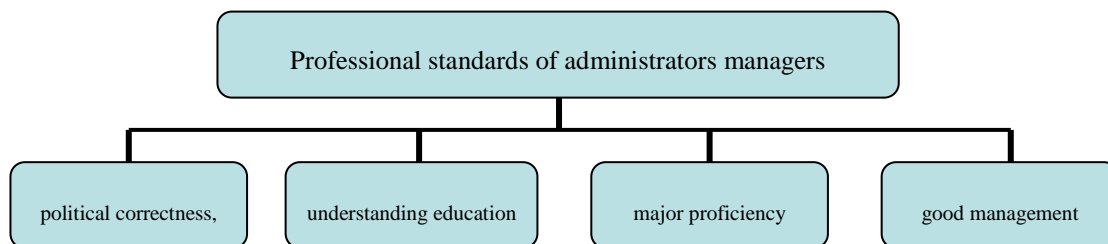
Figure 1　Professional Standards of Administrators

4 Dilemma of University Administrators' Professional Development

In recent years, service school management has been promoted, and university administrators have been positioned as "service personnel", which has weakened the scientific management. Providing a good service does not mean doing a good job of management because management is a professional profession. In America, university administrators are positioned as professional occupations. University administrators must grasp systematic advanced education knowledge and management expertise, master the professional skills of university management, understand the college spirit and culture, accept professional education and training along with integrate into relevant professional organizations. University administrators have their own professional independence; they are neither controlled by the professors nor directed by the state department of education. They are experts in admissions, personnel

policy, book management, budgeting and public relations. They are responsible to the board of directors and master the authority and responsibility by establishing an administration. In China, there are still many institutional defects in the professional development of university administrators.

4.1 The administrators specialized development foundation is weak

At present, China's university administrators have low educational background, low professional title, wide academic sources, uneven levels of professional knowledge, and poor overall professional knowledge. In management position, some of the older administrators have outdated knowledge. Some of the new undergraduate or postgraduate students are fresh blood whose knowledge structure is single owing to the recruitment preference of excellent academics. Even in some important middle-level or senior management positions, teachers who do well in teaching or research in universities are often selected. There are also some management positions for family members of employees in university who have not been systematic trained with management knowledge of colleges and universities. Education and management talents account for less than one third of the professional structure, only basically cover all disciplines. With the rapid development of information society, the information level and the operation ability of modern office equipment of administrators is low. When more and more attention is paid to scientific management and management theory which is guidance on practice while administrators' research level of management activities is low. In a society that values innovation and creativity, the creative ability of university administrators is stagnant.

4.2 Promotion and development channels of administrator is singleness

According to the job classification methods on the staff of state administrative organization, administrative staff in China universities are divided into departmental, division, and staff levels. According to Provisional Regulations on the Staff System in colleges and universities, grades 1-5 are senior staff, 6-8 are mid-level staff, and 9-10 are junior staff. In fact, the division of these two ranks clearly bears the official standard thought, and the establishment of the staff hierarchy is marked by strong administrative management. The higher education law of the People's Republic of China stipulates that administrators of colleges and universities should implement the educational staff system. After the promulgation of the Provisional Regulations on the Staff System in colleges and universities, five universities, including Wuhan University, carried out pilot work of staff system. Education staff system has entered the "Summarizing and deepening Stage "since 2004, however, only 16 universities have so far entered the "new round of pilot work". The pilot experience has not been worked to the whole nation and is not satisfactory. In the case of a smooth promotion, it will take 24 years to reach the tertiary level (the level of the main hall) for a fresh graduate who is engaged in management work for colleges and universities. In the same situation, it will take 21 or 18 years for fresh postgraduates and doctoral students. Simultaneously, if a doctoral graduate is in the teaching position and follows the principle of progressive promotion, he only needs 7 years to become a professor. Moreover, qualifications such as the level of management cadres and years of service are the key considerations in the actual promotion of the staff, which seriously undermines the enthusiasm of professional development of non-leadership employees and young managers.

4.3 The Assessment and evaluation system is not scientific

Evaluation is the main content of the appraisal of university administrator, and it is also an important foundation for encouraging and stimulating the career development of university administrator. At present, the assessment of university administrator is divided into two types: annual assessment and assessment of employment period. However, there is no detailed index system in the two assessments and both assessments lack a detailed index system. The gap between the qualified grades and the outstanding grades of the appraisal is too large and it lacks the hierarchy of transitions. "Character, ability, attendance, and achievement" or "character, ability, attendance, achievement, and honesty" are the evaluation indicators of most universities, "excellent, qualified, basically qualified, and unqualified" are the grades of the assessment results, the employees of the department are the organizers and subjects of the assessment, and "read the summary first, then draw the hook" is the method of the assessment. The non-quantitative, procedural, temporary and inter-departmental characteristics of university administrator are ignored by this assessment system, and it's impossible to accurately measure the actual performance of management personnel. Comprehensive and multi-angle assessment methods (system) such as duality performance evaluation method, contextual performance assessment method and 360-degree performance evaluation system are lacked. In addition to the defects of the appraisal system, the assessment results of the management personnel are not perfect with the promotion system of the appraisers' job promotion, training opportunities, promotion channel, Salary and treatment. These have also made the appraisal system of university administrator exist in name only.

4.4 Lack of a sound exit mechanism for university administrator

In foreign countries, the flow of teachers between colleges and universities is frequent, both the normal flow of personnel between schools and the flow of retired personnel. In the 1990s, Tsinghua University first started the reform of the personnel system in China, and proposed the "non-upgrade or go" program, which broke the traditional concept of teacher tenure; Peking University, China Agricultural University, Renmin University of China, Zhongshan University, etc. more and more universities have also explored one after another. The exit mechanism of college teachers is not only for full-time teachers in universities, but also for administrators in universities. At present, the main managerial model of university administrator is identity management, which has not truly transformed into post management. The flaws in the performance appraisal system make the management personnel of colleges and universities in the state of "can't enter only", that is, there is no constraint of the appraisal mechanism, and there is no early warning of the withdrawal mechanism, which is not conducive to effective evaluation and encouragement of university administrator. As a conclusion, it is a general trend to deepen the personnel system of colleges and universities, such as strengthening job management, implementing flexible and diverse pay systems, exploring teachers' exit mechanisms, and establishing scientific talent selection, use, and evaluation mechanisms which conform to the laws and characteristics of education.

4.5 Defects in the salary system

Currently, there are two different types of compensation for managers: one is the implementation of the salary system for professional and technical personnel, including professional and technical positions, salaries and allowances; the other is the implementation of the salary system for education employees, including job salaries and job targets. In this kind of salary system, the salary level of education staff is lower than that of corresponding professional technical positions. Colleges and universities can only allow managers to "walk on two legs" and "highly enjoy" one category of salary. This kind of salary system seems to give more choices to the administrators of colleges and universities. Actually, an independent classification system was not formed. This kind of salary system makes it impossible for college administrators to have a clear understanding of their career development. "They have to spend a lot of time preparing for the promotion of higher-level titles, but they can't put the whole body into management work, which affects the improvement of management level. Those who have devoted all their responsibilities to management positions do not receive reasonable remuneration, which is not conducive to attracting and stabilizing high-level personnel to perform management work. Taking Guangdong Province as an example, the income level of university administrator is still quite low, which is not matched with the amount of education investment and the level of competency paid by personnel.

5 Countermeasures for Professional Development of University Administrators

5.1 Strengthening the administrative management function localization

From the construction process of world-class university, scientific administrative management system and excellent administrative management team are an important support to promote the universities' development. The administrative management of universities directly serves teaching and scientific research, and plays the role of organization and decision-making. The quality of administrative work has a direct impact on the level and efficiency of school running. With the general trend of administrative reform in domestic colleges, universities should further take good services as a center of gravity of the administrative work, strengthen the administrative management localization, and promote the development of administrative personnel in the professionalization direction.

5.2 Paying attention to top-level design

The leaders of colleges and universities should fully realize the importance of managers' professionalization development, and put managers and teachers on the same important strategic positioning. The construction of a first-class university not only requires the first-class faculty, but needs the first-class management personnel. Therefore, the cultivation of managers with high quality is a guarantee to improve the level of education in colleges and universities. However, it is easy to be ignored in the process of higher education reform. On the premise of the unified understanding, existing management posts must be set scientifically at first. Only through objective analysis of different management positions and finding out the causes of the problem with management personnel quality, could one design a top-level system of managers' professionalization development. Secondly, colleges and universities should strictly follow the recruitment system of management personnel, and do a good

job of recruitment at the source. Some management positions not only require the applicant to have a higher degree, but also require the applicant to have excellent comprehensive quality and work experience. Paying attention to the matching of the professional background and the management positions when management personnel recruitment enables to achieve the goal of the management personnel professionalization development from the source, which makes it possible to adapt to job requirements and improve the efficiency of management work. At present, there is still a lack of channels for the training of management talents in colleges and universities. The internal employment departments of colleges and universities should seriously analyze the recruitment positions, and publicize the recruitment standards and hard constraints. In actual recruitment work, it is of great significance to creating a clear written rules of examination and interview score, knowing the candidates' basic ability to work and testing applicants' ethics level and education related legal knowledge as appropriate.

5.3 Strengthening the training of professional knowledge

Regular professional training and practice is an important means of management personnel professionalization development. However, the managers of colleges and universities have great difficulty in further expanding their professional knowledge from their own perspective because of the repeatability characteristic of the working itself. Therefore, the personnel department should carry out professional knowledge training regularly for its work. In simple terms, the training of standardizing the daily work process should be held at first, which could make the managers set up the consciousness of service for the majority of teachers and students and improve the teachers and students experience in the working process. For example, the training of good office etiquette enables the management personnel to keep the generous manner, civilized language and friendly attitude in the work. Gradually, there is formed a rigorous steady work atmosphere, which can infect other colleagues imperceptibly. Secondly, the training of specific professional knowledge is also needed, which dependents on the scientific analysis of positions and the specialized guidance of experts, so that managers can learn the advanced professional skills regularly to improve their comprehensive quality.

5.4 Focus on career development planning

From the comprehensive perspective of the strategic development of colleges and the development of employees, the career development of university administrators should follow the principle of people-oriented, combining individuals and organizations. At the same time, colleges need to pay attention to and strengthen the service consciousness of administrators, help them to make role definition and career planning, to realize the win-win of individual and organizational development. Nanyang Technological University attaches great importance to the long-term planning for the career development of administrators, emphasis on integrating individual development with the strategic development of university organizations，strive to set clear goals for the personal career development of administrators and then further strengthen their recognition and sense of belonging to the organization. In terms of specific work in employee training, Nanyang Technological University attaches great importance to the training of specific ability and design specific training courses, help the staff to obtain the necessary business knowledge and working experience in a planned and purposeful way. At the same time, attention is paid to arouse the consciousness of independent development of administrators, employees are allowed to freely participate in various training courses and projects inside and outside the school according to their needs. This kind of "goal-oriented" career planning and "bottom-up" training mode is worth learning and using for reference in Chinese colleges.

5.5 Innovative performance appraisal system and rewards and penalties system

The reasonable appraisal reward and punishment system can effectively improve the enthusiasm of administrators in colleges and it is also an important guarantee for the development of professional quality of managers. First of all, specific performance appraisal system should be designed in colleges to manage work, evaluation indexes that are recognized in all respects can be given by experts with rich management experience. The management responsibility system should be improved based on the work performance appraisal, according to the responsibilities of various management positions and the development requirements of professional quality. The management work shall be implemented to specific people and the work performance shall be taken as the basis for rewards and punishment of relevant personnel on a regular basis. Second, universities should strengthen the rectification progress after the evaluation and give schedule when necessary, the assessment results should be combined with the professional quality requirements, so that managers can actively improve their working ability according to the assessment results. In addition, colleges should strengthen the training of managers, opportunities for development should be created for some outstanding personnel and personnel in key

position, and they should be put in positions where they can realize talents.

6 Conclusion

　　With the further reform of education, the development of professional quality of management team is beneficial to the improvement of teaching quality, technology level and logistics service quality of colleges, which is also conducive to carry out various works in colleges. Colleges and universities should attach great importance to the construction of professionalization of managerial personnel, and stimulate the enthusiasm of managers to promote their own quality professionalization around role functions, professional training, assessment and evaluation and performance incentives, so that they can contribute to the reform of education, the development of technology and the improvement of teaching level.

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Analysis on the Relationship Between the Working Values and Turnover Intention of the New Generation of Employees in China

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Abstract: This study examines the relationship between work values and turnover intention of the new generation of employees. In addition, we also creatively proposed organizational commitment as a mediator variable. The research indicates that there is a significant negative correlation between the working values of the new generation of employees and turnover intention.Organizations can make the organization's values and employees' values consistent by improving the richness and interest of the work, so as to reduce the organization turnover rate. In addition, the study also shows that the new generation employees have strong personalities. Therefore, their commitment to the organization is also different. This should also be the focus of the organization.
Keywords: New generation employees; Working values; Organizational commitment; Turnover intention

1 Introduction

The new generation refers to the group of Chinese born in the 80s to 90s of the 20th century. Because of their different concepts, consciousness, and personality from the traditional society, they are called the new generation (Wang Congying, Yang Dongtao, 2017). As the new generation employees and their parents have different life experiences, values, and ideologies, their attitude towards the profession is also very different. In the process of inauguration of the new generation, there is no sense of mission and loyalty to the professions that no fathers do. If they feel that the position does not match their own values, they can leave immediately.

Moreover, employee turnover has always been the focus of organizational managers and researchers (Hom, Mitchell, Lee, & Griffeth, 2012), which is highly valued by the management community and the most investigated organizational behavior.Frequent employee turnover will not only increase the organization's labor costs and instability, but it may also lead to leakage of business secrets and loss of key customers, which will have a negative impact on the sustainable development of the company (Park & Shaw, 2013). According to a survey, the cost of leaving an employee is high, and the average cost of replacing a departing employee is 21% of the average employee's annual salary.

At present, the research on the resignation of employees in the academia is very mature, but the research on the new generation of employees is still in its infancy. There is little research on the relationship between the work values and turnover intention of the new generation of employees.The main purpose of this paper is to explore the mechanism of the new generation employees' work values and turnover intentions, so as to provide a theoretical reference and guidance for Chinese enterprises to avoid the departure of new generation employees.

2 Literature Review

2.1 Work values

The concept of work values was first proposed by Super. He defined work values as job-related expressions that reflected the individual's internal needs and the job traits he pursued when he was engaged in activities (Super, 1970). However, different scholars have different definitions of working values from different perspectives. Scholar Super (Scholar Super,1970) considered the work value as the work-related goal expression from the perspective of demand, reflecting the individual's internal needs and the work traits pursued when engaging in activities. Wollack (Wollack, 1981) argued that work values were an expression of attitude toward general work. Elizur (Elizur, 1984) went on to further research by Wollack. From the perspective of psychology, it was considered that the work value was the value judgment of the individual about the work behavior and the certain results obtained in the work environment. It was an internal ideology that directly affected the behavior. Chinese scholars also studied the values of work. Scholars Ling Wenzhao and Fang Wei, Yu Hua and Huang Xiting started from the definition of values themselves. They believed that work values were the values, attitudes and beliefs that people showed in their professional lives.

Different researchers have different opinions on the division of work value structure. Rokeach

(1980) and others believed that valuescan be divided into ultimate valuesand instrumental values. The former is the ultimate state pursued by individual efforts, while the latter is to achieve the former's behavioral pattern.From the perspective of demand satisfaction, Super divides work valuesinto three dimensions: intrinsic work values,external work values, and extrinsic rewards.The intrinsic work valuesare the satisfaction and sense of value brought about by the nature and content of the work. External work valuesrefer to the value of work results to others and the society. Chinese scholars Jin Shenghua and Li Xue divided work valuesinto objective valuesand instrumental values. In the study of the mechanism of the work valuesand performance of the work of the new generation, Hou Xifang and other scholars divided work valuesinto the five-factor structure of utilitarian orientation, intrinsic preference,interpersonal harmony, innovationorientation, and long-term development. This research divides the dimensions of work valuesand selects the values of the intrinsic work valuesand external work valuesin the most classic Super work value dimensions.

2.2 Organizational commitment

The organizational commitment was first proposed by Becker in 1960. He defined organizational commitment as a tendency to maintain "consistency of activity" due to employees' "unilateral input" to the organization(Hu Weipeng, Shi Kan, 2004).Organizational commitment is a psychological and behavioral commitment to work towards the goals of the organization, based on the organization's identity. There are different standards for the division of organizational commitment dimensions. Several typical classification criteria are shown in Table 1:

Table 1   Division of Organizational Commitment Dimensions

dimension	Scholar	Dimension Content
One-dimensional	Becke（1960）	Continue commitment
	Porter（1982）	Emotional commitment
	Winter（1980s）	Normative commitment
Two-dimensional	Meyer（1984）	Continue commitment,Eemotional commitment
Three-dimension-al	Meyer、Allen（1991）	Emotional commitment, Normative commitment, Continuous commitment
Five-dimensional	Ling Wenjun（2000）	Economic commitment, Opportunity commitment, Normative commitment, Ideal commitment, Emotional commitment

Table 2 shows the evolution of scholars' division of organizational commitment dimension. As for the division of the organizational commitment dimension, different scholars consider the method of division from different perspectives. This research mainly adopts the most typical three-dimensional division of Meyer and Allen (1991). It divides the organizational commitment into emotional commitment (for organizational goals and value identity, and willing to work in the organization to continue to strong desire), normative commitment (out of sense of responsibility and obligation to the organization is willing to stay in the organization's commitment), and continuous commitment (employees think that changing work requires more time and effort, preferring to stay in the original organization to continue working).

2.3 Turnover intention

Employee turnover refers to the behavior in which individuals within the original organization system terminate the employment relationship with the organization and leave the organization. Employee departure can be divided into active and passive departure. The employee's initiative to leave has a great influence on the development of the company. Turnover intention, as a precursor to employee departure, refers to workers in a particular organization for a period of time, after some consideration, intention to leave the organization.

Different scholars have different perspectives on the former dependent variable of the turnover intention. The Chinese scholar Li Ping analyzed the influence of the five personality on the intention of leaving the company through empirical research from the perspective of Big Five personality. Xie Baoguo, Bai Guanglin and others studied the mechanism of employee turnover intention from the perspective of the occupational plateau. Summarizing previous research, the research on the dependent variables of turnover intention is mainly in the following aspects: social statistics, personality factors, human resources management system and leadership factors.

3 Hypotheses Development
3.1 Work values and turnover intention

Vandenberghe's research found that when a person's work values and organizational values do not match, there is a thought of leaving the company. The worse the match with organizational values, the greater the employee's turnover tendencies. Different generations have different work values. Compared with "pre-80" employees, the work values of "after 80" employees, namely the new generation of employees, have a greater impact on turnover intention (Huang Zhongwei,2016).The work values of different dimensions have different influence on employee turnover intention. According to Hertzberg's two-factor theory, work incentive factors are divided into hygiene and motivational factors. The employee's inner working values are related to the motivational factors, while the external working values mostly include the components of the hygiene factors. Compared with hygiene factors, motivational factors have a greater impact on employees. The hygiene factors are only to maintain employees' work in the organization, and the satisfaction of motivational factors will give employees greater satisfaction and recognition of the organization. On the contrary, if motivational factors are not met, employees will be more dissatisfied with the organization and are more likely to have the idea of leaving the organization. Therefore, the following hypotheses can be made:

Hypothesis 1: Work valuesarenegatively related to turnover intention.

Hypothesis 1a: Intrinsic work valuesarenegatively related to turnover intention.

Hypothesis 1b: External work valuesarenegatively related to turnover intention.

Hypothesis1c: Intrinsic work values have a greater negative impact on turnover intention than external work values.

3.2 Organizational commitment as a mediator

At present, there are more studies on the relationship between work values and organizational commitment in the academic community. Different dimensions of work value structure or different factors have different effects on organizational commitment (Zhou Shengfang, 2007). Based on a sample from Singapore, Putti analyzed the relationship between work values and organizational commitments and found that intrinsic work values are more relevant to organizational commitment than external work values. Liu Kai (2016) investigated the new generation of employees of the company and studied the relationship between different work values and organizational commitment in different dimensions and found that skill-oriented work values had a significant impact on economic commitment. Work values such as inner preference, innovation orientation, interpersonal harmony, and long-term development had a significant impact on normative commitment and emotional commitment. There is a very significant positive correlation between work values and organizational commitment (Chen Cancan, 2016). As a new generation of employees, because of their strong personality, the pursuit of career ideals is not simply salary performance, but more job satisfaction and self-realization. Compared with job security, benefits, status, etc., the innovative and interesting work is more attractive to employees. The following hypotheses can be made from this:

Hypothesis 2: Work valuesarepositively related to organizational commitment.

Hypothesis 2a: Intrinsic work values and organizational commitment are stronger in positive relationships than external work values.

The organizational commitment as an antecedent variable of turnover intention has been universally recognized by scholars. However, their perspectives on the relationship between organizational commitment for turnover intention are different (Xia Xiaozhu, 2015). Price (Price, 1997) proposed a departure intention path model in which individual variables and structured variables contribute to turnover intention through organizational commitment. Later studies confirmed that there was a significant negative correlation between organizational commitment and turnover, that is, the higher the organizational commitment, the lower the turnover intention (Cui Xun, 2003). Meyer (Meyer, 2002) separately analyzes the impact of organizational commitment on emotional commitment, sustained commitment and normative commitment on the impact of turnover intention. Research shows that the three dimensions are negatively related to turnover intentions, of which emotional commitment is the most significant.There is a need for further research on the relationship between the various dimensions of organizational commitment and turnover intention.The following hypotheses are proposed:

Hypothesis 3: Organizational commitmentisnegatively related to turnover intention.

Inaddition, we can conclude from relevant studies on the values of employees' work values, organizational commitment and turnover intention.

Hypothesis 4: Employee organizational commitmentmediates therelationship between work values and turnover intention.
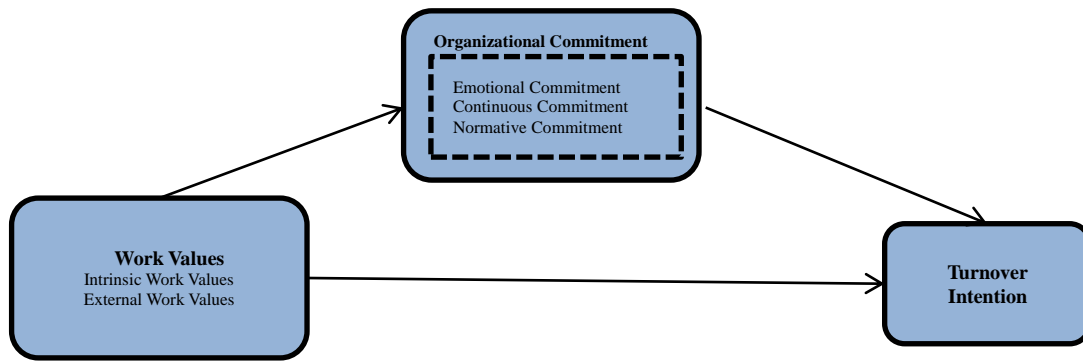
Figure 1　The concept of full relationship model

4 Data and Methodology
4.1 Data collection and instrument
According to the research purpose, this paper takes the new generation of employees in many enterprises in China as the research object, and collects data by means of electronic version questionnaire. A total of 330 questionnaires were distributed and 312 questionnaires were collected. After screening, 286 valid questionnaires, the questionnaire recovery rate was 94.5%, and the effective questionnaire rate was 86.7%.
4.2 Measures
Work values. The measurement of work values is mainly based on the revised questionnaire prepared by Hirozaku Yoshikawa, which is revised by Li Jianmei and Gu Feifei. Internal work values and external work values are measured by four items respectively, using Likert5 (1=completely dissatisfied, 5= Fully satisfied). In this study, the Cronbach's α coefficients of the two sub-scales of internal work values and external work values are 0.936 and 0.925, respectively, and theCronbach's α coefficient of the total scale is 0.855.

Organizational commitment.The measurement of organizational commitment mainly refers to the three-factor organization commitment scale proposed by Allen & Meyer (1990), which includes three dimensions: emotional commitment, continuous commitment, and normative commitment. The emotional commitment is measured in four items, and the continuous commitment and the normative commitment are measured using three items. Use Likert5 (1 = no match, 5 = fully match).The Cronbach's α coefficient of the scale is 0.824.

Turnover Intention. The measurement of the intention to leave is mainly based on the scale of Li Weiting (Li Weiting, 2013), and then modified to get 4 items to measure the variable. Use Likert5 (1=completely disagree, 5=completely agree). The Cronbach's α coefficients of the scale is 0.877.
Control variables. In order to rule out the interference of other factors, this study controls the gender, marital status and education level of the new generation of employees.

5 Results
5.1 Correlation analysis
Descriptive statistics and correlation analysis were performed on the sample data using SPSS 22.0. The mean, standard deviation and correlation coefficient of each variable are shown in Table 3. Internal work values and external work values are significantly positively correlated with the three dimensions of organizational commitment, and are significantly negatively correlated with the turnover intention. Moreover, the three dimensions of organizational commitment are also significantly negatively correlated with turnover intention. These results provide the necessary preconditions for the analysis of the relevant hypotheses of this study.

Table 2　Correlation Coefficient Matrix

Variables	Mean	Standard deviation	1	2	3	4	5	6	7
1 Gender	1.15	0.366	1						
2 Marital status	1.92	0.270	-.410	1					

Continural Table 2

Variables	Mean	Standard deviation	1	2	3	4	5	6	7
3 Education	2.18	0.644	.551	-.373*	1				
4 Intrinsic Work Values	3.0769	1.028	-0.12	0.160	0.048	1			
5 External Work Values	2.9359	0.959	-0.084	0.425	-0.087	0.834**	1		
6 Organizational Commitment	3.1218	1.083	-0.148	0.362	0.043	0.523**	0.450**	1	
7 Turnover Intention	2.8462	0.964	0.069	-0.531	0.198	-0.243*	-0.235*	-0.118**	1

Notes: **$p < 0.01$; *$p < 0.05$.

5.2 Hypothetical test

The table below shows the results of work values, organizational commitment, turnover Intention, and regression analysis of control variables. Available from Model 5 and Model 6, Hypothesis 1 and Hypothesis 1a, 1b, and 1c are validated, that is, both intrinsic work values and external work values are significantly positively correlated with turnover intention (b=-0.521, P<0.001; b = -0.341, P < 0.001), and the intrinsic working values are more negatively correlated with the intention to leave. Model 2 and Model 3 examined the extent to which intrinsic work values and external work values affected the organizational commitment after controlling the control variables. The standardized regression coefficients obtained from Table 4 were b=0.729 (P<0.001); b=0.647. (P < 0.001), from which it can be seen that Hypothesis 2 is verified. This study assumes a negative correlation between organizational commitment and turnover Intention, which is available from Table Model 7, and Hypothesis 3 is validated. For the test of the mediation effect of organizational commitment, from Model 5, Model 6, Model 8 and Model 9, it can be analyzed that the organizational commitment has a partial mediating effect between the work value and turnover Intention, and thus the hypothesis 4 is verified.

Table 3　RegressionAnalysis Table

Variables	Organizational Commitment				Turnover Intention				
	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9
Gender	-0.012	0.034	-0.054	0.361	0.368	0.351	0.361	0.374	0.342
Marital status	0.554	0.19	0.297	0.357	0.297	0.301	0.343	0.328	0.353
Education	0.054	-0.142	0.038	-0.264	-0.296	-0.267	-0.026	-0.240	-0.260
Intrinsic Work Values		0.729***			-0.521***			-0.320**	
External Work Values			0.647***			-0.341***			-0.254**
Organizational Commitment							-0.265**	-0.164**	-0.175**
R2	0.293	0.7	0.654	0.187	0.753	0.644	0.78	0.785	0.74
AdjustedR2	0.232	0.665	0.613	0.117	0.715	0.588	0.737	0.744	0.699
F	4.829	19.865***	16.063***	2.678	19.557***	11.560***	9.517**	18.913***	18.220***

Notes: The above coefficients are standardized regression coefficients. ***$p < 0.001$;**$p < 0.01$; *$p < 0.05$.

6 Conclusion

This study examines the impact of the new generation's work values on turnover intention and increases organizational commitment as a mediator. Through empirical research, the following conclusions are drawn: (1) the work values of the new generation of employees have a positive impact on turnover intention; (2) the organizational commitment of the new generation of employees has a negative impact on their turnover intention; (3) the new generation of employees There is also a positive relationship between the work values and organizational commitments; (4) The organizational

commitment of employees partially mediates the relationship between work values and turnover intention. This research not only enriches the research on employee turnover, but also has certain reference for enterprises. To reduce the turnover rate of employees, enterprises must not only proceed from the organizational level, but also consider the personal factors of employees. However, this study only considers the mediating effect, and does not consider the influence of boundary factors. Later research can proceed from this perspective and conduct further research.

Acknowledgement

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A Study on the High Turnover Rate of New-generation Knowledge Employees

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Abstract: In the era of knowledge economy, the new-generationknowledge employees as a "new power" gradually become the main force of society construction. They have a higher level of knowledge and more innovative ability, but their frequent turnover has become a major management problem. Effective management of the new-generationknowledge employees has become an urgent problem for enterprises. Based on the high turnover rate of the new-generationknowledge employees, this paper analyzes the characteristics of the new-generationknowledge employees, and explores the reasons for the high turnover by the literature research method, and puts forward the corresponding countermeasures of human resource management from the perspective of human resource management in order to meet the challenges facing the new generation of employees in the enterprise management.
Key words: New generation; Knowledgeable staffs; High turnover rate; Recommendations

1 Introduction

In the era of knowledge economy, the new-generationknowledge employees have gradually entered the workplace, and plays an increasingly important role in the development of enterprises. However, from the bad performance of this generation of employees in the workplace, such as"flash" phenomenon, higher turnover rate, etc. According to the survey on the departure of a new generation of employees in a unit in 2013, only 32.7% of the employees have worked for more than 3 years,only 47.6% worked 1-3 years,and 19.7% worked less than one year,most of the new-generationemployees are in a state of frequent job-hopping;according to the investigation of the graduate school graduates by the McKeith Institute, in 2015, about 98% of university graduates chose to voluntarily leave their jobs within half a year. The overall turnover rate was as high as 34% within six months, and the turnover rate was as high as 26.5% in 2016.According to a survey conducted by a website, the turnover rate of new-generation employees in China is as high as 60%, and about one-third of new generation employees are switching jobs more than 5 times per year.According to the above survey, the new-generation employees are usually characterized as frequent job-hopping, which greatly threatened the stability in the workplace. If this problem is not handled properly, it will lead to lower efficiency and restrict the development of enterprises and employees.Therefore, it is imperative to solve this problem.

2 Literature Reviews

2.1 Key concepts

2.1.1New-generation employees

In China, the concept of the new-generation employees is relative to the labor force before the reform and opening up. It is pointed out that workers born in the 1980s, 1990s, and later. There are similarities between the new generation of employees in China and the "baby boom" in the United States. (HJ Krahn & NL Galambos, 2013) The Baby Boomers, on the one hand, are reservoirs of the corporate elite, occupying key positions in the organization; on the other hand, this group has become an organization's "decayed wood" by squeezing the pension and pension systems of enterprises, hindering more creative creativity.

2.1.2 Knowledge employees

The concept of "knowledge workers" was put forward in the book "landmarks of tomorrow" by the father of management Peter F. Druker in the 1950s: "Knowledge workers are using symbols, concepts, people who work with knowledge or information." Follow-up many scholars on the definition of "knowledge-based employees" also have their own emphasis, but the consensus is focused on two aspects: firstly, knowledge-based employees are good at knowledgelearning;secondly, knowledge-based employees are good at applying their studies creatively to achieve organizational goals.(Wang Hanbin,Yang Xiaolu, 2011)

Therefore, this article defines the knowledge-based employees as mental employees having strong learning and innovation capabilities, which can create value for the company in the work process and

can continuously improve their own KSA.

2.1.4 Factors influencing the turnover intention of the new-generation knowledge employees

Although scholars at home and abroad hold different views on the classification and classification of the factors affecting turnover, overall, they can be divided into four aspects: individual factors, organizational factors, work factors, and macro-environmental factors.Based on the improved Price-Mueller (Price-Mueller,2000) model and Yang Xiaolu (Yang Xiaolu, 2012) maturity scale macro-environmental factors include relative responsibilities and opportunities; individual factors select employee personality characteristics and job participation; organizational and work factors include self-sovereignty, fair distribution, work monotony, salary levels, promotion opportunities, job stress, social relations, leadership styles, social support, and career development.(Fang Tao, Jiang Tao, 2013)

3 The Characteristics of the New-generation Knowledge Employees

Compared with the previous labor force in China, the new-generation knowledge employees have the following five characteristics.(Li Yaqian, 2014)

(1)Strong self-management awareness.Based on the particularity of its growth environment, this generation of employees pays more attention to the independence of their lives and work, prefers self-management, is unwilling to be constrained, and sometimes shows poor communication, listening, and stress-relief capabilities.

(2)Strong self-learning awareness.They were born in an age of informatization and fierce competition. They have been well educated since childhood, and they have developed a sense of continuous learning new knowledge and constantly charging themselves.

(3)Prone to innovation and challenging work. The new generation of knowledge workers is no longer in order to meet the needs of physiology, safety and other relatively primary needs in terms of work needs. They are eager to achieve self-worth, tend to prove their ability and improve their own KSAthrough more difficult work, and gain respect and recognition from others.

(4)High turnover rate. Whenthe company is still unable to meet their needsthey are more likely to jump out of the original unit and find a higher platform.They are more concerned about whether their talents are fully utilized. and whether self-worth is recognizedby society. Therefore, the group is also more likely to leave the organization to seek other platforms due to the psychological fluctuations caused by inconsistency between organizational evaluation and self-evaluation.

(5)Occupational anchor effect is obvious. The career anchor effect of the new-generation knowledge employees is embodied in the narrow range of anchorage and the longer anchoring effect. The narrow scope of the anchorage is related to the higher professional access threshold. The sunk cost for the professional makes this generation more inclined to work hard along the goals set in the early career; the longer anchoring effect is due to the relative stability of the professional anchor itself and the firm belief of the new generation of knowledge workers in their own career goals.

4 Reasons for the High TurnoverRate of New-generation Knowledge Employees

After analyzing the relevant domestic and foreign research, through analyzing and summarizing the antecedents, mediators and outcome variables and combining the unique characteristics of the new-generation knowledge employees,(Cao Xiaolong, Huang Jiawen, 2013) the reasons for the high turnover rate of the new-generation in China at present include the following points:

4.1 There is a "generation gap" between the traditional management methods and the new-generation

Traditional management methods tend to be centralized, autocratic and authoritative. People's management tends to be power-centered, employees only need to obey, only have the lower level needs, but the new-generation employees pay more attention to the independence of their lives and work, tend to manage themselves, and emphasis the realization of higher-level needs in their work. Therefore, applying traditional management methods to the new-generation will inevitably lead to many contradictions and problems.

4.2 Corporate incentive mechanism lacks competitiveness

The purpose of the incentive is to fully mobilize the creative and autonomous initiative of employees, complete the task with high efficiency and high efficiency, but the traditional incentive model does not take effect on the new-generation employees, because the new-generationknowledge workers emphasis the work itselfwhen seeking work.Therefore, when there is a big gap between the work environment and expectation, they often trend to leave their jobs.

4.3 Ignoring the realization of the value of the new-generation knowledge employees

When looking for a working platform, the new-generation knowledge employee'semphasis on their future development space and whether they can achieve their own value, get the recognition of others, if the platform cannot meet their needs, they will tend to leave the job.They advocate freedom and have their own unique values, but also emphasis on the matching of organizational concepts or cultures to their own.Changes in the organization's internal policies or management concepts, or when employees find themselves unable to get a self-fulfilling platform, can easily lead to their departure.

4.4 Heavy working pressure and poor compression capability of employees

Most of their work is in the technical and management categories. And most of what they do is technology and management, these types of work are more difficult, and require not only strong professional skills, but also the ability to solve problems. Also need a strong compressive ability.(Zheng Q G & Ding W H, 2011) However, due to the particularity of the growth environment, they often show independence in their work, do not want to be constrained, and show poor resistance to pressure in the face of difficulties. High-intensity work pressure can be regarded as a huge challenge for the new-generationknowledge employees.

4.5 Low level perception and low corporate loyalty

Employees' job satisfaction and enthusiasm are largely influenced by the manager's leadership style. This generation of employees' understanding of leadership is not based on the role of the leader, but is judged by the leader's workability and personal charisma. Based on their unique values, leadership is often a symbol of ability and personality rather than power. Therefore, the new generation prefers charismatic leadership. It is also their low level perception that often gives people a self-illusion and lack of team spirit. In addition, the loyalty of the new generation of employees is more about the work and the profession than the enterprise. When they are looking for a working platform, they emphasis on the future development space and the realization of their own value.

The above are the main factors leading to the departure of the new-generation employees. However, due to the individuality of the separation, the manager of the company should dialectically analyze and treat the separation.

5 Practical Implications

Enterprises can reduce the high turnover rate of the new-generationknowledge employees from the following two levels:

5.1 Corporate level

5.1.1 Improve recruitment system

There is a high turnover rate among employees, which is due to the unreasonable recruitment channels and system.When undertaking recruitment, it must do a proper investigation to fully understand the talents required by the company, as well as the professional appeals and values of the new-generation employees; providing real and accurate information during the recruitment process. Behavioral and occupational assessments to ensure that people are matched and reduce employee turnover after entry.

5.1.2 Improve work autonomy

Enterprises should give full play to the work enthusiasm of the new-generationemployees and mobilize their autonomy. The new-generationemployeeshave high requirements for work autonomy and great desire for career growth opportunities. (FangWenjie, 2014) In order to meet the individual needs of them, the company can set up some challenging projects in terms of work;design some distinctive elements that are more in line with them in the aspect of welfare and inprofessional growth use of entertainment, open and interactive training mode.

5.1.3 Creating an appropriate corporate culture atmosphere

The higher the degree of matching of values between the employees and the organization, the higher the employee's recognition and sense of belonging to the organization will be.(Wang Xiaoli, 2010) At this time, the employees will be more willing to provide better services to the organization. The new generation of employees has the characteristics of strong autonomy, self-management awareness, and a challenging and novel work atmosphere. Therefore, companies can build a warm and diversified corporate culture that suits their needs in line with the characteristics of this generation. The construction of corporate culture enhances employees' sense of belonging and identity, thereby reducing the turnover rate.

5.1.4 Broaden communication channels

Due to the special growth environment of the new generation of employees, they often show poor communication skills and have a weak sense of hierarchy. The respect for the superior is also out of the leadership has a higher ability and literacy. Therefore, using a varietyof communication methods to build a non-hierarchical and barrier-free communication platform. In order to overcome the horizontal communication difficulties of the new generation of knowledge workers and solve the problem of vertical generation gaps, enterprises should build a barrier-free, non-hierarchical platform for emotional release and guidance communication.

5.1.5 Emphasis on the Professional Development of Employees

Enterprises should provide reasonable suggestions for career development planning according to their own abilities and characteristics of new-generation employees, so that they can fully exert their autonomy and initiative on their career paths, recognize their career development paths, and avoid some irrational turnover due to confusion.

5.2 Staff level

5.2.1Fully recognize yourself

Due to the special growth environment of the new-generation, they are labeled with selfishness, low pressure resistance, and strong liquidity. Therefore, the new-generationemployees must fully understand and establish themselves when they are looking for a job. Establishcorrect valuesand accurately position your own professional demands, so as to find a suitable platform for their own, to avoid irrational resignation after entry.

5.2.2 Enhance responsibility awareness and compression capability

From related research, it is known that when employees can't balance their work and family pressure well, they will easily be willing to leave. For the new-generation employees, with the development of society, their pressure will be increasing, so they mustenhance their ability to deal with pressure from all sides, instead of adopting a negative and evasive approach.But there is also a common phenomenon in the workplace: after participating in training to improve their own ability, some employees will choose to change jobs in search of better development. It also makes enterprises worry about the integrity of the new generation of employees. So they alsoshould increase their sense of responsibility. This is both responsible for themselves and for family members.

5.2.3 Do career planning

Making a detailed and reasonable planning for your career development will certainly make your job searching more clearly, and it will also help you find a platform that is more suitable for your own development, rather than feel confused and puzzledfor your future development.

6 Conclusion

Excellent talent reserves have always been the driving force behind the survival and development of enterprises.(Li Yaqian, 2014) Talents are always the core strength of the company's development and growth, and the key to retaining talents lies in the way and method of human resource management, which is consistent with the characteristics of the times and the needs and characteristics of employees. The new generation of knowledge workers is the group with the most characteristics of the new era. They generally accept higher education, have professional knowledge and skills, and at the same time they are individualized, pursue freedom and dare to break through. Because of their unique personality and values, workplace performance is significantly different from other generations of employees,(Jiang Weiwei, 2014) and their arrival will inevitably bring new challenges to organizational management. Current human resource managers must recognize that traditional management methods may not be suitable for the management of new generation knowledge workers. Only by actively changing the management method, better cooperating with the new generation of knowledge-based employees, and constantly adapting to the management methods of the times cannot be eliminated.

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An Analysis of Academic Development Service System for College Students

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Abstract: This article uses comparative research methods,holds that in order to actively guide college students to establish correct academic outlook and values, and cultivate learning ability of students which in accordance with sustainable development,it is very necessary that Chinese colleges and universities construct the "student based" core concept as the guidance,set up a professional organization to provide college students with education training, consulting, management and supervision and other comprehensive services, guided by the core concept of student-oriented and the academic needs of college students. By establishing unimpeded communication and problem solving channels, the academic development service system with services, education and management for university students can be developed, which is guided by colleges and universities, and based on the academic development service organization,supported by the university service department and complement with other social forces.
Key words: College students; Academic development; Service system; Academic development service system

1 Introduction

College students are the most energetic and creative groups in the society and is the backbone of undertaking the mission of promoting social development. Academic achievement is the foundation for the development of college students and the cornerstone for their future success. The academic development of students is an important index to reflect the educational level and the quality of talent cultivation (Yan and Gao, 2016). Donald Kennedy, a former President of Stanford university once said: "The supremacy of universities lies in providing mankind with an intellectual platform for improving culture, creating culture, continuing life and protecting human sustainable development (Kennedy, 2005)."Attaching importance to the academic development of college students is an important function of colleges and universities, an important work for colleges and universities to implement the strategy of talent power and to provide talents for social construction.

In recent decades, famous international universities have formed service systems to promote the academic development of college students, such as the ASAP of Princeton university, which is a specialized agency that includes academic guidance and counseling, specific course support, writing and research services to promote academic development of college students. Harvard University has set up a special organization called Student Affairs Center to promote academic development of college students. The purpose of the agency is to help students in their studies by providing advice, guidance and resources to ensure that college students get all-round development in an inclusive environment and on their way to succeed. Most of the Chinese colleges and universities have set up a functional department responsible for organizing, managing and monitoring teaching activities for college students—the Academic Administration Office; a functional department responsible for college students to solve psychological problems, improve psychological quality and promote the mental health development—the Mental Health Education Guidance Center; a functional department responsible for providing employment service and guiding college students to do well in career development planning—the Employment Guidance Service Center. In the work of these functional departments, academic development services for college students are sometimes involved. However, since these departments have their fixed functional and transactional work, there is no fixed personnel and energy to carry out targeted and efficient research and guidance activities for academic development of college students, it is necessary to study this problem.

2 The Connotation of Academic Development Service System for College Students
2.1 College students' academic development

College Students' academic development refers to the university students under the guidance of the national education policy and the college curriculum teaching syllabus, under the guidance of the teachers, by means of participating in the course of learning, scientific research, social practice, professional practice and other activities，college students complete the credits required by the training program, and complete the graduation thesis (design) and graduation reply, and graduate successfully and finally get the degree. In the process of complete their studies, learning ability, innovation ability, practice ability and competitive ability of sustainable development can be improved in many aspects, and form the core competitiveness of the individual. With the passage of time and the growth of college students, the learning career of college students keeps moving forward regardless of whether they continue their studies or work after graduation. The attitude, expectation and values of their studies will affect their future development.

2.2 Academic development service system for college students

Academic development service system for college students refers to under the guidance of the core concept "student-oriented", colleges and universities set up a professional organization based on academic needs for college students, and organize professional personnel to provide college students with education training, consulting, management supervision and other comprehensive services following the development law of peoplein the process of promoting the overall development of college students. By establishing unimpeded communication and problem solving channels, the academic development service system for college students is formed which is dominated by colleges and universities, and based on academic development service organization and service departments of colleges and universities, and supplemented by other social forces and integrated with services, education and management. This system includes five factors: professional service institutions, high quality academic development instructors, scientific and efficient service means, systematic service content and network service platform.

3 Requirements to Construct Academic Development Service System for College Students

3.1 Professionalization of service subject

Academic development service system is led by universities, and staff of related functional departments, professional teachers, retired teachers, good students, education experts and scholars in the society and other kinds of people form a professional service system (Yu, 2012). Since the object of the service is college students with different academic problems, it is necessary to conduct formal and systematic professional training for employees, and these professionals need to possess professional spirit, not only can realize the importance of school work of college students, but also need to have a high professional level, which can analyze academic development difficulties respectively, and put forward guidelines to promote academic development of college students.

3.2 Modernization of service means

The academic development service system should include an open service platform with modern service means and unlimited time and space. With the intervention of multimedia and network technology, the information service platform is set up to adapt to the personalized academic development of students. On the basis of existing websites, colleges and universities have established a column to promote the academic development of college students, which lists services such as academic guidance, consultation, resource support and expert appointment. In this column, video and lecture notes of open class, writing instruction and practical guidance are available for students to learn independently (Xue and Cheng, 2010). Students can register an account and pose questions on it, and choose counseling section and expert who can provide advisory services in their need. Moreover, they can also choose online consultation, telephone or face-to-face consultation.

3.3 Systematization of service content

Based on the analysis of the connotation of college students' academic development and the essence of education service, and the needs of college students' academic development as the research object, investigate and analyze the academic needs of Chinese college students, and determine that the academic development service system needs to revolve around the internal and external learning, scientific research, social practice, professional practice and so on, and confirm the service content, including providing related services such as school development planning guidance, curriculum resources, essay writing guidance, professional selection guidance, scientific research guidance and other services of improving learning skills of students (Gao,2013). At the same time, academic

development of every student is a dynamic process, therefore, the content of academic development service should be adjusted according to their academic situation at different stages. Service personnel must be good at making scientific forecast for academic development of students, and providing operational advice to their academic development plans combining environmental change and academic development of students.

3.4 High efficiency of service level

Carl Rogers, the father of humanistic psychology once said: "The goal of education should be promoting the study and change of the whole person." The purpose to establish academic development service system for college students is to provide high quality and high efficiency service to promote the academic development of college students. Academic development service for college students confronted with students with different specific situations. Some students are unable to adapt to the academic environment, and some students are lack of academic motivation, and some students are unable to face academic failure correctly, and some students are lack of learning resources. Therefore, it is necessary to carry out high efficient service (Yu and Dong, 2005).

4 International Experience for Reference

4.1 Establishing academic development service institutions

The development of the new period brought opportunities and adjustments to undergraduate education. Princeton University, a leading research university in the world has established a deparment named "Academic Success at Princeton" (ASAP). The purpose of the establishment is to provide students with learning resources, and improve learning ability, research ability and writing ability for students and solve their academic problems. Harvard University has set up the "Student Affairs", which aims to enhance contact between staff and students and add attention to students, and provide academic services and learning resources to improve students learning ability, and build an inclusive growth environment for students to achieve successful experience and promote their comprehensive and full development. Stanford University set up an institution called "The Office of The Vice Provost for Undergraduate Education" (VPUE). It was established in 1995, to promote undergraduate education and the collaboration between teachers and students, colleges and functional departments of entire university, and integration of resources, to fully realize liberal education. The goal is to promote interaction between teachers and students, and develop new curriculum and innovate teaching methods, and provide academic programs and suggestions for college students, and improve their learning ability and help them realize their dreams.

4.2 Build a systematic academic development service system.

The ASAP of Princeton university which consists of an expert team composed of deans and department head, provides academic development services, including academic consultation, health consultation, learning method guidance, specific curriculum resource support and writing and research guidance. The Student Affairs Office at Harvard University offers a range of services that promote academic development, including academic guidance, supervision of student progress, financial assistance, supervision of academic policies and processes, provision of academic counselling and curriculum resources, and development proposals for diversity and containment. The VPUE department in Stanford University provides services including general education courses, targeted writing coaching, professional introduction seminar, undergraduate research support, overseas training courses, academic guidance, learning skills guidance and other services to promote the development of education. The academic advisory department of Oxford University aims to help students solve academic problems and excavate students' learning potential by providing free and confidential services. University staff, parents, students and community staff provide individual counseling, workshop guidance, group counseling and self-help resources for students with need. It also provides a series of special reports to help students improve their learning skills, and stimulate their thinking, and solve academic problems such as academic procrastination, exam phobia and exam anxiety, and promote college students to adapt to college life and achieve a better development.

4.3 Building a network service system

The ASAP institute at Princeton university offers course resources by the column "Course-Specific Support" , including online courses for different majors, free one-to-one tutoring and academic guidance provided by experienced undergraduate tutors. In order to enable the first-class teaching team to serve students outside the classroom, the center for teaching and learning at Stanford University strengthens network platform construction and set up MOOC learning forum by adopting a diversified service

approach and working with two excellent software development teams. After students register, they can get various learning services. A large number of online courses and non-course modes are provided on learning forum, and students can study independently. If students have academic difficulties, they can also ask for help on learning forum. At the same time, the students who are excellent in study can also help other students through learning forum. By constructing such a mutual learning forum, Stanford University provides students with an open learning platform, and is committed to provide students with the high quality resources, and improve their learning ability and promote their academic development.

5 Conclusion

The investigation shows that the factors affecting the academic development of Chinese students are mainly composed of students, teachers and teaching (Wang, 2014). There is a significant positive correlation between professional advantages and professional interests of college students (Chen et al.,2009). A national longitudinal survey of 6139 female college students shows that the current student loans has produced an inhibitory effect on Chinese female college students academic development on the whole (Huang and Zhang, 2017). At the same time, in theoretical research, university workers always attached great importance to academic problems of college students, and have conducted the related research from the perspective of college funding (Li, 2018), tutor (Hu et al., 2017), academic development counseling (Wu and Xu, 2016), academic pressure, academic ability, academic mood, academic failure and academic planning (Wang et al., 2011). However, the cognition and practice of academic development education for college students are not systematic, and a mature academic development service theory system has not been formed. Therefore, Chinese colleges and universities need to set up a specialized department to provide academic development service for college students. Academic development plan is helpful for college students to make proper self-orientation and promote education management (Cao, 2014). Under the new situation, in order to actively guide college students to establish correct academic view and values, and cultivate students to have the learning ability of sustainable development, it is an urgent need to strengthen the study of college students' academic development services in theory and provide new ideas for developing university students' academic education in China.

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Evolution of Development Path of Young Innovative Talents Driven by Postdoctoral System Innovation

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Abstract: Postdoctoral system is an important part of national innovation-driven development strategy. Postdoctoral training is an important source of young creative talents. At present, the development of China's young innovative talents is facing the problems of unsuitable talent competition, poor mobility of personnel, mismatched management system, and shortage of supporting resources. In order to improve the post-doctoral development path, this article adopts policy interpretation, integrates postdoctoral policy keywords, postdoctoral fund project performance evaluation indicators, postdoctoral job satisfaction indicators, and constructs a postdoctoral development path Bayesian index system, including treatment, assessment, teamwork, protection, innovation, employment. Six key nodes found that the post-doctoral employment situation is not optimistic. The postdoctoral treatment is gradually improving, and the cultivation and evaluation of postdoctoral innovation ability needs to be further improved.
Key words: Postdoctoral system; Innovation-driven; Young creative talent; Path; Evolution

1 Introduction

With the increasing specialization and complexity of scientific research, the requirements for personnel engaged in scientific research are getting higher and higher. The postdoctoral fellow as the group of young scientific research talents with the most innovative vitality and development potential has become the main force of international scientific research. Many of the original research results have postdoctoral contributions.

The postdoctoral platform has become a reserve pool and reservoir for young talents in colleges and universities. As the state and station-based units continue to increase the position of treatment and optimize management methods, the post-doctoral system has greatly enhanced the competitiveness of outstanding young talents. By the end of 2015, there were 3,011 postdoctoral mobile stations in 460 colleges and research institutes across the country, covering a total of 110 primary disciplines in all 13 disciplines. The number of postdoctoral research stations established by major companies reached 3,595. Since the establishment of the post-doctoral system, China has recruited more than 150,000 post-doctoral students. By 2017, more than 88,000 people have been stationed (Bai Bingyang, 2017). Helbin (Helbin, 1998) shows that factors such as low wages, no benefits, contempt by their department and institution, longer research deadlines, and anxiety about future careers have a significant negative impact on postdoctoral job satisfaction. In China, with the continuous improvement of the market economic system and the gradual deepening of the personnel system reform, the external environment of post-doctoral talent training has undergone tremendous changes, and some deep-seated problems of the postdoctoral system have gradually been exposed, which restricts the in-depth development of the postdoctoral career (Wang Chuanyan, Ren Chao, 2016). Miller (Miller, 2012) used a binary sequence regression model to study and found that the size of the research interests and the degree of matching, and the frequency of interactions with the coordinator had a positive and significant effect. The shorter the first post-doctoral career, the pursuit of teachers' research career, and the low income. The postdoctoral job satisfaction of the country as well as the high appraisal of the coordinating mentor is relatively high (Gerlese S. Åkerlind, 2005; Fan Wei, Liu Wenlan, 2013).

In general, China's postdoctoral research on talent innovation has developed rapidly and has achieved a series of progress and results. On the one hand, it has quickly cultivated high-quality research talents with international perspective and innovative qualities in a short period of time, making high-level university teachers available (Xue Eryong, 2012; Liu Yun, Yang Fangjuan, 2017). There is a certain reserve; on the other hand, the quality of post-doctoral innovative talents training has been improved, and the cooperation and exchange between high-level international talents at home and abroad have been promoted. However, the improvement of postdoctoral policy and the development and implementation of young creative talents are at the initial stage both in theoretical exploration and practice, and there are still some deficiencies (Yao Yun, 2017; Liu Yun, Yang Fangjuan, 2017). In

reviewing its development history, it is necessary to soberly understand the current difficulties and difficulties and actively explore the development path (Zhang Muchu, 2017).

2 Basic Situation of Postdoctoral Research in China

Postdoctoral career is a transitional phase between the completion of a doctoral degree and the acquisition of a long-term fixed career (Stephan P, 2005). With the gradual improvement of the postdoctoral system and the continuous deepening of the reform of personnel system in colleges and universities, the scale of postdoctoral researchers in China has gradually expanded and become an important force in the field of academic research. According to statistics, as of 2014, China had a total of 78807 postdoctoral researchers. The average annual growth rate of postdoctoral enrollment from 2000 to 2014 was 12.3%. In 2016, the number of post-doctors reached 18244 and the number of outbound stations reached 10599.
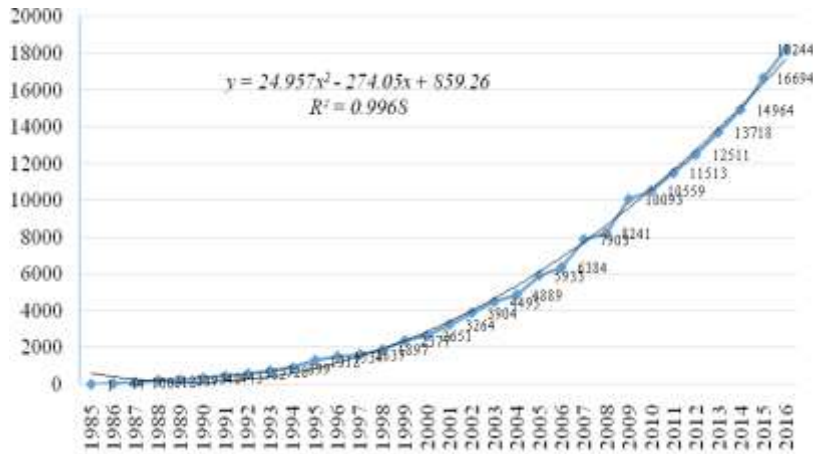
Figure 1   Statistics on the Number of People Entering the Station for Postdoctoral Researchers in Each Year

The number of post-doctoral stations in each year of China has steadily increased, excluding the initial period of 1985-1990. Since 1990, the average growth rate has been 17.88% and the variance is 0.109. Through the linear correlation analysis, the number of arrivals in each year was obtained as: $y = 24.957x^2 - 274.05x + 859.26$, and the fitting residual was $R^2 = 0.9968$.
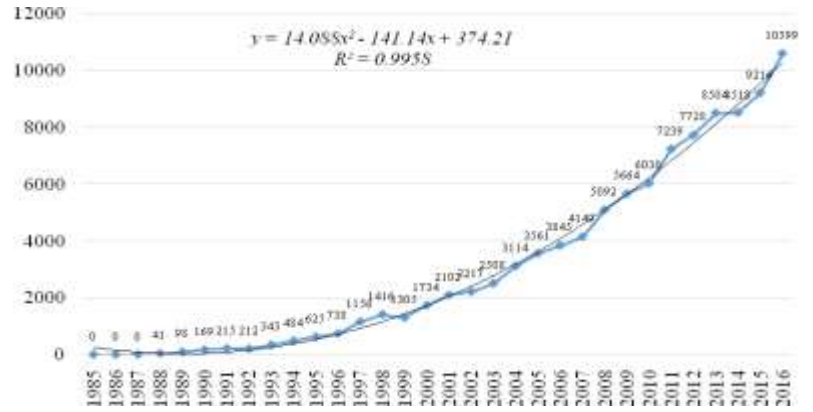
Figure 2   Statistics on the Number of Outbound Postdoctoral Researchers in Each Year

The number of postdoctoral stations leaving China in each year is basically stable, excluding the initial period of 1985-1990. Since 1990, the average growth rate has been 20.27% with a variance of 0.191. The growth rate of the number of outbound stations in each year has a certain fluctuation, showing negative values, indicating that some postdoctoral staffs have postponements. Through the linear correlation analysis, the number of arrivals in each year was obtained as: $y = 14.088x^2 - 141.14x + 374.2$, and the fitting residual was $R^2 = 0.9958$.

In recent years, the top three disciplines with the largest number of postdoctoral station researchers

have been engineering, science, and medicine, accounting for 39.51%, 22.8%, and 10.05% of the national postdoctoral enrollment, respectively, compared to the fewest recruits. The disciplines are military science, arts, and philosophy, accounting for only 0.64%, 0.54%, and 1.05% of the total number of people enrolled in the year. Because the gap between the number of disciplines is extremely large, it is doomed that the promotion of postdoctoral related policies cannot be exhaustive, but only selectively fund research of key disciplines, a nd the transformation of relevant results.

3 Postdoctoral Innovation Drives Talent Development Path

3.1 Postdoctoral innovation drivers

By tapping the potential of young talents and creating conditions to help them come to the fore, and then promote the release of the entire talent team, it has become an important implementation path for the "two-class" construction of universities. However, the development of young talents in colleges and universities is still faced with many difficulties due to reasons such as the competition for talented people, poor mobility of personnel, mismatch of management system and shortage of supporting resources (Thunnissen M, Boselie P, 2013; Xue Eryong, 2012; Fan Wei, Liu Wenlan, 2013).

Huang Yuanqi (Huang Yuanqi, 2018) obtained 56 key postdoctoral policies from 1998 to 2015, extracted 24 subject words, and obtained 24 high-frequency words. After co-word clustering, he formed five clusters of management system reforms, establishment of stations, personnel training, institutional planning and management, life and scientific research protection, representing the main focus of post-doctoral policy at this stage.

Table 1   Postdoctoral Policy High Frequency Keywords

Keywords	Frequency	Keywords	Frequency	Keywords	Frequency	Keywords	Frequency
station	☆☆☆	workstation	☆☆☆	enterprise	☆☆☆	academic exchange	☆☆☆
funding	☆☆☆	recruit	☆☆	evaluation	☆☆	rover	☆☆
declare	☆☆	system	☆☆	innovation	☆☆	protection	☆☆
funds	☆☆	input	☆☆	personnel management	☆☆	achievements	☆☆
cultivate	☆☆	planning	☆☆	promotion	☆	quality	☆
management System Reform	☆	excellent postdoctor	☆	apartment	☆	experimental unit	☆

After a semantic analysis of the latest postdoctoral policy documents, it was found that talent, innovation, reform, uniqueness, importance, and comprehensiveness were the most frequent words, reflecting that postdoctoral policy is now entering an in-depth reform period, highlighting the training of young talents and focusing on innovation, advance to the characteristic development model requires the comprehensive improvement of the postdoctoral system.

3.2 Based on Bayesian postdoctoral talent development path evolution model

The Bayesian network nodes represent random variables. Directed edges between nodes represent the causality between nodes and express the strength of the relationship with conditional probability. A node variable can be an abstraction of any problem, suitable for expressing and analyzing uncertain and probabilistic events, and can be inferred from incomplete, imprecise or uncertain knowledge or information.

In order to construct the Bayesian network model, we first need to select relevant important variables, and then classify them according to the target variables, mediation factors, interventions, implementation factors, control factors, and additional influences, and perform parameter learning. The "target variable" is the final variable that you want to influence through management or intervention; the "intervention variable" is the measure that is implemented to reach the target variable and can be considered as various management decision-making choices; the "mediation factor" is the linking target variable and intervention variable. The intervening factors, that is, the intervention variable must transmit its effect through mediating factors, while the mediating factors have a direct impact on the target variable; the "control factor" is an exogenous variable that does not change with intervention, and it has an effect on both the mediating factor and the target variable; "Implementation factor" is a variable that directly influences whether an intervention or a decision is successfully implemented. The effect will affect the target variable through an intermediary factor. "Additional impact" is a variable that changes with the intervention and the target variable, and is an additional result outside the target. For

the system There are no active influences on other factors within. Through the learning of indicators and the analysis of policy texts, the post-doctoral development path Bayesian nodes are shown in Table 2.

Table 2   Postdoctoral Development Path Bayesian Node Selection

	Node classification	Node selection	Hierarchy	Abbreviation
1	Implementation factor	treatment	Middle	TR
2	Intervention variable	Evaluation	Middle	AS
3	Intermediary factors	Team	High	TE
4	Additional effects	Protection	Middle	GU
5	Controlling factor	Innovation	High	IV
6	Target variable	Employment	Low	EM

After the Bayesian structure is initialized, the condition tree Bayesian network model and the parameters of how to learn the model under a given model structure are formed, but the structure of the model needs to be automatically learned from the data. It is necessary to find the closest joint distribution of conditions, that is, to maximize the conditional log-likelihood based on the input data.

In order to obtain the optimal conditional tree Bayesian network model efficiently without the need to display the tree structure of the enumeration finger order, this problem is converted into a weighted directed tree with the largest sum of edge weights in the graph.

4 Postdoctoral Development Path of Evolution

This paper uses the weights of employment, assessment, teamwork, safeguards, innovation, and treatment in policy papers and expert scoring as inputs for Bayesian path evolution.
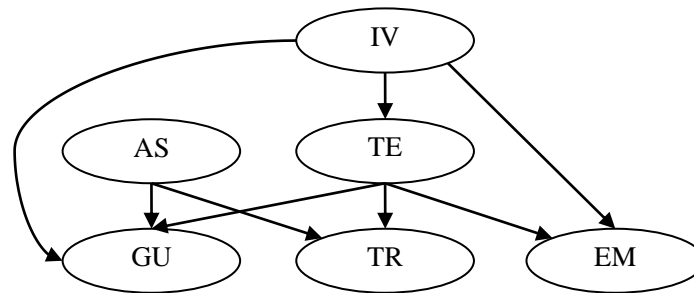
Figure 3   Evolution of Postdoctoral Innovation Driven Policy

By calculating the maximum similarity loglik = 0.5543, indicating that the results of this study still have some uncertainty. The probability distribution of innovation nodes (IV) is (low, medium, high) = (0.4125, 0.2874, 0.3001), indicating that there is still much room for improvement in the current state of postdoctoral innovation. The probability distribution of the treatment node (TR) is (low, medium, high) = (0.0357, 0.4188, 0.5455), which indicates that the current postdoctoral degree is universally recognized for the level of treatment, but there is nearly a half probability that the post-doctoral treatment has yet to be improved. The probability distribution of the employment node (EM) is (low, medium, high) = (0.4059, 0.0957, 0.4985), indicating that the post-doctoral employment situation is not optimistic, a considerable probability is that the post-doctoral employment level is low, and there is also a partial probability that the post-doctoral employment level is better, but the low degree of recognition of employment at the middle level reflects the polarization of post-doctoral employment. It is neither satisfactory nor very satisfactory.

5 Conclusion

The improvement of postdoctoral policy and the development and implementation of young creative talents are at the initial stage both in theoretical exploration and in practice. The scale of postdoctoral researchers in China has gradually expanded and become an important force in academic research. Future China postdoctoral policy will more closely integrate the needs of social development, promote marketization and internationalization to promote the cultivation and flow of talents, promote postdoctoral innovation and entrepreneurship, and enable postdoctoral policies to play a role in

cultivating high-level innovative young talents and promoting innovation in mass entrepreneurship. Bigger effect. At present, the development of young innovative talents is facing the problems of unskilled competition for talents, sluggish flow of people, mismatched management systems, and shortage of supporting resources. Post doctors themselves also face social constraints, a low sense of belonging, and a high pressure on their lives. In order to solve such problems and improve the post-doctoral development path, China has introduced several policies in succession. Based on the key words of postdoctoral policy, this article constructs the post-doctoral development path Bayesian index system, including six key nodes of treatment, assessment, team, security, innovation, and employment. Through computational simulation, it is found that post-doctoral employment is not optimistic, and post-doctoral treatment is positive. Gradually improve, the cultivation and evaluation of postdoctoral innovation ability needs to be further improved.

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Research on Optimal Matching of the Two-way Choice Between Entrepreneurial Mentor and Entrepreneurs

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Abstract: Theoretical research and practice have showed that the entrepreneurial mentor plays an important role in the growth of entrepreneurs and the development of entrepreneurial enterprises. The optimal match between the entrepreneurial mentor and entrepreneurs is the basis of the mentoring function of the entrepreneurial mentor. However, the current research about operational optimal match between them is relatively scarce. Based on the related mentoring theoretical research, this paper uses Gale - Shapley algorithm to construct a set of optimal matching model of the two-ways choice between the entrepreneur mentor and the entrepreneur. The application of this method in an entrepreneurship mentoring platform reflects that this method is suitable.

Key words: Entrepreneurial mentors and entrepreneurs; Optimal matching; Gale-shapley algorithm; Two-way choice

1 Introduction

"Entrepreneurship" is a very hot topic nowadays. According to the data of The Global Entrepreneurship Monitor (GEM), China's early entrepreneurial activity index is high, but the survival rate of enterprises is low. The study found that providing entrepreneurial guidance for entrepreneurs can effectively improve the survival rate of entrepreneurial enterprises and make them develop continuously. A survey in the United States also found that the failure rate of enterprises that did not receive business guidance reached 55 % within 4 to 6 years, but the failure rate would decline to 20 % after receiving business guidance. Therefore, the support of entrepreneurship instructors is an important part of entrepreneurship assistance in the entrepreneurship promotion strategies of various countries. The matching between the entrepreneurial mentor and the entrepreneurs is the first step in the process of providing guidance to entrepreneurs by the entrepreneurial mentor. The results of mutual choice between the entrepreneurial mentor and the entrepreneurs are crucial to the entrepreneurs and their entrepreneurial achievements, and they also have some influence on the entrepreneurial mentor at the same time. It will have a positive effect on the achievement of entrepreneurial achievements, the realization of guidance functions and the teacher-pupil relationship when the entrepreneur mentor and the entrepreneur achieve a stable and effective match. Many entrepreneurship support institutions in China, such as incubators in universities and government-built entrepreneurship support institutions, have mostly failed to recognize the importance of matching entrepreneurs with entrepreneurs, or just simple one-way matching, which makes the matching between entrepreneur's mentor and entrepreneurs not optimal.

At present, the research on the matching problem between the entrepreneur mentor and the entrepreneur focuses on the research on the influencing factors of the matching between the entrepreneur mentor and the entrepreneur. For example, Ragins et al and Allen study illustrated the relationship between the gender of the entrepreneurial mentor and the willingness to guide (Ragins, 2000). The research of Allen and Eby illustrated the difference of entrepreneurs' gender perception of guidance function (Allen&Eby, 2004). Ragins and Cotton studied the influence of the gender combination of mentors and students on the matching effect (Ragins&Cotton, 1999). The research of Allen and Gravells illustrates the influence of the age and education level of the entrepreneur mentor and the entrepreneur on the matching (Gravells, 2006). Allen, ST - jean and Audet studied the influence of the tutor's personal experience on matching (St-Jean&Audet, 2009). The research results of Dougherty show that tutor status affects the result of teacher-pupil matching (Dougherty, 2013). The research of Ensher and Murphy shows that the race matching results of mentors and students would affect the quality of mentoring relationship (Ensher&Murphy, 1997). It can be found that the matching problem between the entrepreneur mentor and the entrepreneur is mostly qualitative research, and the simple matching method of single factor is considered in current research situation. The operational method of how to match in combination with factors which seriously affected the guiding effect of entrepreneurs is scarce. In this paper, the Gale - Shapley algorithm will be used to construct the optimal matching model of the two-way choice between the entrepreneur mentor and the entrepreneur, so as to get the stable matching that accords with Pareto optimality.

This paper consists of four parts. After introduction of research background, the principle of Gale-Shapley algorithm is introduced. Based on the theory research results of motoring affection and relationship, Gale-Shapley algorithm is used to build a scientific model for the matching between the entrepreneur mentor and the entrepreneur. The entrepreneurial mentor and entrepreneur of an entrepreneurial guidance platform are taken as an example to make a match, and get a stable and optimal match in both directions. Finally, the future research is prospected.

2 Introduction to Gale-Shapley Algorithm

Gale - Shapley algorithm is an algorithm invented by American Mathematicians Gale and Shapley to find stable matching, also known as Deferred-acceptance Agorithm, which is referred to as " GS algorithm". It was first used to study the university admission and stable marriage problems. Subsequently, scholars began to attach importance to the bilateral matching problem studied it from different angles. A lot of researches were achieved, such as the match between buyers and sellers, the enrollment problem of universities and colleges, and the match between employees and positions, etc. Shapley and Roth won the Nobel Prize in economics for their contributions to the stable market matching theory and market practice in 2012.

Gale and Shapley published the foundation stone of bilateral matching theory as "College Admissions and the Stability of Marriage" in 1962. Matching experiments on both men and women in the marriage market and students and schools in enrollment were conducted in the paper and obtained stable matching results. When matching, the male and female guests in the wedding market were regarded as the collection of both parties in the trading market. The ladies set was supposed as $W=\{w_1, w_2, \cdots\cdots, w_i\}$ and the men set was supposed as $M=\{m_1, m_2, \cdots\cdots, m_j\}$. If the information of each participant was disclosed, each participant ranks the satisfaction of another party member according to their own preferences. Every woman w_i has a satisfaction ranking for all men in M, and every man m_j has a satisfaction ranking for all women in W. On this basis, it can produce stable matching results of "men's best" or "women's best" no matter which party first according to the principle of preferential matching.

The concrete algorithm is to simplify the matching between two parties in market transactions from the perspective of mathematical science into mapping from one set of elements to another set of elements with the help of computer programming technology. The condition of "stability" is that some elements in the two sets would not be interested in elements in the other set except those matched with others. Then we get a satisfactory and stable match between the two sides through deferred - acceptance algorithm.

The match between the entrepreneur mentor and the entrepreneur is the process that the entrepreneur mentor searches for the entrepreneur who meets the preferences, and at the same time, the entrepreneur searches for the ideal entrepreneur mentor. In short, they need pairing and matching. It is more suitable to compare the pairing and matching between the entrepreneur mentor and the entrepreneur to love and marriage. Therefore, we can map and solve this brand-new problem based on mature marriage model, and use game theory to solve the most stable matching problem of entrepreneurial project team.

3 Construction of Matching Model between Entrepreneurial Mentor and Entrepreneurs

The so-called stable match refers to that the entrepreneur matches the corresponding entrepreneur mentor, and they both think each other is the best. They will not fire or abandon each other in the match between the entrepreneur mentor and the entrepreneur. If one or both parties are not the most satisfied objects of the other party, it must be ensured that the entrepreneur can no longer find a better entrepreneur mentor than the one currently matched. All the objects in the two sets of entrepreneurs and entrepreneurial mentors would not be interested in other objects in the other set except those that have already been paired with themselves, then it forms a stable choice and pairing.

The influencing factors of entrepreneurs' choice of entrepreneurial mentors include: demographic characteristics (gender, age, position, race, etc.) of entrepreneurial mentors, guidance direction of entrepreneurial mentors, personality of mentors, past guidance experience of entrepreneurial mentors, guidance level of entrepreneurial mentors (including the position of mentors), etc. The influencing factors of entrepreneurs' mentor selection include demographic characteristics (gender, age, education level, race, etc.), entrepreneurs' personality, entrepreneurs' major (direction and field of entrepreneurship), entrepreneurs' past entrepreneurial experience, etc. All the above information must enable both parties to fully learn. Only when the information is sufficient and symmetrical learned, can the entrepreneurial

mentors and entrepreneurs rank their preferences correctly. Therefore, both parties should master the information in order to make a two-way choice between entrepreneurs and business mentors.

Before using GS algorithm to match, the following assumptions must be made:

Hypothesis 1: the mentors and entrepreneurs who participate in the matching should always keep their rational and clear preferences.

Hypothesis 2: every entrepreneur has only one entrepreneur mentor.

Hypothesis 3: the mentor has determined the number of entrepreneurs to bring before matching.

Hypothesis 4: both parties can sort each other accurately.

It is natural for entrepreneurs to apply to the most satisfactory business tutor. If entrepreneurs can't match their favorite mentors, they should settle for second place and contact the second satisfaction, and so on. It is in line with the mentor's interests to constantly choose his favorite among the entrepreneurs who throw offers to him. Then all the parties involved in the pairing have chosen their favorite and most satisfactory pairing objects within the range of choices, which is also the inevitable result of market game.

4 The Application of the Matching Model of Entrepreneurship Mentors and Entrepreneurs

We suppose that the *A entrepreneurship guidance platform* is a service platform organized jointly by the department of human resources and social security and the department of education in the *A District of the city W*, employing experts in the field of science, technology, finance, management and other well-known entrepreneurs to form a team of entrepreneurship mentors to provide entrepreneurship guidance and service for the entrepreneurs so as to reduce their entrepreneurship costs and risks. Its main daily affairs include the basic maintenance of the platform, expert consultation (policy consultation, expert guidance, entrepreneurship ability assessment, etc.), policy propaganda and acceptance, measures of innovative work and so on.

Assuming that *the A entrepreneurship guidance platform* needs to match the best entrepreneurs with 6 entrepreneurship mentors, according to the introduction of the platform, there are 3 mentors who can guide 2 entrepreneurs each cycle at the same time, so there are 9 entrepreneurs in each cycle to receive guidance on the platform, and the mentors are numbered as M_1, M_2, M_3, M_4, M_5, M_6, the entrepreneurs are numbered as P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9. Among them, M_1, M_2 and M_3 can guide two entrepreneurs at the same time, marked as M_1', M_2', M_3 'to show the difference. The following information of entrepreneurship mentors is announced in the *A entrepreneurship guidance platform*: basic information, past experience, the busyness degree of entrepreneurship tutor work, entrepreneurship direction, guidance style and so on. The information of entrepreneurs is announced as follows: the past entrepreneurship experience, the qualifications and majors of the entrepreneurs, the character of the entrepreneurs, the basic characteristics of the entrepreneurs, and the direction of the entrepreneurs' entrepreneurial companies.

After the above information is published on the A platform, the entrepreneurship mentors' preference for entrepreneurs and the entrepreneurs' preference for entrepreneurship mentors are presented from high to low as follows:

$$\begin{cases} M_1'(P_1, P_6, P_3, P_2, P_4, P_5, P_8, P_7, P_9) \\ M_2'(P_2, P_3, P_1, P_8, P_5, P_6, P_4, P_9, P_7) \\ M_3'(P_8, P_6, P_7, P_9, P_5, P_1, P_2, P_4, P_3) \\ M_4(P1, P_2, P_5, P6, P_4, P_3, P_9, P_7, P_8) \\ M_5(P_6, P_3, P_7, P_9, P_8, P_5, P_4, P_2, P_1) \\ M_6(P8, P_1, P_7, P5, P_6, P_9, P_3, P_2, P_4) \end{cases}$$

$$\begin{cases} P_1(M_1', M_4, M_2', M_5, M_3', M_6) \\ P_2(M_1', M_3', M_2', M_6, M_4, M_5) \\ P_3(M_2', M_5, M_6, M_4, M_3', M_1') \\ P_4(M_5, M_4, M_3', M_6, M_2', M_1') \\ P_5(M_5, M_4, M_6, M_3', M_1', M_2') \\ P_6(M_2', M_3', M_6, M_4, M_1', M_5) \\ P_7(M_3', M_1', M_4, M_2', M_6, M_5) \\ P_8(M_1', M_5, M_3', M_6', M_4, M_2') \\ P_9(M_1', M_4, M_3', M_6, M_2', M_5) \end{cases}$$

This paper use Gale-Shapley algorithm to match them, allowing the entrepreneurs to choose the entrepreneurship mentors.

In the first round, P_1, P_2, P_8 and P_9 choose M_1', and the group (M_1', P_1, P_2) is formed according to the preference of M_1'; P_3 and P_6 choose M_2', forming (M_2', P_3, P_6); only P_7 chooses M_3, forming (M_3, P_7); no one chooses M_4; M_5 is chosen by P_4 and P_5, forming (M_5, P_5); no one chooses M_6; therefore, the result of the first round is (M_1', P_1, P_2), (M_2', P_3, P_6), (M_3', P_7), (M_5, P_5), leaving P_4, P_8, P_9 unchosen.

In the second round, P_4 chooses M_4, who hasn't been chosen yet, thus forming (M_4, P_4); P_8 chooses M_5 according to his preference and M_5 refuses P_5 and chooses P_8, forming (M_5, P_8); P_9 chooses M_4 but fails to be chosen. Therefore, after the second round, there is only P_5 and P_9 left.

In the third round, P_5 chooses M_4 according to his preference and M_4 refuses P_4 and chooses P_5, forming (M_4, P_5); P_9 chooses M_3' who happens to have a quota left, forming (M_3', P_7, P_9). There is only P_4 left.

In the fourth round, P_4 chooses M_3' but fails to be chosen since M_3' has already taken two entrepreneurs.

In the fifth round, P_4 chooses M_6, forming (M_6, P_4).

The matching process of GS algorithm can be described by table-dispatching method shown in Table 1. Among them, "*" indicates the choice of people in this round who failed to match in the previous round.

Table 1   The Process of Table-dispatching of GS Algorithm

	Round				
	1	2	3	4	5
P_1	*M_1'	M_1'	M_1'	M_1'	M_1'
P_2	*M_1'	M_1'	M_1'	M_1'	M_1'
P_3	*M_2'	M_2'	M_2'	M_2'	M_2'
P_4	*M_5	*M_4	M_4	*M_6	M_6
P_5	*M_5	M_5	*M_4	M_4	M_4
P_6	*M_2'	M_2'	M_2'	M_2'	M_2'
P_7	*M_3'	M_3'	M_3'	M_3'	M_3'
P_8	*M_1'	*M_5	M_5	M_5	M_5
P_9	*M_1'	*M_4	*M_3'	M_3'	M_3'

After five rounds of selection by Gale-Shapley algorithm, the matching between entrepreneurship mentor and entrepreneur is complete. The results are as follows: (M_1', P_1, P_2), (M_2', P_3, P_6), (M_3', P_7, P_9) (M_4, P_5) (M_5, P_8) (M_6, P_4).   In this way, the *A entrepreneurship guidance platform* can get the best matching between the entrepreneurship mentor and the entrepreneur on the basis of the entrepreneurs' first selection.

5 Conclusion

This paper introduces and practices the Gale-Shapley algorithm stable matching theory and its practice method, applying it to the matching of entrepreneurship mentors and entrepreneurs on the *A entrepreneurship guidance platform*. With the example of the double selection and pairing of 6 entrepreneurship mentors and 9 entrepreneurs, we assume that each entrepreneur should choose and throw "offer" to the most satisfactory entrepreneurship mentor first, and every entrepreneurship mentor examines all the current pairing opportunities, and "temporarily accepts" the most satisfactory offer and rejects the offer of other entrepreneurs. All the entrepreneurs who have not matched the entrepreneurship mentors will match the "sub satisfactory" mentors in the next round, and the stable group is realized after repeated pairing over and over again.

In the practical application, under the condition mentioned above, the *A platform* can use the computer design system to number the entrepreneurship mentors and entrepreneurs. The system will assign each mentor for a period of time to understand each number's information (anonymously) and to sort the numbers according to their preference, and each entrepreneur corresponding understands the information of each number (anonymously) and sorts them according to the preference. The system will assign each mentor for a period of time to understand each number's information (anonymously) and to sort the numbers according to their preference, and each entrepreneur corresponding understands the information of each number (anonymously) and sorts them according to the preference. Through the programming of the computer system, the Gale-Shapley algorithm can be applied automatically to match the entrepreneurs according to their choice. The matching results can be translated from the

numbers into the names and displayed by the system. In this way, entrepreneurs and entrepreneurship mentors can get their own matching results from the computer to achieve the best matching of the two-way choice between them under the condition of the entrepreneur's first selection.

The conclusions of this paper can effectively solve the matching problem of entrepreneurship mentors and entrepreneurs in reality. It realizes a faster, more practical and more stable matching method, thus improving the efficiency and quality of the resource optimization. In the future research, intelligent optimization algorithm can be designed, and the corresponding matching system can be developed to achieve the more efficient matching.

Acknowledgement

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Research on Effect of the Power Distance on Employee Innovative Behavior: The Moderating Role of Leader-member Exchange

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Abstract: As the competition of organization is increasing intensely, the enterprise's development requires employees to drive innovation spirit and innovation behavior. How to improve the staff's innovation behavior have become the common topics of scholars and managers? This research investigates the effects of power distance on employee innovative behavior, and introduces leader-member exchange to verify its regulatory effect. The study uses questionnaires and statistical analysis to carry on the investigation, involving about 189 employees and their immediate supervisors, and the conclusions are as follows: supervisors' power distance negatively predicts employees' generation of innovative idea; supervisors' power distance positively predicts employees' implementation of innovation ideas; and leader-member exchange moderates the relationship between power distance and employee innovative behavior. This study discusses the practical significance of leader-member exchange in power distance and employee innovative behavior.

Key words: Power distance; Employeeinnovative behavior; Leader-member exchange; Innovative ideas

1 Introduction

With the arrival of the knowledge economy and the increasingly fierce market competition, innovation has become the internal demand and external driving force for the development of the enterprise[1]. The employee innovation behavior has been the cornerstone of organizational innovation and has received extensive attention from domestic and foreign scholars. However, in the past, the research on innovation behavior did not systematically examine the impact of the power distance within the organization on employee innovation behavior. Power distance as a cultural value can affect the attitude of the leader or employee. According to the attitude-behavior consistency theory, the attitude must determine corresponding behavior. Researchers have pointed out in the latest research that power distance, as a cultural value orientation, can have a significant impact on employees' work attitude and behavior. This research attempts to promote the research on effect of the power distance on employee innovative behavior in China. In addition, innovative behavior requires organizational personnel to cooperate with superiors and superiors. This article is based on China's situation and introduces a leader-member exchange (LMX) to explore whether this variable can affect the relationship between power distance and employee innovation. This research explores the power distance from the individual level and defines the power distance as the individual's acceptance of the unequal distribution of power and status in the organization.

2 Theoretical Basis and Hypothesis

2.1 Power distance and employee innovative behavior

The concept of power distance was first proposed by the Dutch management psychologist Hofstede[2]. Later, the scholars found that even in the same culture, there are differences in the power distance of organizations or individuals. Therefore, the study of power distance has gradually expanded to the organizational and individual level. Clugston et al. define the individual-level power distance as the individual's acceptance of power inequality organizations and institutions. Supervisors high on power distance will continue to elicit employees to engage in submissive roles, frustrating employees' efforts to exert their own power(Kiesler, 1983; Shechtman & Horowitz, 2006). Supervisors low on power distance are more likely to consult with their employees before making decisions (Cole, Carter, & Zhang, 2013), share power, and allow employees to make autonomous choices (Earley & Erez, 1997).

Personal innovation behavior refers to the novel ideas that can be applied to the practice during the work process, as well as a new way to solve the problem (Amabile, 1987). In recent years, scholars have more defined employees' innovative behavior from the perspective of the process. The simplest is a two-stage model. Lu Xiaojun et al. found that individual innovation behavior is divided into creative generation behavior and creative execution behavior[3]; more detailed divisions such as Kanter think that innovation behavior is divided into a three-phase process. This research refers to Robert and

Christopher's point of view, defines the employee innovative behavior as the employee's plan for generating innovative ideas or solving problems in the work process, and strives to put it into practice. It consists of two stages: the creation of innovative ideas and the implementation of innovative ideas. The creation of an innovative ideas means that individual seeks and discovers opportunities for innovation in order to enhance the organization's products, technologies, work processes, and services. The implementation of innovation ideas mean that individuals mobilize resources, persuade and influence others to support innovation, and regularize innovation into the daily operation of enterprises through their efforts[4].

The relationship between power distance and employee's innovative behavior: Researchers have put forward the negative correlation between power distance and the generation of creative idea[5], because individuals with high power distances cannot treat others equally, which inhibits members in creative idea creative level[6]. However, due to the need to focus and control resources during the implementation phase of the creation idea, and then ensure that the viewpoints are quickly put into practice and converted into new products, only a high power distance can promote the completion of this process. Given these arguments, this research proposes that:

Hypothesis 1: There is negative relationship between power distance of supervisor and creation of employees' innovative ideas.

Hypothesis2: There is positive relationship between power distance of supervisor and implementation of employees' innovative ideas

2.2 Leader-member exchange

In the 1970s, Graen et al. pioneered the leadership-member exchange (LMX) based on exchange relations (Dansereau et al.,1976). Leadership-member exchange theory refers to a leader's corresponding to a subordinate, and a unique relationship formed between leader and subordinate in work practice and represents the quality of their social exchange relationship. LMX makes it easier for employees with good relationship with supervisors to obtain superior support and resources, so they will work harder and take on more tasks to not live up to the trust of their leaders, which weaken the negative effect between power distance of supervisors and creation of employees' innovative ideas. Besides, it strengthens the positive effect between power distance of supervisor and the implementation of employees' innovative ideas. Based on upon, this research proposes that:

Hypothesis 3: leader-member exchange moderates the relationship between power distance of supervisor and employee innovative behavior.

Hypothesis 3a: leader-member exchange moderates the relationship between power distance of supervisor and creation of employees' innovative ideas.

Hypothesis 3b: leader-member exchange moderates the relationship between power distance of supervisor and implementation of employees' innovative ideas.
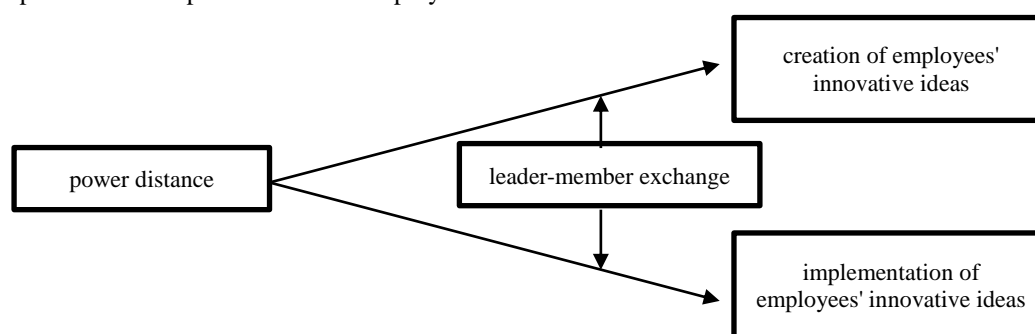
Figure 1   The Research Model

3 Method

This research uses the literature method to review the theory and practice of power distance, employee innovation behavior, and the up and down leadership-member exchange relationship. It gradually builds the conceptual model and research hypotheses, designs questionnaires, and conducts empirical research.

Supervisors indicated their power distance using the individual-level power distance scale developed by Dorfman and Howell[7]; Employees indicated their innovation behavior using the Kleysen and Street two-stage model developed by Huang Zhikai et al., which is more suitable for China's

situation. A total of 12 item scales were revised into five grades that were self-assessed by employees; For LMX using LMX-7 scale (1=Strongly Disagree to 5=Strongly Agree) developed by Graen and Uhl-Bien (1995) and contained seven items.The scale has been validated with good reliability in studies in the Chinese context. Additionally,this research controlled Investigator's age, education, andgender.

4 Results

Theresearch conducted an online questionnaire to collect data from the company's superiors and employees. 207 questionnaires were collected, and 189 valid questionnaires were collected. Prior to testing our hypotheses, we conducted a conducted exploratory factor analysis，confirming that our scales were distinct, and all items provided statistically significant loadings on their intended latent constructs.

Table 1 is the correlation coefficient of each variable. Results of the regression analyses are reported in Table 2. In model 2, independent variables (β=-.446, P<0.01), LMX was added to model 3, and independent variables (β=-.471, P<0.01). After adding interactive items to Model 4, the main effect independent variables (β=-.422, P<0.01). As a result, Hypothesis 1 was supported.

Nest, In model 6, independent variables PD（β=.903,P<0.01, LMX was added to model 7, and independent variables（β=.885,P<0.01）. After adding interactive items to Model 8, the main effect independent variables（β=.897,P<0.01）As a result, Hypothesis 2 was supported..

Further, After adding the PD×LMX interaction term in model 4, the explanatory power was improved (ΔR^2=0.112, ΔF=30.985, P<0.01) and the coefficient in front of the interaction term was positive and significant. Thus, as a result, Hypothesis 3a was supported. After adding the PD×LMX interaction term in model 8, the explanatory power was improved (ΔR^2=0.004，ΔF=4.250，P<0.05),and the coefficient in front of the interaction term was positive and significant. Thus, as a result, Hypothesis 3b was supported.

Finally, as shown in Figure 2, the level of LMX will moderating the relationship between power distance and employee innovation behavior.

Table 1　Variable Descriptive Statistics and Correlations

	M	SD	PD	Creation	Implementation	LMX	EIB
PD	2.84	1.116	1				
creation	3.18	0.592	-.448**	1			
implementation	3.05	1.084	.891**	-.263**	1		
LMX	3.08	0.593	.081	.237**	.258**	1	
EIB	3.14	0.493	.497**	.463**	.743**	.402**	1

N=189.PD=power distance. LMX=leader-member exchange. EIB= employee innovative behavior
** p＜.01 (two-tailed).

Table 2　Regression Analysis of Variables

	Creation					Implementation		
	M_1	M_2	M_3	M_4	M_5	M_6	M_7	M_8
Gender	.050	.033	.036	.079	-.034	.011	.014	.022
Age	-.061	-.063	-.124	-.148	.074	.067	.028	.023
education	.136	.094	.100	.108	-.068	.020	.024	.025
PD		-.446**	-.471**	-.422**		.903**	.885**	.897**
LMX			.289**	-.194**			.184**	.165**
PD×LMX				.354**				.069*
R^2	.037	.222	.301	.412	.050	.801	.833	.838
Adj.R^2	.008	.194	.271	.384	.021	.794	.826	.830
ΔR^2	.037	.186	.078	.112	.050	.751	.032	.004
F Change	1.259	39.437**	18.380**	30.985**	1.738	620.784**	31.175**	4.250*

N=189.PD=power distance. LMX=leader-member exchange. EIB= employee innovative behavior
*p＜.05.**p＜.01
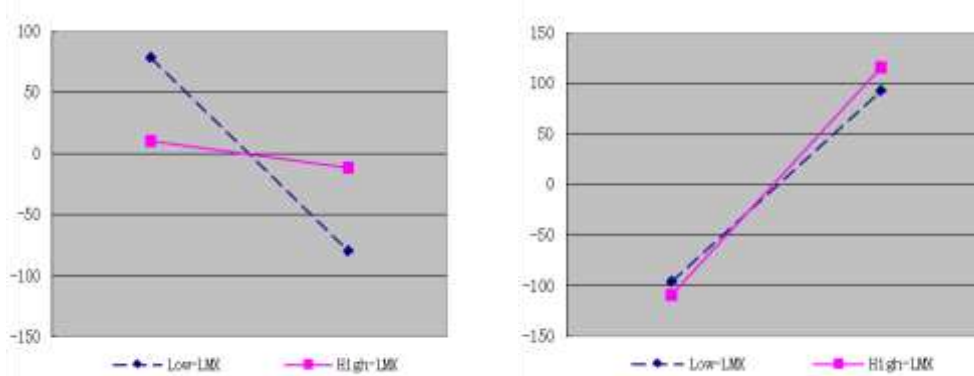
Figure 2   LMX Moderation

5 Conclusion

First, the power distance negatively influences creation of employees' innovative ideas and positively predicting the implementation of the employee's ideas of innovation. Second, the leadership-member exchange can strengthen the relationship between power distance and creation of employees' innovative ideas, and ease the relationship between power distance and implementation of employees' innovative ideas.The findingshighlight the important effect of power distance and leadership-member exchange between supervisors and employees, andsuggest that enterprises should pay more attention to relationship culture and strengthen vertical communication in organizations. This study rarely involves higher-level superiors, and relevant research hypotheses can be tested on a larger scale in the future.

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A Membership Program and a Complain Website: How Sport Clubs Manage Experiences of their Members

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Abstract: To win and keep fans, the football clubs maintain programs of advantages, also called Loyalty Programs. These programs have gained importance for the finances of the institutions existing in Brazil, in fact 73 associations that have already created their programs, raising 1,301,339 consumers. However, these programs do not always meet the expectations of the fans. The purpose of this study was to analyze the level of satisfaction and attendance of their complaints by the institutions involved in Loyalty Programs. Six programs were analyzed from the perspective of service marketing and customer satisfaction-supporter management. The study considered the proposals of the specifics programs and collected data on complaints and solutions given on the "ReclameAqui" (Complain *Here*) website. One of the results is that among the clubs studied, Atlético-MG, Corinthians and Palmeiras showed the best results in their efforts to solve problems.
Key words: Football; Loyalty programs; Service marketing; Reclame Aqui(Complain Here)

1 Introduction

Providing services is to have, as the ultimate goal, customer satisfaction through the interaction of several layers of business relationship. Satisfaction with the product, if the service in focus is linked to some material good, satisfaction with the way the service is rendered, regardless of whether it involves a product or not, satisfaction with the price and advantages identified in the transaction. "The American Marketing Association defines services as being activities, advantages or even satisfactions that are offered for sale or provided in connection with the sale of goods (Las Casas, 2015). And to provide these services with the target audience, the passionate about football (soccer, in USA) is even more complex, as it aims to meet the demands of products or amenities

To enhance their business relationship with their potential customers, clubs have created their benefit programs, which have been acquired and evaluated by fans thereafter. Online forums are already consolidated as democratic and effective tools for consumers to express their impressions about experiences in post-consumerism. The theme of this article is the management of customer satisfaction and we investigated the Advantages Programs of 6 major clubs of the Brazilian Championship Series - namely: Flamengo-RJ, Corinthians-SP, Palmeiras-SP, Atlético-MG, Cruzeiro-MG and Botafogo-RJ - and the degree of satisfaction registered by the consumer via the site "ReclameAqui", a portal that receives 15 million accesses per month.

The objective of this study is to verify if there is a correlation between management of unsuccessful experiences of members of the benefit programs of the clubs under analysis and the number of members in each of them, as well as the desire of the consumer to continue doing business with the clubs after experience. As unsatisfied supporters can cancel their participation, it is assumed that those who remain in the program are having their expectations met.

Initially, we will describe the concepts about services marketing, football and the financial volume generated by sports in Brazil. Then, we will collect the post-consumer complaint data from 6 advantages programs of Brazilian clubs, data obtained on the "ReclameAqui" website. Finally, we will try to analyze which clubs are the best that relate to their members, which ones relate worse and if the good or bad business relationship impacts on the desire of its members to continue in the Program.

The contribution of this article is to reveal which clubs are really concerned about the satisfaction of their fans and propose alternatives to improve this relationship. Although some studies have already analyzed the site ReclameAqui, there is no one specifically directed to the satisfaction of the fans that belong to the Programs Sócio-Torcedor (Fan Member).

2 Theoretical Framework
2.1 The football business in Brazil

Despite an elitist beginning of football in Brazil, restricted to the highest castes of society in the early 20th century, football became extremely popular among Brazilians, becoming the most practiced sport by

Brazilian men (IBGE, 2017) and motive of enormous passions. A five-time FIFA World Cup Champion, the Brazilian national team is recognized as one of the world powers. Sports marketing sponsored around R $ 665 million in 2013 (Souza, 2014), "confirming football as the mode that receives the most money in the country, concentrating 68% of the funds invested by the sponsors in the year" (p. 10).

2.2 The most popular teams in Brazil

According to survey conducted by the IBOPE Research Institute, it is possible to measure the number of Brazilian affiliations to their clubs. In the ranking of the fans, Flamengo, Corinthians, Sao Paulo, Palmeiras, Vasco, Atlético-MG, Cruzeiro, Grêmio, Internacional and Santos appear as the ten associations with the biggest fans of Brazil (2017), as shown in table 1. This institute organizes the digital ranking of the clubs, taking into consideration the relevance of the digital accounts of the associations and how many followers in the social media online universe, as we see in figure 1. Note some inversions of placement in the digital ranking in relation to the ranking of the number of fans, including the placement of Chapecoense among the ten most relevant clubs digitally even that the club from Santa Catarina does not appear among the 15 biggest fans group. The commotion generated by the tragedy that occurred in December 2016, when the plane that took Chapecó-SC's team to Colombia for the South American Cup final crashed, produced a genuine empathy for the Brazilians to the *Arena Condá* team.

Table 1   The 15 clubs with the Largest Number of Fans in Brazil

1	Flamengo	32.5 million
2	Corinthians	13.6 million
3	São Paulo	27.3 million
4	Palmeiras	10.6 million
5	Vasco	7.2 million
6	Atlético-MG	7 million
7	Cruzeiro	6.2 million
8	Grêmio	6 million
9	Internacional	5.6 million
10	Santos	4.8 million
11	Fluminense	3.6 million
12	Bahia	3.4 million
13	Botafogo	3.4 million
14	Vitória	2.6 million
15	Sport	2.4 million

Source: IBOPE 1(2017)

Figure 1   Digital Ranking of Fans
Source: IBOPE 2 (2017)

2.3 'Socio' membership program

The great Brazilian football clubs have created their relationship programs with their fans, offering them solutions and facilities in the purchase and guarantee of ticket purchases, as well as financial advantages and amenities in the consumption of products and services of commercial partners of the clubs. The website "Movement for a Better Football" (*Movimentopor um FutebolMelhor*, in Portuguese) brings together the member-fan programs of 73 Brazilian clubs, adding, according to the portal itself, 1,301,339 registered members. Each club administers the program itself. The ranking updated in June 2018 is presented in table 2.

Table 2 The top 15 Clubs in Membership Numbers		
1	Corinthians	142.575
2	Palmeiras	124.845
3	São Paulo	123.555
4	Internacional	120.616
5	AtléticoMineiro	112.756
6	Cruzeiro	109.679
7	Sport Recife	78.774
8	Flamengo	43.277
9	Fluminense	43.250
10	Botafogo	37.095
11	Coritiba	36.106
12	Vasco Da Gama	28.516
13	Santos	25.112
14	Remo	24.748
15	Ponte Preta	21.664

As maintained by Martins and Las Casas (2017), the club loyalty program promotes the consumption incentive for the rewards offered to affiliated supporters and provides insight into the fan profile of their fan and allows for enhanced financial planning with other sources of revenues from the club's business relationships between partners and partners. "It is reasonable to consider that the loyal supporter follows the club more through the media, attends more regularly at the stadium, is more exposed to sponsor brand communications and club product offerings, and provides data needed for use in other clubs marketing actions "(pp. 48-49)

Source: Por Um Futebol Melhor website

2.4 Service marketing and ReclameAqui website

Basic rule of any Service Marketing manual is the conviction that it is up to the company to meet the needs of customers through their products or services. And monitoring the degree of customer satisfaction or dissatisfaction, learning why your customers abandon their services or consuming their products can enable new strategies and increase delivery. Jato, Lucas, Farina, Tentrin and Garcia (2008) show that consumers, once dissatisfied, can act in different ways.

"(1) Complain with the store or the manufacturer; (2) stop buying the brand or store; (3) promote negative word of mouth communication; (4) complain to private or governmental bodies; and (5) initiate legal proceedings "(p.65)

At the time of the aforementioned study, the Internet revolution was taking its first steps and the word of mouth complaint, listed as item number 3, had not been typified in the form of online complaints. The option of complaining in the store or with the manufacturer was a tendency to appeal at first, before leaving to buy the product. Discussion forums, complaints and compliments are in the online environment, and are available democratically and accessible from a few clicks. And if there is the consumer registering their experiences with the companies, there should also be service providers and suppliers, set to the online universe or not. Customer relationship capabilities in this new arena can be instrumental to the success of these operators in this new phase of Relationship Marketing. The portals designated for the interactions between consumer complaints and the company's response opportunity gave a strong voice to the people.

The ReclameAqui site does not qualify as a complaint site. It is presented as a search site. And he believes that 92% of Internet users who access www.reclameaqui.com.br do so to evaluate the company before making the purchase. The data of access to the site are registered in Table 2 and give the dimension of the importance of such spaces have for the current relations between consumers and companies.

Table 2   Data Collected From the Site ReclameAqui

42,000,000	Page views/ monthly
3'11"	Visiting time on site
56%	Male audience
44%	Female audience
15,000,000	registered consumers
120,000	Companies registered

Source: site ReclameAqui

The site presents its way of evaluating and punctuating the companies through a criterion with factor as defined in Table 3:

Table 3   Distribution of Factor Per Site Elements

Response Rate	Factor 2
Average Ratings (Consumer Rating)	Factor 3
Solution Index	Factor 3
New Business Index (Would you do business again?)	Factor 2

Source: Site of Reclame Aqui

Thus, up to 10 points per company are distributed, being rated as "optimal" the company that reaches between 8 and 10, 'good (between 7 and 7.9),' regular '(between 6 and 6.9),' bad '(between 5 and 5.9), and' not recommended 'for all those who score below 5. "This formula is only applied if the company goes through 2 previous evaluations: it has a response rate higher than 50%. If you have a response rate of less than 50%, it is automatically categorized as "not recommended", says the site.

3 Selection and Presentation of Observed Programs

Six professional men's football clubs from 3 different states were selected. All of them with huge crowd. Flamengo and Corinthians are named by IBOPE 1 (2017) as the most popular clubs in Brazil. We saw, in figure 1, the digital ranking of Brazilian clubs prepared by IBOPE 2 (2018). "The survey is published monthly by IBOPE Repucom and aims to follow the development of the digital bases of 40 clubs with the largest number of followers in the country." Flamengo, Corinthians, Palmeiras, Cruzeiro, Atlético and Botafogoappear, in this order, among the 13 first placed in the ranking. In their respective Fan Programs, the six teams have different IBOPE 1 (2017) and IBOPE 2 (2018) rankings. In Minas Gerais, Atletico has more affiliates than Cruzeiro. Both have more successful Socio-supporter programs than Flamengo, the most popular club in Brazil. Flamengo maintains the lead of its regional rival, Botafogo. Among the clubs analyzed here, Botafogo is the only one that maintains the same performance in the three rankings: the worst. The data of the clubs' relationship programs with their supporters will be observed below in the order of their ranking in IBOPE 1 (2017).

3.1 NaçãoRubroNegra – Flamengo

Review Period: 6/23/2015 to 6/22/2018	Complaints: 211
Complaints answered: 0%	Average response time (in hours): missing
Would do business again: 23.8%	Solution index: 28.6%
Rating: 1.62	
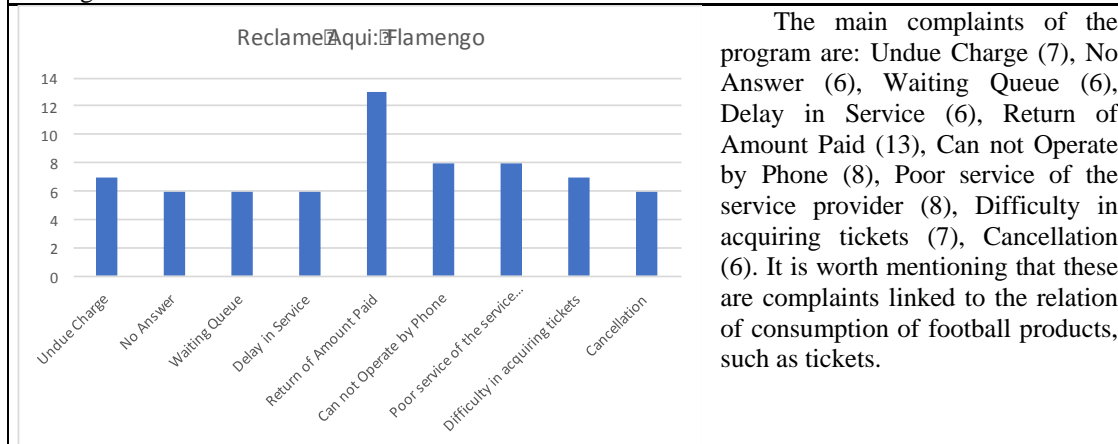
The main complaints of the program are: Undue Charge (7), No Answer (6), Waiting Queue (6), Delay in Service (6), Return of Amount Paid (13), Can not Operate by Phone (8), Poor service of the service provider (8), Difficulty in acquiring tickets (7), Cancellation (6). It is worth mentioning that these are complaints linked to the relation of consumption of football products, such as tickets.

Figure 2   Complaints of the NaçãoRubroNegra

3.2 FielTorcedor – corinthians

Review Period: 6/23/2015 to 6/22/2018	Complaints: 862
Complaints answered: 84%	Average response time (in hours): 1039
Would do business again: 68.3%	Solution index: 72.4%
Rating: 5.87	
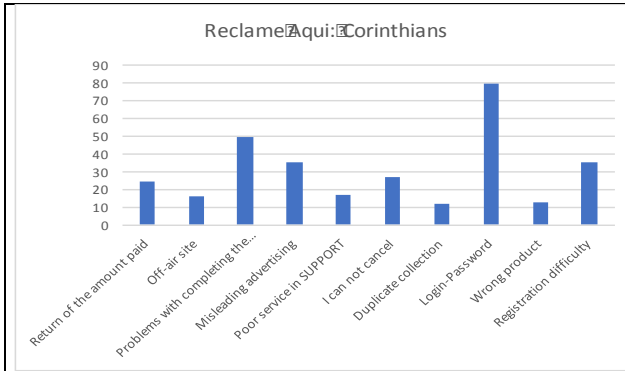
Figure 3　Complaints of the FielTorcedor

The main complaints of the program are: Return of the amount paid (24), Off-air site (16), Problems with completing the purchase (49), Misleading advertising (35), Poor service in SUPPORT (17), I cannot cancel (27), Duplicate collection (12), Login-Password (79), Wrong product (13), Registration difficulty (35). As the main reasons for complaint, this program has technological deficiencies, such as site, registration and login.

3.3 Avanti palmeiras – palmeiras

Review Period: 6/23/2015 to 6/22/2018	Complaints: 1,169
Complaints answered: 100%	Average response time (in hours): 249
Would do business again: 62.6%	Solution index: 71%
Rating: 4.88	
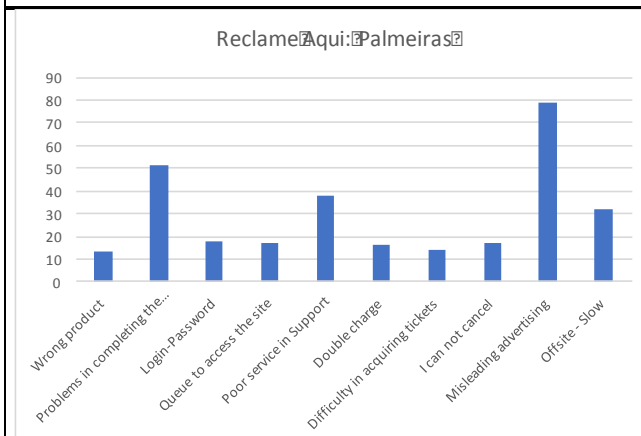
Figure 4　Complaints of the Avanti Palmeiras

The main complaints of the program were: Wrong product (13), Problems in completing the purchase (51), Login-Password (18), Queue to access the site (17), Poor service in SUPPORT (38), Double charge (16), Difficulty in acquiring tickets (14), I can not cancel (17), Misleading advertising (79), Offsite - Slow (32). Complaints regarding technology tools (websites, duplicate charges), and dissatisfaction with the consumption of football products, such as tickets, appear.

3.4 Galo na veia – atlético-MG

Review Period: 6/23/2015 to 6/22/2018	Complaints: 405
Complaints answered: 98%	Average response time (in hours): 1,106
Would do business again: 75%	Solution index: 83.5%
Rating: 6.97	
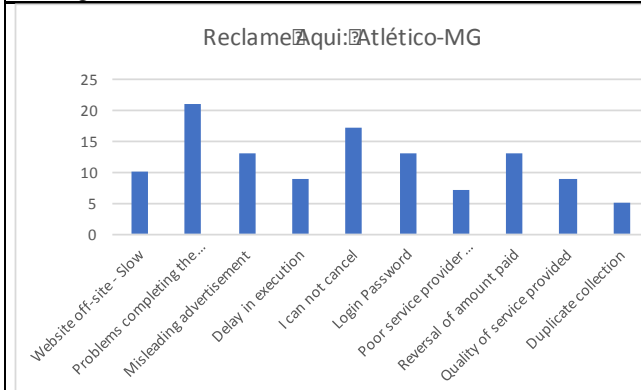
Figure 5　Complaints of the Galo naVeia

The main complaints of the program were: Off-air site - Slow (10), Problems in completing the purchase (21), Misleading advertising (13), Delay in execution (9), I can not cancel (17), Login Password (13), Poor service of the service provider (7), Reimbursement of the amount paid (13), Quality of service rendered (9), Duplicate collection (5). Higher prevalence of problems in interaction with technology and perception of the value of service delivery.

3.5 Sócio do futebol – cruzeiro-MG

Review Period: 6/23/2015 to 6/22/2018	Complaints: 104
Complaints answered: 1%	Average response time (in hours): 265
Would do business again: 29.4%	Solution index: 29.4%
Rating: 2.82	

The main complaints of the program were: Wrong product (2), Poor service provider service (5), Quality of service provided (6), Abusive value (5), Improper billing (3), Non-compliance with marked places (1), Reversal of amount paid (4), Low quality (3), Difficulty in acquiring tickets (3). It is worth registering that the search in the *ReclameAqui* was with the term "CruzeiroEsporteClube", because "Sócio do Futebol" does not generate any result

Figure 6   Complaints of the CruzeiroEsporteClube

3.6 SouBotafogo – botafogo-RJ

Review Period: 6/23/2015 to 6/22/2018	Complaints: 58
Complaints answered: 3.4%	Average response time (in hours): 90
Would do business again: 0%	Solution index: 0%
Rating: 0	

The main complaints of the program were: Delay in service (1), Quality of service provided (2), Misleading advertisement (2), Poor service provider service (2), Improper billing (1), Reversal of amount paid (5), Freight amount (1), Cancellation (3), Does not attend (1), Delay in execution (2). It is worth registering that the search in the Reclame Here was with the term "BotafogoFutebol e Regatas", because "SouBotafogo" does not produce any results.

Figure 7   Complaints of the Botafogo de Futebol e Regatas

Overall is possible observe that most problems identified by the supporters are connected with technological aspects and return of amount paid. Another recurrent claim is about service qualities. Even that those datas are important it is required to analyze the alternatives solutions taken by the clubs.

4 Data Presentation and Quantitative Analyzes

Table 4   Data collected for this article

CLUB	Number of Affiliates	Market Share	Rating *ReclameAqui*	% Complaints Answered	Solution Index	Response Hours	Would Do Business (%)
Atlético	112756	1.61%	6.97	98	83.5	1106	75
Botafogo	37095	1.09%	0	3.4	74.9	90	0
Corinthians	142575	1.05%	5.87	84	72.4	1039	68.3
Cruzeiro	109679	1.77%	2.82	1	29.4	265	29.4
Flamengo	43277	0.13%	1.62	0	28.6	*	25
Palmeiras	124845	1.18%	4.88	100	71	249	62.6

Source: Site "Por um Futebol Melhor" and "Reclame Aqui", IBOPE 1 (2017) and IBOPE 2 (2018)

The Minitab 2018 program was used for data analysis and treatment. Table 4, shows the data still "in natura", where we can observe the absence of the "Hours for the response" data of Flamengo-RJ. This "Missing Value" will be treated as recommended by Las Casas and Guevara (2010), initially placing the average of the indicator in the programs and then promoting statistical regression. Then, data before doing the regression data were normalized and positivized (from "Hours for response" to "Speed in response"), as could be seen in Table 5.

Table 5 Descriptive Statistics: Number of Affiliates, Market Share, Rating ReclameAqui, % Complaints Answered, Solution Index, Response Speed, Would Do Business Again (%)

Variável	N	N*	Média	EP Média	DesvPad	Mínimo	Q1	Mediana	Q3
Number of Affiliates	6	0	54,9	17,1	41,8	0,0	4,4	70,3	87,4
Market Share	6	0	61,4	14,3	35,0	0,0	42,0	61,2	92,7
Rating ReclameAqui	6	0	53,0	15,6	38,3	0,0	17,4	55,2	88,2
Complaints Answered	6	0	47,7	20,8	51,0	0,0	0,8	43,7	98,5
Solution Index	6	0	57,1	18,1	44,4	0,0	1,1	78,5	88,3
Response Speed	6	0	59,0	17,9	43,8	0,0	4,9	81,6	88,3
Would Do Business Again (%)	6	0	57,8	16,2	39,6	0,0	25,0	61,3	93,3

Variável	Máximo
Number of Affiliates	100,0
Market Share	100,0
Rating ReclameAqui	100,0
Complaints Answered	100,0
Solution Index	100,0
Response Speed	100,0
Would Do Business Again (%)	100,0

4.1 Analysis of variable groupings

Figure 8 allows us to see at what level of similarity the clusters are formed, and the composition of the clusters of the final partition. The dendrogram indicates the variables degree of similarity. Group 1 showing highest degree of similarity.

Table 6 Analysis of Variable Groupings: Number of Affiliates, Market Share, Rating ReclameAqui, % Complaints Answered, Solution Index, Response Speed, Would Do Business Again (%)

Step	Number of Groupings	Level of similarity	Level of distance	Grouped	New grouped	Number of obs. at the new grouped		Final Partition	Variables
1	6	99,4010	0,01198	3	7	3	2	Grouping 1	Number of Affiliates, Rating ReclameAqui, Complaints Answered, Would Do Business Again
2	5	94,7799	0,10440	3	4	3	3		
3	4	87,9436	0,24113	1	3	1	4		
4	3	65,7290	0,68542	2	5	2	2	Grouping 2	Market Share, Solution Index
5	2	64,7639	0,70472	1	2	1	6		
6	1	7,6917	1,84617	1	6	1	7	Groupings 3	Response Speed
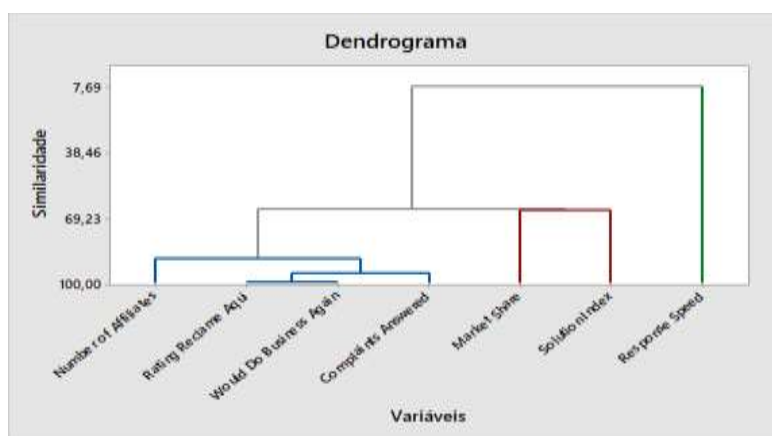
Figure 8 Dendrograma of the Groups of Indicators

It is noticeable in all programs that attending customer discontent is not a priority. Therefore, the indicators observed here have a very low correlation with the waiting time of the customer dissatisfied in obtaining their return. This situation will be considered in the conclusions of this article. In the same way, the percentage of fans of the Membership Program of its club (Market Share) also presents low correlation

to the other items, as well as "solution index". Table 7 shows statistically the strong correlations between the indicators analyzed.

To analyze the correlation between the selected indicators, the "Pearson Correlation" will be used.

Table 7   Correlation: Number of Affiliates, Market Share, Rating ReclameAqui, % Complaints Answered, Solution Index, Response Speed, Would Do Business Again (%)

	Number of Affiliates	Rating ReclameAqui	Complaints Answered
Rating ReclameAqui	0,860		
	0,028		
Complaints Answered	0,759	0,896	
	0,080	0,016	
Would Do Business Again	0,853	0,988	0,919
	0,031	0,000	0,010

The results are interpreted as follows:
● 0.9 for more or less indicates a very strong correlation.
● 0.7 to 0.9 positive or negative indicates a strong correlation.
● 0.5 to 0.7 positive or negative indicates a moderate correlation.
● 0.3 to 0.5 positive or negative indicates a weak correlation.
● 0 to 0.3 positive or negative indicates a negligible correlation

As could be seen correlation between " Complaints Answered " and "Number of Affiliates" is lowest a not very precise (p=0.080).

5 Analyzes, Conclusions and Limitations

As shown in Figure 9, Atlético, Corinthians and Palmeiras (in this order) present a better relationship in the correlation between the rating received on the site "ReclameAqui" " Complaints Answered ". And this observation leads us to look at Figure 10, which records the same strong correlation between " Complaints Answered " and "Would You Do Business Again" with your club. For Keller and Kotler (2006), the number of clients who experience a negative experience and who can do business again with the company, provided that their complaints are answered, is between 54 and 70%. "The percentage rises to astonishing 95% if customers feel that the complaint was answered quickly" (p. 153). When they published the book, they argued that clients talked to five people on average about the good treatment they received from the company that solved the problem. Today, experiences are shared for as many people as the customer has in their network of virtual relationships.
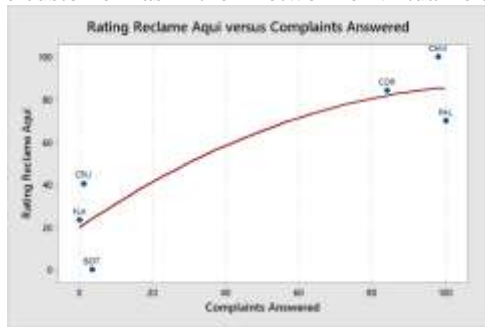
Figure 9 Rating ReclameAqui X Complaints Answered	Figure 10 Complaints Answered X Would You Do Business Again

It is important to point out that Cruzeiro, Flamengo and Botafogo cannot exonerate themselves from responsibilities or from ignorance of the best uses of Internet communication channels. The three clubs with the worst performance in terms of unsatisfied customer interaction are protagonists in social media. Their accounts have, adding Facebook, Twitter, Instagram and Youtube, millions of followers, as seen in figure 1. Who has the online prominence that these clubs have, not giving satisfactory return to their complaining consumers can be seen as a commercial negligence.
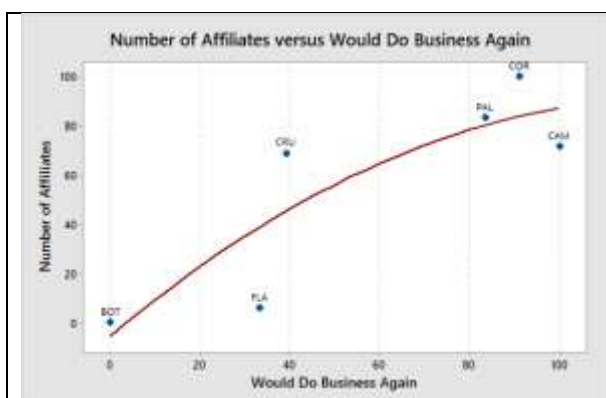
Figure 11   Number of Affiliates X Would You Do Business Again

Figure 11 correlates the number of affiliates of a program to the perception of the internet users who has had their complaint answered by the club in the site ReclameAqui. The relation cause X effect does not allow such direct association. But here is the note: the clubs that knew best how to deal with complaints from their members are the ones with the best performance in terms of membership. Neglect has its price.

The loyalty of the fans and the commercial experiences lived between them and their club seem to have different dimensions. The customer may complain about the post-consumer experience and wish to cancel the purchase. However, the supporter will hardly leave his heart club for a disappointment, even more if it comes from an unsuccessful purchase. Espartel, Müller Neto and Pompiani (2009) analyzed through qualitative (exploratory) and quantitative research, and found that, "although the fan is satisfied with the site, the stores and the sponsor, are the factors 'from within of the field' (players and team performance) that trigger this sequence of relationships. In other words, the management and the structure developed by the clubs are important, but the victories and the titles won are that bring the supporters closer to the club (...). The constitution or representation of loyalty in this way is confirmed, for example, by the motivations to be a partner: the formal approach (being a partner) between the supporter and the club is mainly because of love or passion for the club and to help it grow" (p. 76).

This study shows that neglecting of returning of unhappy supporters is already starting to cause a breach of confidence in the club's advantages program. Although it is not possible to measure the correlation between the little case in the return to the dissatisfaction and bad experiences of its fans and the growth or fall of the number of affiliates - and this is one of the limitations of this article and suggestion for other researches -, it is possible to observe that the love of the shirt does not prevent that consumers feel betrayed in their confidence in the consumption, they complain publicly and they wish to cancel their commercial links with the club, as could be seen on the desires of cancellation, or else with the program of the club in the site ReclameAqui.

If it is not possible to affirm that the low performance of clubs like Flamengo and Botafogo as to the number of affiliates in their advantage programs is due to the negligence found in this study, it is possible to affirm that the clubs with the best performance among those observed here are the ones that have the most effective channels of communication with clients whose experience has been unsuccessful, and this is a managerial contribution of the study: expectations of the customers of the partner-fan programs can be frustrated in the numerous interaction alternatives, be it in the purchase of tickets, access to the site, in the delayed delivery of a product purchased or in the contact via SUPPORT to request some service. It is part of the service, as intangible, as perishable and heterogeneous. But the club that really cares about the return to the client will be able to get even closer to it, generating not only emotional fidelity (not the subject of our study) but, rather, commercial loyalty.

Being in the network, attentive to the demands and interacting with the consumer, is not only a trend, being intrinsically linked to the current social force. For Guedes and Silva (2016), "this environment leads organizations to review their communication policies and relationships with their stakeholders" (...). Living online is a reality that organizations cannot avoid "(page 63).

The fact that only one portal of post-consumer analysis is one of the limitations of the study and suggest to follow the study. Field surveys with consumers who are members of benefit programs could be produced at stadiums, at the time of purchased facilities, such as tickets to matches. And a field survey on the value perception of the club loyalty program could be done before and after the game may help to assess how much the match score interferes with the value given by the consumer to the program.

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Exploring the Use of Consumer Endorser Strategy in Social Media Product Promotion Advertisement and Its Impacts on Young Consumers Behavior in Tanzania

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Abstract: The paper focuses on examining the use of consumer endorser as a strategy for product promotion advertisement on social media and the extent to which it affects young urban consumer behaviors in Tanzania. Using AIDA model and Characteristics of the source model, the conceptual model was designed and empirically tested using self monitored questionnaire. The results of the study shows that awareness, interest and desire have positive significance effects on both expertise endorser and trustworthiness characteristics but shows no significance with intention to buy the product. Moreover, awareness, interest, desire and intention to buy shows positive significance with endorser attractiveness characteristics. The study recommended the use of consumer endorser strategy as an effective tool for advertisement among young customers between the age of 18-25 as part of Managerial implications related to the study findings. Furthermore, future research direction has been drawn on employing a wider sample to test the effectiveness of other consumer endorser characteristics such as consumer endorser-product congruency but also on considering non convenient sample such as adults and rural consumers.
Key words: Consumer endorser; Social media; Impacts; Advertisement; Behavior

1 Introduction

Globally, the emergence of internet has influenced the transformation of the way product promotion advertisements are conducted, from traditional to modern ways. In recent years, social media usage has rapidly increased especially among young consumers who are more tied to new technology. An increasing popularity of social media and online marketing channels have become potential strategic tools to influence consumers (Truog&Simmons, 2010). It is argued that there is a reasonable number increase in the use of consumer endorser in social media advertisement due to the emergence of social media (Nhung, N.P et al, 2011). Social media affects consumer behavior and attitudes. When a product campaign ad features consumers to advertise and promote the endorsed product, the targeted audience are impacted both their attitude and behavior toward that product or a brand.

From Tanzania environment, the ICT revolution has knocked the door on how promotion is done in a new technology way especially the enhanced use of internet and the introduction of social media in early 2000's. before 2000's Celebrities were used in traditional media as endorsers but the paradigm shifted with the introduction of social media where by those who are not celebrities have also been used as endorsers. In Tanzania there is a literature gap as most previous studies focus only on celebrity endorsement and neglecting to research on the role the of non celebrity endorsers. This research seeks to fill the literature gap based on Tanzania perspective.

Moreover, the use of celebrity endorser has been criticized to cause lack of trust to customers when the same celebrity used in many different advertisements (Yashin,1998) and thus past literature suggested the use of non-celebrity endorser, however the question arise on how the consumer endorser characteristics affects consumer behavior. From the author's knowledge, currently there is no existing research in Tanzania context that provides deep insight about the impacts of consumer endorser characteristics on consumer behavior. Therefore, this research seeks at answering the research question that how the use of consumer endorser strategy in product promotion in social media affects consumer behavior?

2 Literature Review

In recent years the concept of consumer endorsers has been widely used especially with the advancement and birth of social media such as YouTube, Facebook, WhatsApp and many more. Social media has been widely used by customers as an information center for customer to get to know the product and gather as enough information as possible before they make a purchase decision (Lempert 2006).

According Friedman & Friedman (1979) have mentioned three major categories of endorsement which are celebrity endorser, consumer endorsers and expertise endorsers. In many previous researches celebrity endorsers have received much attention among many researches especially in traditional media but consumer endorsers received less attention (Natarajaan&Chawla,1997; Gaided&Rached,2010; Nhung, N.P et al,2011). In a global context very few studies have extensively dealt with consumer endorsers on social media. However, from the researcher's knowledge, there is no research found to be done in Tanzania market that intensively and specifically dealt with consumer endorsers in social media, therefore creating a research gap which this paper seeks to fill.

Consumer endorser can be referred to as any normal person who is non celebrity and without any prior knowledge of the product endorsed with but has just acquired that knowledge through experience of using the particular product (Friedman &Friedman, 1979).

Other studies argued that endorsers play a great role in shaping consumer behavior by creating a positive attitude on advertisement (Ohanian, 1991; Erdogan,1999, Marinov, 2007), creating and promoting brand awareness (Freberga, Graham, Mc Gaughey&Freberg,2014). Some other comparative studies have compared consumer endorser with celebrity endorser and come up with the views that celebrity endorser has more influencing power to attract consumer's attention and therefore establishing a positive feeling to consumers than non celebrity endorsers (Forouhanded et al, 2011; Liu et all, 2017, Ranjabarian et al, 2010; Erdogen, 1999). On the other hand, Belch & Belch (2009), Shimp (2000), urge that consumer endorser have influential power in enhancing and creating high level of credibility and sincerity to the product promoted.

In criticizing the use of celebrity endorsers Yeshin (Yeshin, 1998) put forward a different view point that consumers lack trustworthiness and truthfulness to celebrity endorsers when they are endorsed in multiple products or brands at the same time. Since fame does not last forever, it is likely that the indorsed brand may not perform well and loose its market performance when celebrities endorsed loses their popularity. With reference to this views, there is ambiguity in using consumer endorser (non celebrity endorser) especially on social media and therefore call for the need of an extensive research to unveil this ambiguity. This study has centered the focus to unveil the ambiguity.

Other literatures argued that the use of consumer endorser may led to enhancement and creation of higher degree of both credibility and sincerity (Belch&Belch,2009; Shimp 2000). This view is ambiguous and may rise a question as to what are the consumer attitude towards consumer endorser and what impact may it have on the advertisement with specific consideration of social media context.

3 Conceptual Frame Work and Hypothesis Development
3.1 Conceptual frame work

This study uses the AIDA mode (Awareness, Interest, Desire, Action/Intention to buy) derived from DAGMAR (Defining Advertising Goals for Measured Results) by Colley (Colley, 1984) as cited by Farouhandeh et al (Farouhandeh et al, 2011). Also the Kelman (Kelman, 1961) model on Characteristics of the source. Two models used to find the impact of the characteristics of the endorsers on the AIDA. According to the source characteristics model, Kelman (Kelman, 1961) assert that characteristics of the endorser influence consumer attitudes and behavior (action). The endorser characteristic can be categorized into two namely credibility and the attractiveness of the endorser. Credibility is the extent that a consumer put and perceive the endorser as trusted source with knowledge and enough information about the endorsed product. Thus credibility can be sub grouped into two namely Trust and expertise. Moreover, the attractiveness is related to social value, the social appearance, the likeability and familiarity of the consumer endorser to consumer. Attractiveness do affects the effectiveness of the content transmitted in social media channel and in turn affects consumer behavior. On the other hand, to study the impact of featuring consumer endorser on social media, the AIDA model is used to measure the relationship and extent to which the characteristics of the endorser affects AIDA.
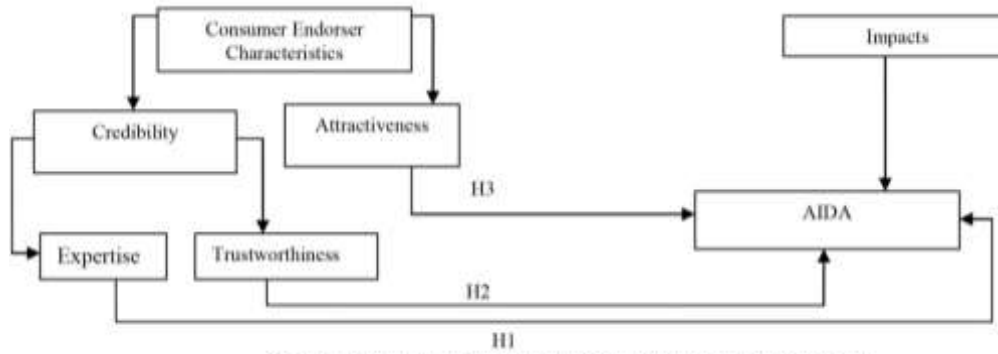
Note: A=Awareness, I=Interest, D=Desire, A=Action /Intention to Buy
Figure 1   Conceptual Model

3.2 Hypothesis

From the conceptual model, the following hypothesis derived.

According to Nhung, N.P et al (Nhung, N.P et al, 2011) argued that when an endorser shows expertise characteristics it affects consumer attitude and behavior therefore the author hypothesizes that H1: Consumer endorser's expertise has a positive impact on awareness, interest, desire and intention to buy the product.

When consumers think that the endorser demonstrate a trustworthiness characteristic, this may have an impacts on all or some level of AIDA. Nhung, N.P et al, (Nhung, N.P et al, 2011) argued that trust may have impacts on effectiveness of the advertisement and consumer behavior. Therefore, the author hypothesizes that H2. Consumer endorser's trustworthiness has a positive impact on awareness, interest, desire and intention to buy the product.

The personality and attractiveness of the endorser are viewed by some previous researches to have an impact on consumer attitude and behavior (Atkin & Block, 1993 as cited by Nhung, N.P et al, (Nhung, N.P et al, 2011). The advertisement with an attractive endorser is hypothesized to be more effective than with a normal personality endorser, therefore, H3. Consumer endorser's attractiveness has a positive impact on awareness, interest, desire and intention to buy the product

4 Methodology

4.1 Data collection

This paper employs primary and secondary data. Secondary data were collected from previous studies from different journals, books, and other related literature. Primary data were collected from self monitored questionnaire. Questionnaire were distributed through online channels by sharing links to particular respondents. The research questionnaire was derived from Nhung, N.P et al, (Nhung, N.P et al, 2011) and adjusted to meet the objective of this study.

4.2 Population and sample selection

The major population of this research involves young consumers from Tanzania mainland who are social media users. A random sample of 131 respondents from Dar es salaam city which is a major business city was taken. The sample was taken from University students from different universities in Dar es salaam. The reason to select university students in Dar es salaam is because of age factor as most who are students are young generation born within the science and technology era and so they are most users of social media through various device such as mobile phones and computers. Moreover, they are urban dwellers and hence experience the technology use more than rural dwellers. Therefore, the researcher found them to be the convenient sample of the research

4.3 Reliability test

Reliability refers the internal consistence (Helms, 2006) and measured by Cronbach's Alpha test. Cronbach's Alpha coefficient ranges from 0-1 and the more the coefficient is closer to 1.0 the higher the internal coefficient. (Gliem & Gliem, 2003). According to Ndyali (Ndyali, 2014) affirms that Cronbach's Alpha must be greater than 0.60.   Cronbach's Alpha of this study is 0.683 This means that reliability results of this research are acceptable

Table 1   Reliability Statistics

Cronbach's Alpha	N of Items
.683	7

4.4 Data analysis techniques

Study data were analyzed using IBM SPSS statistics software Version 22. Different data analysis techniques were used such as Chronbach's Alpha for reliability Test. Moreover, regression analysis was also done. Lastly, Descriptive data analysis was conducted to compute frequency and percentage.

5 Findings and Discussion

5.1 Sample composition

Table 2   Demographic Results of Respondents

Characteristics	Frequency (f)	Percentage (%)
Age:		
A) 18-20	53	40.5
B) 21-25	73	55.7
C) 26- 30	3	2.3
D) 31-35	2	1.5
Total	131	100.0
Gender:		
A) Male	59	45.0
B) Female	72	55.0
Total	131	100.0
Level of education A) Undergraduate	54	41.2
B) postgraduate	2	1.5
C). Non-degree	75	57.3
Total	131	100.0
Marital status:		
A) Single	107	81.7
B) Married	24	18.3
Total	131	100.0

5.2 Regression analysis

This paper employs Multiple linear regression. Multiple regression used to examine the impacts of several predictors on a single outcome. This study, adopted multiple regression to analyze the effects of each independent variable on dependent variable. Each consumer endorser characteristics (here referred to as ETA stands for Expertise, Trustworthiness, Attractiveness) is considered as *independent variable*, while the impact/effectiveness (here referred to as AIDA stands for Awareness, Interest, Desire and Intention to buy/Action) considered as *dependent variable*.

5.2.1 The Effects of Consumer Endorser's Expertise (E) on Awareness, Interest, Desire and Intention to buy/Action (AIDA)

The model summary clarifies the correlation between independent variables (ETA) and dependent variable (AIDA), the value of R ranges from -1 to 1 and the sign shows the direction either positive or negative relationship. From table 3, the value of R shows a positive value which means there is a positive relationship between consumer endorser expertise and all AIDA factors which support H1(H1= Consumer endorser's expertise has a positive impact on awareness, interest, desire and intention to buy the product). However, desire shows higher effects that can predict 45.2% of variance in consumer endorser's expertise than the rest of the dependent variables. Moreover, R^2 elaborates the change in dependent variables (AIDA) as a result of changes in independent variable (ETA) as shown in table 3. The R^2 value for Desire is 0.198 which is greater than others. This means that Desire contribute more by 19.8% changes while other variables contribute the remaining percentage. Furthermore, The ANOVAs test asses weather the model is statistically significant better at predicting the outcome variable. Field (2009,2008) assert that for the model to be significant, the F test value should be greater than 1. From Table 3 awareness, Interest and desire have F value greater than 1 which means that they are all statistically significant, but intention to buy have a value less than 1 (F=0.219, sig 0.640 p=<0.05) which means that intention to buy is not significant and therefore should be rejected, thus the H1 support only the positive relation to all AIDA but significance is only on awareness, intention and desire but not on Intention to buy. This means consumer attention to buy is not affected by consumer endorser expertise characteristics. On the other the coefficients, shows t value results where desire shows slightly greater impact (t=5.753, sig=0.000 at p<0.05) than awareness, interest and intention to buy while intention to buy shows slightly less impacts (0.468) than the rest of the factors. The previous findings by Nhung,

N.P et al, (2011) support this finding on the basis that there is a positive relation however it shows there is only a significant correlation in awareness of the product only, while the rest of the levels shows no significant correlation.

Table 3   Model Summary, ANOVAs and Coefficients test

Dependent Variable	Model Summary	ANOVAs(p=<0.05)	Coefficients
Awareness(A)	R=0.185,R^2=0.034,AdjR ^{2}=0.027	F=4.597,Sig 0.034	StdBeta=0.185,t=2.144,Sig=0.034
Interest(I)	R=0.229,R^2=0.052,AdjR ^{2}=0.045	F=7.133,Sig 0.009	StdBeta=0.229,t=2.671,Sig=0.009
Desire(D)	R=0.452,R^2=0.204,AdjR ^{2}=0.198	F=33.099,Sig 0.000	StdBeta=0.452,t=5.753,Sig=0.000
Intention to buy(A)	R=0.041,R^2=0.002,AdjR ^{2}=-0.006	F=0.219,Sig 0.640	StdBeta=0.41,t=0.468,Sig=0.640

5.2.2 The Effects of Consumer Endorser's Trustworthiness (T) on Awareness, Interest, Desire and Intention to buy/Action (AIDA)

The model summary results in table 4 indicates that R value is positive in all AIDA variables which denoted a positive correlation between consumer endorser's trustworthiness and AIDA which support H2 (H2= Consumer endorser's trustworthiness has a positive impact on awareness, interest desire and intention to buy the product). Moreover, they are all within the range of -1 to 1 as suggested by many scholars. Since the R^2 results indicates the change AIDA due to change in Consumer's trustworthiness, the results from table 4 show that the change in consumer interest (I) will affect more changes in consumer endorser's trustworthiness by 3.4% than awareness, desire and intention to buy. However, intention to buy contributes to less changes by 0.1% than awareness, interest and desire. On another hand ANOVAs test show F value for awareness, interest and desire to be greater than 1 except intention to buy (F=0.100, Sig 0.753 at P<0.05). Since the rule of the thumb states that for any model to be statistically significant its F-test value must be equal to 1 (Field,2009), therefore the model for intention to buy on predicting consumer endorser's trustworthiness is not significant. Thus H2 accepted to show positive relation to all AIDA but significance is only found in Awareness, desire and interest but not in intention to buy. In other words, consumer intention to buy is not affected by endorser's degree of trustworthiness but other factors do. Moreover, the standard Beta coefficient for interest is 0.306 which denotes slightly more impact on the model than the rest. This results also supports the previous research by Nhung, N.P et al, (2011) and can be applied in other countries with similar environment like Tanzania.

Table 4   Results for Model Summary, ANOVAs and Coefficients

Dependent Variable	Model Summary	ANOVAs (p<0.05)	Coefficient
Awareness(A)	R=0.215,R^2=0.046,AdjR ^{2}=0.039	F=6.255,Sig 0.014	StdBeta=0.215,t=2.501,Sig=0.014
Interest (I)	R=0.306,R^2=0.094,AdjR ^{2}=0.087	F=13.362,Sig 0.000	StdBeta=0.306,t=3.655,Sig=0.000
Desire (D)	R=0.185,R^2=0.034,AdjR ^{2}=0.027	F=4.597,Sig 0.034	StdBeta=0.185,t=2.144,Sig=0.034
Intention to buy(A)	R=0.028,R^2=0.001,AdjR ^{2}=-0.007	F=0.100,Sig 0.753	StdBeta=0.028,t=0.316,Sig=0.753

5.2.3 The Effects of Consumer Endorser's attractiveness (A) on Awareness, Interest, Desire and Intention to buy/Action (AIDA)

Regression analysis was performed to find out how consumer AIDA is affected by consumer endorser attractiveness. The model summary from table 5 shows that R value is positive in all each dependent variable (AIDA). This indicates a positive relation between consumer endorser's attractiveness and AIDA which support H3 (Consumer endorser's attractiveness has a positive impact on awareness, interest, desire and intention to buy the product). Awareness shows that can predict 31.7% of the variance in consumer endorser's attractiveness than other dependent variable in the model. Field (2009) assert that the difference between R^2 and adjusted R^2 shows how good the model fits in the population, and it should be equal to or close to R^2 From the results in table 5 shows that the difference is 0.007(0.100-0.093) for awareness, 0.007(0.027-0.020) for interest, 0.006(0.105-0.099) for desire and 0.008 (0.018-0.010) for intention to buy. This closeness shows that the model fits the population. The ANOVAs analysis shows that F value is greater than 1 in all dependent variables (AIDA), this means that the model is significant as suggested by Field (2009) that for a model to regarded as significant, the F-test value should be greater than 1.0. Desire shows higher significance by F=15.204, Sig 0.000. The

coefficients indicate how crucial each consumer endorser's attractiveness in predicting consumer's AIDA. The t values for all AIDA shows that they are significant predictor of consumer endorsers' attractiveness. Both awareness and interest shows slightly higher importance (t-0.3796) in the model. The positive relation shows that the increase in consumer endorser attractiveness increases the effectiveness of product promotion advertisement in all levels of AIDA.The work by Nhung, N.P et al, (2011) also support this finding.

Table 5   Results for Model Summary, ANOVAs and Coefficients

Dependent Variable	Model Summary	ANOVAs(p=<0.05)	Coefficient
Awareness	R=3.17,R^2=0.100,AdjR^2=0.093	F=14.406,Sig 0.000	StdBeta=0.327,t=3.796,Sig=0.000
Interest	R=0.165,R^2=0.027,AdjR^2=0.020	F=5.590,Sig 0.000	StdBeta=0.327,t=3.796,Sig=0.060
Desire	R=0.325,R^2=0.105,AdjR^2=0.099	F=15.204,Sig 0.000	StdBeta=0.325,t=3.899,Sig=0.000
Intention to buy	R=0.134,R^2=0.018,AdjR^2=0.010	F=2.376,Sig 0.126	StdBeta=0.134,t=1.541,Sig=0.126

6 Managerial Implication

This study found that consumer endorser is an effective strategy for promotion advertisement in social media, it is the recommendation of this study that SMEs and marketing managers to effectively use consumer endorser strategy as it has influence in changing and influencing customer's perception and behavior towards the product.

The age of respondents of this study has a great concern to managers as shows that many are youth between the age of 18-25 which represent 96.2% of all respondents. This means that consumer endorser strategy can be more effective to young people than adults because of their high exposure with the technology world than adults. Therefore, this will help managers in decision making when making a marketing plan as to who will best be benefited with their advertisement campaign.

7 Conclusion

The objective of this study was to examine how consumer awareness, interest, desire and intention to buy are affected by consumer endorser's characteristics with special focus on consumer endorser's expertise, trustworthiness and attractiveness characteristics. The results show that consumer intention to buy a product is not affected by consumer endorser's expertise characteristics but other factors do such as awareness, interest and desire. Consumer endorser's trustworthiness does not influence consumer intention to buy but may influence awareness, desire and interest on the product. Consumer endorser's attractiveness shows significant positive relationship with all consumer awareness, interest, desire and intention to buy the product. Moreover, the higher the consumers are attracted by consumer endorser, the higher the interest of the product endorsed. Future research with a wider sample need to be administered to include other sample of respondents such as from elders and rural consumers to find out how their behaviors are affected by consumer endorser's characteristics. This study only focused on three characteristics of endorser namely attractiveness, trustworthiness and expertise but a future research need to be done to include other characteristics such as consumer endorser-product congruency characteristics to mention few.

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Brand and the Relationship in the Context of Marketing 3.0

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Abstract: Understanding and fulfilling the customer's wishes is the essence of marketing, which has been evolving over the years and has reached a new stage from the concept exposed through Marketing 3.0. The article aimed to address the relevance of the relationship with customers within a new marketing perspective that has become essential for brand appreciation. Based on the methodology of literature review and through research in bibliographic references and analysis of five scientific academic studies, a study was develop to identify the practical application of the concepts of Marketing 3.0, which were found particularly in case studies. The results indicate the perception of the importance of using the new marketing as a bridge with the human being and their relationships and social objectives. Although the theme is still recent, it was perceived as an essential mechanism to add value and ensure the survival of the business, since without understanding the established relationship and the desires that permeate the client's spirit, it becomes too difficult remain in the current market.
Key words: Marketing 3.0; Relationship; Brand value

1 Introduction

The evolution of marketing, which was more valued for their concepts than the simple relationship of buying and selling, became a cause, human or social point motivator to associate to an idea, and literally buy it this were maximizing the results.

Having the Marketing as focus and Marketing 3.0 as an object of study, means that investors require gathering information to establish a business relationship without focusing only on the product or service, and yet enhance the mark.

The literature review carried out by means of survey articles with case studies on the application of marketing 3.0, presented a shot indicative of results that can be obtained with the personal values-based approach to the establishment of gains real. The analysis of real cases allows the establishment of parallel and inspire action models of recovery through the associated marketing to personal feelings.

The main reference considered was Philip Kotler, based on his several works but especially in his book Marketing 3.0 (2010), where are detailed phases of marketing that aims to reach the minds, hearts and spirits.

This article structured from the historical presentation considers the evolution of marketing until the contemporary period, always focusing Marketing 3.0, by identifying the wishes in line with the soul.

The focus in the relationship, which is fundamental to understand the desires of customers, and your relationship to the appreciation of the mark, as primary marketing goal. The presentation of practical experiences of application of Marketing 3.0, excelled for establishing how the connection between desires and values of people are turning to action and adding value.

The analysis about this phase of marketing, which has as its focus the consumer awareness and the importance of continuity of studies on the topic, already craving 4.0 Marketing of Kotler, aims to broaden the discussion about the convergence of marketing traditional to the digital age, which is already a path without back increasingly experienced by consumers.

2 Goals and Method

Since marketing began understood as a tool in addition to the synonym of sales, a view increasingly individualized graduated, the strategic focus changed from the producer/seller to the customer/consumer/opinion maker. This new vision justifies the importance of the subject of this article, problematic as follows:

How entrepreneurs are relationships with customers from the adoption of Marketing 3.0?

The objective was to analyze what are the strategies that entrepreneurs are adopting in order to meet this new phase of marketing, with cutout on the perception of actions that are integrated with human and social relations and that result in value to the products and brands.

The research conducted in the database of academic and scientific work, such as Google Scholar and Scielo, set limits on the term "Marketing 3.0" as a starting point, and established as a priority the last 10 year period (2008-2018), when the concept came to be more widespread, studied and applied.

Five scientific papers were used to report on practical examples of implementation and analysis of Marketing 3.0, in addition to bibliographical research aiming at the historical contextualization of the theme.

The bibliographic survey and qualitative research in scientific articles allow drill through, and perceptions about the characteristics relevant group of sentimental influence on marketing, as it is a way of thinking that could be followed for the construction of a reality (MINAYO, 2013).

According to Ganesh (1995, p.58), some main characteristics of a qualitative research is consideration of the environment, your descriptive character and the main focus of the approach, the result or product. In the feature article, the analysis aims to identify the path that has been trodden on this new version of marketing, that is directly related to the feeling and social belonging, so an important phenomenon to study.

3 The Evolution of Marketing

The word marketing is as meaning market, when in free translation of English market and Latin GMU's *mercatus*, but this term has gained new meanings over the years, in addition to representing sell, negotiate or advertise, as well details Kotler in his works and in the quote:

[...] marketing is social and managerial process by which individuals and groups obtain what they need and want through creating, offering, and exchange of value with other products. Many people see the marketing to seek and find clever ways to dispose of the products of an organization, namely, the marketing is only seen as advertising or selling products. However, the art of true marketing is the art of knowing what to do "(KOTLER, 2000, p. 27).

The term marketing was created in American universities in the early 1900, when integrated disciplines of the curriculum of five institutions and established the first concepts, classifications and developing a new vision in relation to business, what would become one of the great creations of the 20th century (SANTOS et al., 2009).

According to Sharma (2007), after the 1929 depression and World War II began to gain marketing body on the need to sell produce and present the products and services to the market to attract the customer, within a fitness for a new scenario commercial. In the 1930-1940, the marketing focus were the products, which according to Kotler (2010, p. 3), is the Marketing 1.0 which means, "Selling factory products to everyone who wanted to buy them." The main features of this phase were standardization, basic products and gains in scale to reduce costs of production.

From the 1950 and 1960 began to develop new concepts of marketing, with Neil Borden and the marketing mix, and in 1960 with the creation of the 4 P ´s (product, price, place and promotion) by Jerome McCarthy. According to Santos et al. (2009), at that time the expanded discussions on management and the social sciences, which led to a new marketing look, which began targeting primarily focus on information and consumer

According to Kotler (2010) is the Marketing 2.0, when the client passes to set the value of the product.

The marketing professional need to segment the market and develop a superior product to a specific target market. The golden rule according to which ' the customer is King ' works well for most companies. Consumers are better off because their needs and desires being met. (KOTLER, 2010, p. 4).

At first, it was believed that marketing was just a tool to aid the production and sales in order to generate and manage demand focusing on 4 Ps: product, price, place and Promotion. For Brazil, which had your field-based economy and little competition, the Decade of 1950 marked the beginning of marketing through widespread concepts by Escola de Administração de Empresas de São Paulo da Fundação Getúlio Vargas, and with the arrival of the first foreign organizations to use the media of the time-radios, magazines and newspapers-to publicize their products (SILVA, 2013).

The Brazilian marketing based on an American model replay until the 1970, when the expansion of the economy and the advertising agencies began to emerge as important tools in the strategy to make the industries to remember by consumers who were eager for consumption (SILVA, 2013).

From there the marketing became more valued, passing the winning departments and relevance in large enterprises, and expanding the range of expertise to Governments, civil organizations, religious bodies and political parties. Large enterprises, such as shopping malls and hypermarkets, had on

marketing the your highlight and began to discover new performance formulas to create a connection with the consumer, that's when the relationship marketing (SANTOS et al., 2009).

It is understood that the discovery of the importance of the relationship was a key point for changing the look of the consumer for the client, which took place from the late 1990, when the customer's management came to be understood as essential to maintain and increase the business. The advancement of communication, whether by advertisement, the phone and the internet, has made the relationship even more relevant, since the secret is in trying to figure out what matters to people.

The evolution of marketing and the change of vision nay be observed in the definition (s) thus submitted by the American Association of Marketing (AMA, 2013):

In 1935 = performance of activities that direct the flow of goods and services from producers to consumers.

In 1985 = the process of planning and implementation of the concept, the price, the communication and distribution of ideas, goods and services to create exchanges that satisfy individual and organizational objectives.

In 2004 = a organizational function and a set of processes for creating communication and delivering value to customers and for managing relationships with them, in a way that will benefit the Organization and its stakeholders (strategic public).

In 2013 = is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners and society in General.

According to Kotler (2010, p. 4), marketers currently "trying to get to the heart and mind of the consumer", which from the Marketing 3.0 represents understand the values acting by three major forces: the era of participation, the paradox of globalization and the era of creative society, adding collaborative marketing, cultural and spiritual.

4 Spirit and Emotion

As a leading expert in the area, Kotler (2010, p. 5) points to the evolution of marketing over decades and casts the future by means of Marketing 3.0, which is focused on the combination of the emotional with the human spirit, but brings as luggage all development introduced in the last century, making this one of the most strategically important theme by combining product management, customer management and brand management.

According to Kotler (2000, p. 32), marketing is used to denote the process that includes market analysis, planning, execution and control of actions that aims to maximize the results of a company to succeed. Churchill (2005, p. 4) follows the same line to say that marketing is the process to improve the results of organizations, "[...] planning and executing the conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual and organizational goals.

Kotler (2003, p. 167) believes that "the main functions that marketers must have in relation to customers are evaluating the opportunities, mapping the perceptions, preferences and requirements of customers", but taking into account "changes that satisfy the objectives of individuals and enterprises "(KOTLER, 2010, p. 4), which was named 3.0 Marketing.

Figure 2   Marketing 3.0 Action Goals.
Source: PAULO (2016) adapted from KOTLER (2010).

Choose the means of performing the marketing, relationships and generate satisfaction, involves communication and feedback to create the best strategy in the market that if you intend to keep or win as

the season experienced. Kotler (2010) analyzes marketing went through several stages with a large number of new concepts, but they all are always a reaction to changes in the business environment.

The current time is marked by the highest appreciation to horizontal relationships (customers) than the vertical (client-company). This trend strengthened by means of social media, but for Kotler (2010, p. 34) is a reflection of the generation of confidence (or lack thereof) in relation to advertisements of companies, as demonstrated by research and consumer market.

For organizations to create a connectivity and become relevant, Kotler (2010, p. 45) States that require "share the same dream with consumers and make a difference". One of the main examples in this sense has encouraged the change of philosophy of organizations, focusing on actions aimed at the marketing, for example corporate philanthropy, social or environmental, with internal and external measures sustainability.

Quoting Stephen Covey, Kotler (2010, p. 40) says that the goal of the new marketing is ' crack the code of the soul ', without neglecting the spirit. According to Covey, explains the four basic components of a full human being are physical body, mind capable of thinking and independent analysis, heart able to feel emotion and spirit, soul or philosophical Center. Marketing scholars point out that to place a product on the consumer's mind in a unique way is necessary to access these points. (KOTLER, 2010).

Actually marketing is evolving into a new stage, which is to find and address the minds of consumers, which has received different names as cause marketing, social or collaborative, and that has a major sustainability highlights of Marketing 3.0. However, although everyone has as focus create a connection with the consumer, terms such as Marketing to social causes (MCS), Corporate Social investment (CSI) or Corporate Social responsibility (CSR) present concepts, applications and objectives differentiated, as will be better detailed in the discussion about Marketing 3.0 in practice.

5 The Relationship and the Brand

The search for a new kind of relationship with the customer goes well beyond meeting the needs in order to strictly commercial results. It was realized that the relationship was a driving spring of business as a whole and the valorization of products and brand.

The rise of relationship marketing was a reflection of the perception that the interaction of generalized form with the intended audience resulted in more business transactions, but transformed into a philosophy of business management with the involvement of all: customers, prospective customers, suppliers, employees of all levels and middlemen; through forms of communication that create a positive business concept, which was realized over the years to become the main focus of the present (MCKENNA, 2002; GORDON, 2000).

Relationship marketing represents a major paradigm shift, because it is the evolution of competitive and confrontational mentality to a new approach marked by interdependence and cooperation (KOTLER (2003, p. 134).

It is in this direction that Ogden and Crescitelli (2007) reinforce the definition of audience or client, which is not always the final consumer in the case of relationship marketing, and list four types of public:

Inner-company officials. Feature a lot of credibility in people, because they are in direct contact with the company and production; despite not reaching the other large-scale public, if compared to other media;

Intermediary distributors, wholesalers and retailers. Retailers stand out for having greater influence over consumers;

Press, Government and community associations or called public opinion. The press has featured paper by impact and far reaching the target audience;

Consumer end user. Is primarily responsible for the value of a brand, since he is the one who defines and endorse values.

It is believed that customer satisfaction is a constant challenge for this the topic relationship marketing demand numerous and continuous studies, even because the public changes in terms of people, generations and also changes over time by your manners and actions. Kotler is an example in this regard, since it discusses the relationship marketing in extensive list of his works.

To understand the process of customer satisfaction, Kotler (2000, p. 43) points out several types of marketing: reactive, proactive and creative, explaining that the first fills a need; the second seeks to fill the needs that the client may have in the near future; and the third is the solution to production problems that customers don't even know they could have, but respond with enthusiasm to the initiative. So

creativity is valued to generate satisfaction, according to Kotler (2000, p. 53) is "the feeling of pleasure or disappointment resulting from the comparison of the expected performance for the product (or result) in relation to the expectations of the people".

Value could present a list of different definitions. In a business relationship, the term may be used as a product or service pricing, your production costs, time or existing demand, but Kotler (2000) explains that:

Value delivered to the customer is the difference between the total value for the customer, and the total cost to the customer. The total value for the customer is the set of benefits that customers expect from a particular product or service. The total cost to the customer is the set of cost that consumers expect to incur to evaluate, acquire, use and dispose of a product or service (KOTLER, 2000, p. 56).

Several authors have approached the point of view of marketing tools that generate customer loyalty or satisfaction, although all results have as Center the mark, since all individual or collective measures that reflect the perception of the client are also define the value you are adding to the company.

Marketing 3.0 has as focus just the mark, presented through the template named 3Is: brand integrity, brand identity and brand image.

Figure 3   Model 3Is
Source: Kotler (2010).

The representation by Kotler (2010) triangle-shaped features a combination of the brand, positioning and differentiation, three items synchronized in a positive way.

Kotler (2010) emphasizes that not always fixing the mind of a consumer is given so favorable, so the combination of brand and positioning that occupies only becomes complete when a differentiation that enhances the other two points. "Differentiate establishing synergy with the placement will automatically create a good brand image. Only the full triangle has credibility on Marketing 3.0" (KOTLER, 2010, p. 41).

6 Discussion: Marketing 3.0 in practice

Marketing 3.0 is a global concept that could be used in different ways, and in this article was presented a review of the literature with publications that have demonstrated practical results of implementation and evaluation of method on different fronts and goals. According to Kotler (2010, p. 22), this is an era focused on the consumer and demand "marketing collaborative approaches, cultural and spiritual", because the "marketing practices are very much influenced by the changes in behavior and attitudes of the consumer".

This view of marketing focused on social issues, such as CITES Kotler (2010), is often not well understood by consumers, as demonstrated by Mathew et al (2015). The increasing investment in social activities is understood mostly as philanthropy, but Matthews et al. (2016) highlights that every company aims to profit and there is no accounting for donating space, but occur collaborations, often without expecting some return, but as a form of institutional commitment to community development, as identified the applied research in the city of Bauru (SP) by Mathew et al (2016).

Moraes et al. (2016) reports that research has identified still some confusion about the difference between the concepts of Marketing to social causes (MCS), Corporate Social investment (CSI) and Corporate Social responsibility (CSR), but regardless of mode, any person or entity in Brazil could finance and/or develop social policies, since aligned with public policies and legislations in force.

Social investment could be implemented through social projects in various areas-environmental, educational, cultural, sporting, among others – and be performed through the company itself; with inter-sectorial partnership, for example by a project developed by another company or institution; or through the creation of an Institute that is aligned and funded by the company (Mathias et al, 2016).

So every social action may be considered an investment seeking return, be it financial, marketing or targeting the recovery of product, brand or the change of image and concept established on the company.

Moraes et al. (2016) even CITES studies and research that demonstrate the advantages identified for social investment, or the loss of opportunities for who drops the subject. American and European consumers accept paying more for socially responsible products and 70% drop the consumption of products from production processes with non-socially responsible behavior. England 86% of consumers have a more positive perception of the company that contributes to the sustainability of the planet.

In Brazil, according to the Institute for the development of Social investment research, pointed out that the binding of the company to a social cause raises the value of the institution for 96% of respondents. The Ethos Institute also identified that 51% of Brazilian consumers judge the quality of the companies for the treatment of officials and the ethical conduct of business, while 24% of consumers seek products of companies highlight the social responsibility (Mathias et al 2016)

An example of integrated marketing communication world, through social action, is the Pedigree, the company's English brand Mars that operates in the food for dogs, and that is in Brazil since 1989, quickly becoming reference for your innovation in products and marketing. From 2008, the Pedigree invested heavily in social marketing campaign "Adopt is all good", held in various countries (Santana; Ferreira, 2015).

According to figures of the Brazilian Industry Association 2013 of Pet Products (Abinpet), of the 37.1 million Pets, more than 20 million were abandoned, and 70% of them end up in shelters, and of these, 90% never find a home. Pedigree began social marketing in relation to abandoned animals in 2005 in the United States, through support to shelters to rescue abandoned dogs, the awareness of the population on the theme and the stimulus to the adoption of these dogs (Santana; Ferreira, 2015).

It is understood that by embracing this cause, the mark has met social concepts and stimulated the feeding the animals, enforcing the feed consumption through an emotional relationship with your audience. In marketing, the Pedigree switched to using phrases like "we're crazy for dog"; "It's all good Dog" and "every dog deserves a happy home", I argue that all dogs must be loved, well cared for, well fed, regardless if they are to race set or so called Mutts. That is, the brand has added social value to your marketing, as well as highlight the quality of your product for dogs "in the family", passes the subliminal message that all dogs deserve this treatment and food.

The success of the strategy, according to Santana and Ferreira (2015), fostered the contention by the mind and by the preference of consumers, so that the Dog Chow, that until 2011 worked the rational side of consumers, for example pointing out the quality of the product, went on to emotional campaigns, stating that the dog is not just a pet, but rather a part of the family.

Within the concept of Marketing, 3.0, it is understood that the strategy of the Pedigree was very well executed by using the integrated communication and aiming to add value to the brand. Besides the TV campaign "I Know", which depicted the situation of more than 20 million of abandoned dogs in Brazil, warn of the responsible Pedigree guard used the internet portals with the challenge that each one of them should find a home for an abandoned dog (SANTANA; FERREIRA, 2015); so using online tools, received a challenge to find a home for the abandoned dog. While Lord, Google's dog, featured videos on Youtube and Orkut community, Wajid had photo album on Flickr and interacted with the audience through the Yahoo answers. Already the Sissy, the dog chosen by MSN, had your own page on MSNspaces and interacted with the surfers via Messenger.

The prospective owners were attracted and directed to the website of the campaign with the goal of telling why adopt those dogs deserved. 3,192 proposals for adoption, more than 16 million of Internet users impacted and more than 1.2 million hits to site7 show that the action was a success. On Youtube of Pedigree, were posted the videos of the three dogs being delivered to their owners (Santana; Ferreira, 2015, p. 4).

Kotler (2010, p. 9) emphasizes the relevance of digital marketing to say that: "As social media are low cost and little biased, will be the future of marketing communications."

Gomes and Kury (2013) highlight that the form of communication is the factor of influencer Marketing 3.0, since information technology has penetrated the market, transformed the forms of interaction between people and how they relate to the companies.

The new era is the connectivity and mobility, especially in the last decade, when computers and cell phones increasingly accessible low-cost internet allies, open source and free wi-fi, especially through social media has changed the way people relate

Gomes and Kury (2013) mentioning the phrase of Hunt: "if any intermediary of communication changed anything, it's the internet," and analyze that there was an inversion of communications, mass media for a segmented version, which now begins by target audience, more focused and economical, from the information who is the consumer, their wishes, desires, thoughts, body and soul, its values and what's expected of a brand to consume it.

This perception has made many companies change their marketing communication strategy, adopting advertising messages aligned to social, cultural and behavioral responsibility of this new society, an attitude in keeping with the "politically correct", as shown by Silva (2016) in his analysis studying advertisements, citing two emblematic examples, which are the marketing's of Skol and Avon, who have excelled both on television as on the internet.

In 2016, Avon launched the campaign "BB Cream Color Trend and the Democracy of the skin" with the concept of empowerment of minorities, using in their fat, gay characters advertising images, black and transsexuals as protagonists, in videos that have been released both on the internet as on TV (SILVA, 2016). The objective was to deface established standards for a long time in the advertising of cosmetics: white women, skinny and beautiful.

The use of female image of stereotypical way is at the heart of discussions of the marketing and social responsibility. The beer advertisements have always been a negative icon in this sense, relating to sex and drink behavior prejudiced to heterosexual men, resulting in adverse reactions so negative that made the Ambev, largest beverage company in the Brazil and one of the largest in the world, responsible for various brands of beer, to reposition the Skol marketing (Silva, 2016).

Although complaints about sexism in advertisements for beer has remained for years, Silva (2016) analyzes the start to change marketing positioning of Skol occurred after February of 2014, when the brand launched your campaign of Carnival with the title : "I forgot the ' no ' in house '. The play won great advertising impact after being photographed by the Pri and Ferrari advertising journalist Mila Adams and published in feminist groups on Facebook. Taking into account the past brand advertising, it's easy to see why the commotion caused: the message was condoning the culture of sexual abuse to vulnerable women. After the poor reception, the campaign was taken off the air in less than a week (Silva, 2016, p. 21).

Skol has changed the focus of your advertising of the archetype of the "male-catcher" for characters who feature a young conscious personality, without prejudice against the genre or physical biotype, turning the word "respect" in your flag marketing, as "RespeitoIsON", in 2016 and the sponsorship of LGBT Parade of S ão Paulo (Silva, 2016).

It is observed that this placement has been maintained and strengthened. In 2018, the Carnival campaign hype of Skol highlighted the diversity in the party, in blocks, and other pieces in the air keep the focus differentiating what is "square" as biased points, and what is "round", symbol of the Skol, as politically correct. Several advertisements have the woman as focus, but now with a different approach, for example by encouraging respect for older women who date younger men or warning that the use of short clothes are not invitation to sexual approach.

However, for the change of the marks is necessary to change who does the marketing of the companies within the new vision of 3.0. In this sense, a good example is the Brazilian advertising agency Heads, which adopts a policy in relation to gender equality and women's empowerment principles of UN (United Nations), noting, for example, that more than half of their positions are occupied by women and that there is no wage difference between genders (Silva, 2016).

The positioning of the company, which includes studies on the presence of women in advertising, stands out in campaigns on equality, such as Valentine's Day, made for O Boticario, starring a homosexual couple. Despite controversy, this new position was positive for the company, resulting in growth and business for Heads, which won new accounts and became the second largest independent agency in Brazil (Silva, 2016).

The perception about the application of Marketing 3.0 does not only occur through the masses, with television advertisements, neither only in large organizations. Paulo (2016) demonstrated in a study carried out in a supermarket in the city of Formiga, in Minas Gerais, that 73.68% of the strategies were focused on Marketing 3.0 and 57.14%   were perceived by customers.

Through questionnaires applied to clients and managers, Paulo (2016) observed that the value of the shares applied in the supermarket of Minas Gerais and that are connected to the concept of Marketing 3.0 were:

- the suggestions of the customers;
- consumer desires;
- the staff's knowledge of the mission;
- concern for environmental issues;
- products that stimulate improvement of the quality of life;
- products with sustainable principles;
- social events to promote mission and social campaigns;
- cultural values incorporated to employees; and
- concern about the client's vision, hearing, smell, touch, and taste.

Even with this roll of actions directed to the customer, Paulo (2016) still highlights the lack of a fundamental item in Marketing 3.0, which is the broad relationship, since the only channel of communication with the customer is the site. Other shortcomings to be corrected, according to Paul's study (2016), are the limitation of the public to the middle class; the performance force focused only on its directors and supervisors, excluding the operational layer; the lack of customer awareness campaigns regarding environmental issues, and the lack of application of social and environmental practices aimed at stimulating the purchasing process (PAULO, 2016).

According to Silva (2016), SEBRAE (Brazilian Service for Support to Micro and Small Enterprises) confirms the tendency for socially engaged companies to profit more and stand out from their competitors. It is perceived that this occurs mainly because of the consumer engagement connected with the same principles and participants in social media, which reinforces the importance of knowing the soul of the consumer, as predicted by Kotler (2010) on Marketing 3.0.

"Increasingly, consumers are looking for solutions to satisfy their longing to transform the globalized world into a better world. In a confusing world, they seek companies that address their deepest needs for social, economic, and environmental justice in their mission, vision, and values. In Marketing 3.0, the goal is to offer solutions to the problems of society. Companies differentiate by their values "(KOTLER, 2010, p.19)

Gomes and Kury (2013) understand that there is a shift from the Information Age to the Age of Consciousness, which is what we experience, where the general awareness makes people cover more and also do more, take responsibility and filter what it is good and bad for you and for the world. Change is characterized not only by the reception of the message, but also by the treatment of that information with the "urgency to reconstruct thought before passing on its own message" (Gomes, Kury, 2013).

7 Conclusion

By presenting a historical account of marketing and characterizing the relevance of the relationship to identify and connect with ideals, the present article shows how Marketing 3.0 has been applied in practice and how it became relevant for companies, in terms maintenance and evolution of the business and especially for the appreciation of the brand.

It is understood that more and more organizations need to obtain knowledge of their target audience, not only through discourse or transmission of information, but demonstrating in practical actions, how it is contributing to the world, or in social or environmental causes.

The use of media, especially social media through the Internet, still makes relevant a relationship of exchange, interaction and identification of the public's desires, which is increasingly segmented into themes of interest to them. It is this identification that Kotler calls knowledge of the spirit of the consumer, and that is fundamental for companies to establish strategies of Marketing 3.0.

The topic is increasingly relevant for marketing, and more research is needed to characterize the relevance of digital marketing in this change of position, since the advance of the virtual relationship is a path without return that dominates the commercial relations; and that is precisely what Kotler approaches with the already denominated Marketing 4.0.

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Influence Factors on Consumer Decisions: A Quasi-experiment with Brands of Sustainable Products

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Abstract: The goal set for this research is to propose a model of brand management to guide consumer choice to more sustainable options. The model assumes that consumers have varying degrees of awareness on the sustainability of products and services. At the same time, products and services may also be considered in varying degrees of sustainability. Thus the strategy of brands should be to communicate its sustainability aspects in order to reach the consumer who is at the same level. It is expected that from the momentum established by the model, in which more and more information is conveyed about the sustainability aspects of products and services, consumers start to be more aware and at least more informed. The independent variables were the brand's image and the price. The dependent variable was the participant's intention of purchase. There were 402 consumers subjected to the quasi-experiment. The results was analyzed at brand level and, in general, showed that more sustainable brands grew in participant's preference after they received information about the sustainability aspects of that type of product, but this gained preference were partially lost when participants were aware of product's prices.
Key words: Sustainability; Conscious consumption; Brands.

1 Introduction

The marketing has been studied under different aspects that are part of the concept of sustainability, which include, social marketing, marketing 3.0, green marketing and greenwashing. But in Brazil, the convergence between Marketing and Sustainability is little Studied (Moretti & Toledo, 2015).

In 2015, the UN adopted a new development agenda, which assumes the role of continuing the Millennium Development Goals. This new agenda was launched in September 2015 and entered into force on the first day of 2016. The new agenda is called Sustainable Development Goals, and consists of 17 objectives and 169 new goals. Among these objectives, the twelfth refers to responsible consumption: "ensure standards of sustainable production and consumption", being directly related to this research. It shows how relevant sustainable consume is in the contemporaneous era and that marketing and consumer behavior studies can contribute to sustainable development goals.

In this context, the overall objective is to propose a model of brand management to guide consumer choice to more sustainable options. Secondary objectives are: to analyze the importance of the brand from the perspective of sustainability and find appropriate ways to implement sustainability by organizations.

2 Literature Review

Sustainability is about the interdependence of living beings among themselves and in relation to the environment. It is the recognition of the needs and interests of other parts such as community groups, educational institutions and religious, labor and public, reinforcing the network of relationships that keeps them intact. It is also about valuing different aspects of human life as family life, intellectual growth, artistic expression and moral and spiritual development (Savitz, 2007).

The term has its origin during the 1980s, with the growing awareness that countries needed to find ways to promote economic growth without destroying the environment or to sacrifice the well-being of future generations" (Savitz, 2007, p.2) and was popularized by the Brundtland report, prepared by the world commission of the environment development (WCED, 1987).

Since then, sustainable development has been widely accepted by academics and the executives as a major theme in the research agenda and organizations (Savitz, 2007; Hahn et al, 2015; Serralvo&Belloque, 2014). It means that organizations are required to manage their business taking into account the interconnected and interdependent, economic, environmental and social issues (Hahn et al., 2015).

Sajeva et al. (Sajeva et al., 2015) used the Voltaire's view that a snowflake in an avalanche never feels responsible, the environmental problem is the fault of all the people. For these authors, while

regarding sustainability involving the social, human and environmental aspects, and economic, as well as their interactions, it is clear that environmental problems are mainly caused by societies and their inability to keep within the limits imposed by the vast natural system in which we live (Sajeva et al., 2015).

The Triple Bottom Line concept of sustainability rests in the integration of social, environmental and economic issues, making a tripod. According to this model, organizations, need to act responsibly in all three dimensions to be considered sustainable (Elkington, 1997). But, Hahn et al. (Hahn et al., 2015) wrote that organizations have failed to apply satisfactorily the concept of sustainability. They discussed about prioritizing certain aspects, namely the lack of balance between the three dimensions, generating what they call voltages. This fact is due to the incompleteness of this model; and the proposal to minimize these effects is the application of an "integrative vision of corporate sustainability" (Hahn et al., 2015).

This integrative view proposed that organizations need to pursue different aspects of sustainability simultaneously, and that managers have to consider the possible tensions between dimensions rather than dismiss them. According to the authors, through this strategy, management for sustainability will be taken beyond the Tripple Bottom Line (Hahn et al., 2015). This model takes into account the systemic aspects, organizational and individual, in addition to economic, environmental and social dimensions, and yet circumstances, in a context, space and time to analyze the possible tensions in organizational sustainability.

Hahn et al. (Hahn et al., 2015) proposed an integrative model of strategic management for sustainability. In marketing, is also concepts related to the Tripple Bottom Line pillars: economic, social, environmental. These three concepts were treated separately: commercial marketing, social marketing and green marketing. But when considering the essential function of marketing, which is to meet the needs of human beings, social and environmental aspects are implicit, since the integrity of these is essential for humanity.

2.1. Consumer behavior

Consumer behavior is the study of the processes involved when individuals or groups select, buy, use and dispose products, services, ideas or experiences to satisfy their needs and desires (Solomon, 2002; Blackwell; Miniard; Engel, 2006), and came as a distinct field of study during the 1960s (Pachauri, 2002).

The marketing concept suggests that organizations must meet consumer needs, therefore, to implement the concept of marketing, organizations must understand their customers and stay close to them to develop products and services (Peter; OLSON, 1996). Kotler and Keller (2000) aggregated to this idea the aspects of price, distribution channels and communication. The importance of consumer behavior knowledge rests on the foundation of modern marketing philosophy, which recognizes the consumer as the focus of marketing activity (Singh, Vrontis&Thrassou, 2011).

All the successful marketing program is based on a well-grounded theory and understanding of consumer needs (Runyon & Steward, 1987). Since pure economics alone cannot explain all variations in sales, several sub-perspectives within the discipline can offer rational explanations for variations in demand (Pachauri, 2002).

Each customer is unique and their behaviors vary (Grant, 2007). Simple observation provides a limited view of the complex nature of consumer choice, so researchers have increasingly sought the concepts and methods of more sophisticated research, provided by the behavioral sciences in order to understand, predict and possibly control consumer behavior more effectively. Therefore, the amount of generated knowledge must be assessed in terms of its ability to improve the efficacy of marketing practice (Pachauri, 2002).

A consumer behavior definition, proposed by the American Marketing Association - AMA in 1989, is "the dynamic interaction of affect and cognition, behavior and environmental events by which human beings conduct aspects of their lives exchanges" (AMA, 2016). This definition, according to Peter and Olson (1996) analysis, presents very interesting aspects to be analyzed. Consumer behavior is dynamic, which means it is a system moving with constant changes and alterations. Moreover, it involves interactions between affect, cognition and environmental events that promote these changes in behavior.

Rocha and Barros (2006) thought consumption by anthropology and explored the theme in the sense that consumption is a system of signification, in which the main social needs supplies is the symbolic necessity. This thought goes beyond the simple selection, use and disposal of products. For the authors, "consumption is like a code, and through him are translated much of our social relations and prepared many of our subjectivity experiences" (Rocha & Barros, 2006, p. 45).

This code reflects feelings and social aspects, forming a classification system of things and people, goods and services and groups. Since consumption allows an exercise of "classification" of society, this can be inclusive in two different ways, through the insertion of new products and services that are added and are articulated to the other, and the inclusion of identities and social relations which are defined largely from that code (Rocha & Barros, 2006).

This second way to include consumption is closely linked to conscious consumption, in the sense that this new way of consuming focusing on sustainability must be linked to an identity and supported by "compassion" towards the social relations of the individual.

2.2 Brand concept management-bcm

The model proposed by Park et al (1986) shows how many concepts related to brand management and marketing can be integrated into a single model. Koch (2014) pointed out that this model has played a key role in launching the research area of brand extension, in which the positioning of the brand is important.

Park et al (1986) explained that the selection of the brand concept can be given by the identification of functional, symbolic or experiential needs. A brand with the functional concept is defined as one that is designed to meet international consumer needs. The ones with the symbolic concept are developed to link an individual to a group, to a context or the image itself. A brand with the experiential concept was developed to fill internally generated needs for stimulation or variation.

According to the authors (Park et al., 1986), still, the terms "functional", "symbolic" and "experiential" are used to reference an image created by a brand, not a product of class. Any product can theoretically be positioned as functional, symbolic or experiential, and may still have a mixture of these concepts, as many brands have. That is, it is possible to develop an image of brand with two or more concepts.

They explained the relationship (Park et al., 1986) between the concept of a brand and its image must be managed throughout the life of the tag. For each of the three stages of management proposed by the authors, introduction, development and strengthening, there are particular positioning strategies, accompanied by appropriate marketing strategies mix, allowing consumers to understand the brand image (introduction), realize their value increasing (development), and generalize this picture to other brands of the organization (fortification).

The stage "Introduction" is defined as a set of activities to establish an image or positioning a brand in a given market during the entry period on the market. The image and positioning selected by the organization must be within the concept of the limits of the selected brand and be influenced by the presence of a niche in the market. At this stage, there may be a change in sales. When the marketing mix elements are consistent with communication, operational and complementary tasks among themselves (for example, coordinated), a synergy is more likely. The mixture coordinates successfully communication and operation tasks, the relative advantage of the brand should be apparent to the target market. Another goal of brand management concept during the entry period in the market is to develop an image that could be extended easily during subsequent phases. If this introduction does not try to foresee the next steps, synchronization efforts between steps tend to be less effective (Park et al., 1986).

During the "development" stage, the positioning strategies should focus on improving the value of the brand image so that its relative superiority to competitors can be established and sustained. Increasing the perceived value of the brand is essential as the competitive environment becomes more complex. For example, an increase in the number of competitors emulating the brand's position may decrease the ability of consumers to discriminate among brands. Moreover, the changing needs of consumers, triggered by factors such as a better knowledge of the product, or products best wishes (particularly through the use of specific situations), may require specific strategies to increase the value of the brand. It is worth mentioning that positioning strategies, implemented at the "design" stage may require the amendment of the marketing mix components (Park et al., 1986).

The authors (Park et al., 1986) pointed out the fact that the positioning strategies at that stage differ from a typical repositioning strategy. Firstly, the repositioning usually does not depend on a primary means for guiding their activities. In contrast, according to the scenario, positioning strategies in preparation, are guided by the concept of the brand. This is because the image in preparation is established, of course, the concept of the brand. Thus, the image produced is a logical extension of the initial phase and the potential inefficiencies associated with the change of an image without a scenario guiding, can be avoided.

Plans for the positioning at the stage of "preparation" should begin when the concept of the brand is initially selected by the planning for the positioning of activities. The concept selection phase, the company can create its own changes rather than react to market changes, as they occur. It is noteworthy

that the repositioning, by contrast, is usually determined from the current market conditions in the short term. Several different strategies for positioning can be used to increase the value of the image in this stage (preparation). Mainly because the brand can be made via its usefulness, or can be defined to meet a more specific need (Park et al., 1986).

Finally, keeping the exclusivity of the brand can increase their perceived value. The placement strategy that is more suitable to increase the value of a particular brand may be given by the initial concept. Although the preparation of the image may require an adjustment of the initial position. As in the introductory phase, the marketing mix elements, in preparation, will be more effective and efficient in increasing the value of the image, when these elements are consistent with the communication objectives, operational and complement each other.

In the final phase of the BCM, the stage of "fortification" aims to link a brand image developed in the image of other products produced by the company in different product classes. Various products, all with similar images, reinforce each other and serve to strengthen the image of each brand. So, all brands can benefit from this strategy. Strengthening the image of a brand by a fortification strategy does not imply that the brand development stage has been completed, it should continue throughout the life of the brand. During the fortification phase, the new product placement strategies establish the connection with the existing concept of the brand (and consequently, the image drawn brand). This connection can be achieved by a common identification joint promotion or joint distribution (Park et al., 1986).

2.3 Price

The price is "the amount of money that one must sacrifice to get something wanted" (Monroe, 1990, p.5), also acting as a product quality signal (Monroe, 1990). "The most common and obvious" to Diamantopoulos (2005, p. 245) is the importance of price to the rational principle that it is the only aspect of the marketing mix that generates revenue, while others are associated with costs. Thus, costs are incurred in order to create value while the price has the role to extract value. For Semenik and Bamossy (Semenik and Bamossy, 1995), the price is a tool that assists in one of the key roles of macroeconomic marketing function which is to facilitate the exchange process. "The price establishes a foundation to culminate in an exchange between the parties" (Semenik&Bamossy 1995, p.352).

Through the price it is established the level of reward for the production and management activities involving a particular product. However, Diamantopoulos (Diamantopoulos, 2005) emphasized that the aspect of revenue is not "in any way" (Diamantopoulos, 2005, p. 245) the only feature that makes it important. The price significantly impacts the volume of sales and therefore the participation of the brand in a given market. Diamantopoulos (Diamantopoulos, 2005) wrote that studies have shown that the price elasticity is up to 20 times higher than the elasticity of advertisement. Besides having a strong influence on demand, price's influence is manifested faster than the other aspects of the marketing mix.

Still comparing the price with the other components of the marketing mix, it is a variable that can be adjusted with a certain speed. However, Diamantopoulos (Diamantopoulos, 2005) warns that this is also a handy advantage to competitors and, on the other hand, reactions to price changes are not only faster, but more intense too, which also calls for a lot of caution in its decision-making process, since the results should promote significant impact.

While discussing price, Semenik and Bamossy (Semenik and Bamossy, 1995) followed a rationale with more emphasis on customer, rather than seller. There is other aggregate acquisition cost price, such as the time consumers takes to get a particular product; the convenience is also associated with site acquisition, opportunity and risk. For instance, consumers may think the risk of buying an unknown brand is higher than paying the higher price for name brand.

Broone and Kurtz (Broone and Kurtz, 1998), indicate that in practice the determination of cost-based pricing is the most popular method, what also occurs in Brazil according to Botelho and Urdam (Botelho and Urdam, 2005). However, Semenik and Bamossy (Semenik and Bamossy, 1995) adverted that it is a mistake to consider only the production and marketing costs in determining the price of a product. While these costs are "extremely important" (Semenik&Bamossy 1995, p.353) because it cannot determine a price that does not cover these costs, a price based only on these premises can be too high or low for the market because it does not recognize "important public" that will evaluate the price.

The authors explain that, besides consumers, there are other relevant public that affect pricing decisions. Members of the industry, as wholesalers, retailers and distributors, direct and indirect competitors, the government, which may impose restrictions to prices, and the company itself, are the highly influencing players in price decisions (Semenik&Bamossy, 1995). But for Semenik and Bamossy (Semenik and Bamossy, 1995), customers are the most important group, the actual customers and also the potential ones.

Understanding how consumers think a product, you can decide on which product features and services will allow the company to establish a price that will both be perceived as appropriate by customers and allow the company to cover its costs and obtain a reasonable return. (Semenik&Bamossy 1995, p.353)

Serpa and Avila (Serpa and Avila, 2004), while working with the relationship the reference price and the theory of perspective also approached this concept. For them, this relationship is the basis used by the consumer to judge the actual price charged for a product. The notion of justice is what determines the setting of the reference price. The reference price is the price that the buyer considers reasonable or fair.

Complementing the vision of Semenik and Bamossy (Semenik and Bamossy, 1995) and Diamantopoulos (Diamantopoulos, 2005), Broone and Kurtz (Broone and Kurtz, 1998) emphasized the legal and economic aspects in pricing theory. The authors note that in addition to the previously presented theory, there are rational rules that must be respected and that also go beyond the calculation of the cost of a particular product.

3 Model Proposal

This model is centered on the consumer. The proposal considers that in the context of sustainability, consumers have varying degrees of awareness of the products and services. Thus, the level of consumer awareness is the first key pillar of the model. It is noted that a consumer can have different degrees of consciousness for different products. However, the degree of awareness of a consumer should have no major gap between different products or services, because when the consumer has certain degree of awareness and knowledge about a topic or product, means that he has a critical thought regarding their way of consuming, and it should reflect in other issues.

The second pillar is the sustainability strategy that should be applied on the business, it is an essential aspect that must have validity, truthfulness and transparency for consumers, and it cannot carry out the practice of greenwashing (or been perceived as greenwashing by consumers). The sustainability strategy does not have to be developed in the same way proposed in the model. This is a logical suggestion of how sustainability can be developed and expanded in an organization. However, this form is more appropriate to the model as well as the organization will not meet the demand of consumers in each of the levels of consciousness indicated in the model. In this pillar, to move from one level to the other, the strategy should be cumulative. An organization that offers a sustainable product must maintain aspects of sustainability achieved in the previous level, and also sustainable level transactions in question.

The third pillar of the model is the strategy established by the brand in each consumer awareness level. This strategy, as well as sustainability, should also be accumulated. A brand that has reached the degree of integration with certain consumers should keep the information strategies and interaction to meet the consumers of other levels. The brand strategy is always based on information regarding product sustainability aspects however, the way it is presented in the third column "brand strategy" is the best way of how this information should be transmitted to the consumer, because the higher the level of consumer awareness, more demanding will be presented on their relationship with the brand.

As presented previously, the model has three key pillars and four levels. Figure 1 shows the model structure.
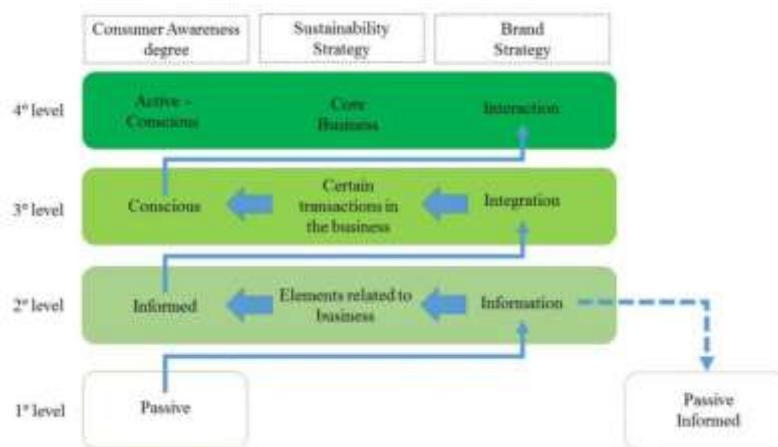
Figure 1   Brand Management Model for Sustainability

It is important to note that consumer awareness levels are also cumulative, so the active conscious consumer is also can be considered conscious and informed, it just cannot be regarded as "passive" as a levels of consciousness.

One aspect that can influence the model is the price. The more sustainable product or service tends to be more expensive in practice. Thus, what happens is that when consumers relate to brands, the form shown in the model, may want to change your choice of consumption, but it can be limited by the difference of price paid for such a change.

It is important to explain that at in all levels, there may be a shift in consumer awareness or not. At the first level, the passive consumer can remain at the same level, but have received information, will an informed passive consumer. In other levels, the consumer only remains at the level it is, with the same degree of consciousness.

4 Method

The aim of the field research is to test the model proposed in this research. This test was done with consumers by means of a quasi-experiment. The product chosen for the quasi-experiment was the milk. In this market, there are different categories of milk, of which four were selected and assigned to the four model levels: UHT (Ultra High Temperature process), pasteurized, Organic and Soy Organic. For each category, one or two brands were used to represent them, as it is shown on the table 1. Each of the levels proposed in the model is represented by one or two brands and thus it was possible to test the selection of product category, and therefore its degree of sustainability, from the choice of the mark made by the participant.

Table 1　Corresponding brands to model levels

Level of the model	Type of Milk	Brand (s)	Price
Level 1	UHT	Parmalat	R$ 2,98
		Paulista	R$ 2,91
Level 2	Pasturized	Fazenda Bela Vista	R$ 3,91
		Xandô	R$ 4,04
Level 3	Organic	Timbaúba	R$ 6,95
Level 4	Organic Soy	Native	R$ 10,99

Following the research protocol proposed for the realization of quasi-experiment is presented.

In this research, two independent variables were isolated: the first is the image of the milk ́s brand and the second is the price. The dependent variable is the participant ́s intention to purchase among the options.

They were subjected to quasi-experiment 402 consumers of milk. The participants were selected by convenience, i.e., means that the selection has not been made by randomization, which characterizes the quasi-experimental method (Shadish et al., 2002). The test was available online and publicized through social networks and email. We asked people to forward the email and share the test ́s link on their own social networks, so it is not possible to estimate how many people received the invitation to participate.

Table 2　Stages of the quasi-experiment

Phase 1 – first exposition of brands	
O_1	Participants indicate the purchase order of preference of the brands in the form.
X_1	Information on the sustainability of milk types involved in this testing phase, are presented to the participants.
O_2	Participants indicate the purchase order of preference of the brands in the form.
X_2	The prices of the brands involved in the test are exposed to participants.
O_3	Participants indicate the purchase order of preference of the brands in the form.
Phase 2 – second exposition of brands	
O_4	Participants indicate the purchase order of preference of the brands in the form.
X_3	Information on the sustainability of milk types involved in this testing phase, are presented to the participants.
O_5	Participants indicate the purchase order of preference of the brands in the form.
X_4	The prices of the brands involved in the test are exposed to participants.
O_6	Participants indicate the purchase order of preference of the brands in the form.

Phase 3 – third exposition of brands	
O_7	Participants indicate the purchase order of preference of the brands in the form.
X_5	Information on the sustainability of milk types involved in this testing phase, are presented to the participants.
O_8	Participants indicate the purchase order of preference of the brands in the form.
X_6	The prices of the brands involved in the test are exposed to participants.
O_9	Participants indicate the purchase order of preference of the brands in the form.

The participants received clear and objective instructions regarding the procedure and informing that the information would be anonymous. Participants were subjected to nine measurements and six interleaved experimental treatments.

Initially, participants read the consent term and informed if they agreed with it. Then informed their gender, family income, age and the type of milk they consume, from the options: UHT, pasteurized and Organic. For each test phase, it was considered the number of participants, as follows: Participants who choose pasteurized milk in the question presented before the experiment: "What kind of milk do you consume?" were not considered in the first phase of the test that addressed UHT and pasteurized milk. Participants, who choose organic milk in the same issue, were not considered in the first and second phases of the test. Additionally, there was considered only in the second phase, the participants that have chosen the pasteurized milk in the second observation (O_2) and in the third phase participants who chose the milk type A in the second observation (O_2) and organic milk in the fifth observation (O_5). Therefore, the second and third stages, the "n" varies, it is the number of participants who have gone to these levels.

The following packages were presented, milk brands, which represent levels 1 and 2 of the model. Then the participant indicated on the form the order of preference for the purchase of each of the brands, the first option to the fourth option, this is the first observation (O_1). After this stage, the participants received the first experimental treatment (X_1). Appeared a screen with two images containing information about the types of milk in question. An image had negative information about the type of milk lesser degree sustainability, and other positive information about the type of higher degree of sustainability milk. In this first stage of quasi-experiment, the long-life milk is the lowest grade and the milk is the highest level. After reading the information, participants indicated again the order of preference for the purchase of each of the brands; this was the second observation or measurement (O_2). Participants then received the second experimental treatment (X_2) which was the exposure of product prices on the images of milk packaging in question. After that, participants were asked again about their purchase choice, also be noted in electronic form. This is the third observation (O_3). Here it was finished the first part of the test. Then occurred the change of brands presented to the participants. The presented brands passed to those relating to the following levels. This procedure was repeated two more times were tested for the second and third levels, and subsequently the third and fourth levels, but with only one brand representing each level.

The variables were analyzed by their measurements. The quasi-experiment under analysis has dependent samples and should be carried out test of difference between the means of dependent samples, because what is sought is to evaluate if there are changes in the behavior of individuals before and after certain interventions. For Zikmund (Zikmund, 2011), the chosen design allows to conclude that the difference between the observations (O_2-O_1, O_3, O_2 and so on) is a measure of the influence of the experimental treatment, which is performed in the first stage of the test calculation:

$$d = O_n - O_{n-1} \tag{1}$$

At where:

d: difference between the position of products in the participant's preference before and after the intervention.

On: position the product in the participant's preference after the intervention, 1 being the most preferred product.

On$_{-1}$: product position in the participant's preference, before the intervention. Is obtained, then the average difference between observations:

$$\mu d = \frac{\Sigma d}{n} \tag{2}$$

After the calculation of the differences between observations and their average, the assumptions

made were found in table 2. Interventions were made in favor of products with higher level of sustainability and therefore if the interventions X_1, X_3 and X_5 have the expected impact, the products with the lowest level (eglong life compared to Type A) must lose positions, while higher level should gain positions. In addition, since most organic products have higher prices, it was expected that the interventions X_2, X_4, X_6, and would lead to a decrease in preferably more organic products.

Lastly, the hypothesis that increased preference for products with higher level of sustainability was observed remains significant even after knowledge by participant's higher prices that these products possess (as $O_3 - O_1$). It is noted then that the assumptions were set considering the importance of the direction of change in the preferences of the participants for the products, and not only if there was a change regardless of the direction.

Table 3   Hypotheses of the quasi-experiment

	UHT	Pasteurzed	Organic	Soy Organic
$O_2 - O_1$	$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$		
$O_3 - O_2$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$	$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$		
$O_3 - O_1$	$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$		
$O_5 - O_4$		$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$	
$O_6 - O_5$		$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$	$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	
$O_6 - O_4$		$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$	
$O_8 - O_7$			$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$
$O_9 - O_8$			$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$	$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$
$O_9 - O_7$			$H_0: \mu_d \leq 0$ $H_1: \mu_d > 0$	$H_0: \mu_d \geq 0$ $H_1: \mu_d < 0$

To verify these hypotheses, observations were tabulated in Microsoft Excel® software and the underlying protocol applied. This was chosen based on the guidelines proposed by Anderson, Sweeney and Williams (Anderson, Sweeney and Williams, 1999), Larson and Farber (Larson and Farber, 2004), Freedman et al. (Freedman et al., 1998), but the work that presents this protocol more closely to this case is Levin and Fox (Levin and Fox, 2004).

Data analysis consisted in checking the difference between the observations through a test of difference between means. First, it was calculated the standard deviation of the sample, then identified the number of degrees of freedom (g.1.) and performed calculation of the statistical standard Student's t. Finally, it was calculated the p-value.

5 Results

The average analysis enabled the graphic display of results, however, to say that these changes are in fact significant, statistical tests were done.

Table 4   Results

Parmalat	$O_2 (-) O_1$	$O_3 (-) O_2$	$O_3 (-) O_1$	Fazenda	$O_5 (-) O_4$	$O_6 (-) O_5$	$O_6 (-) O_4$
Average	0,41	-0,03	0,38	Average	0,407	-0,367	0,04
Standard Deviation (s)	0,914	0,788	0,983	Standard Deviation (s)	0,503	0,493	0,593
n	305	305	305	N	199	199	199
Standard Error	0,052	0,045	0,056	Standard Error	0,036	0,035	0,042
Test t	7,821	-0,653	6,744	Test t	11,394	-10,46	0,954
p-value	0	0,257	0	p-value	0,000	0,000	0,171

Paulista	$O_2 (-) O_1$	$O_3 (-) O_2$	$O_3 (-) O_1$	Timbaúba	$O_5 (-) O_4$	$O_6 (-) O_5$	$O_6 (-) O_4$
Average	0,416	-0,246	0,17	Average	-0,407	0,367	-0,04
Standard Deviation (s)	0,855	0,848	0,894	Standard Deviation (s)	0,503	0,493	0,593
n	305	305	305	N	199	199	199
Standard Error	0,049	0,049	0,051	Standard Error	0,036	0,035	0,042
Test t	8,493	-5,057	3,324	Test t	-11,394	10,46	-0,954
p-value	0,0000	0,0000	0,0000	p-value	0,000	0,000	0,171
Fazenda	$O_2 (-) O_1$	$O_3 (-) O_2$	$O_3 (-) O_1$	**Timbaúba**	$O_8 (-) O_7$	$O_9 (-) O_8$	$O_9 (-) O_7$
Average	-0,384	0,141	-0,243	Average	0,197	-0,145	0,053
Standard Deviation (s)	0,807	0,763	0,855	Standard Deviation (s)	0,489	0,389	0,412
n	305	305	305	N	152	152	152
Standard Error	0,046	0,044	0,049	Standard Error	0,04	0,032	0,033
Test t	-8,285	3,222	-4,95	Test t	4,962	-4,575	1,571
p-value	0,000	0,001	0,000	p-value	0,000	0,000	0,059
Xandô	$O_2 (-) O_1$	$O_3 (-) O_2$	$O_3 (-) O_1$	**Native**	$O_8 (-) O_7$	$O_9 (-) O_8$	$O_9 (-) O_7$
Average	-0,443	0,144	-0,298	Average	-0,197	0,145	-0,053
Standard Deviation (s)	0,887	0,913	0,966	Standard Deviation (s)	0,489	0,389	0,412
n	305	305	305	N	152	152	152
Standard Error	0,051	0,052	0,055	Standard Error	0,04	0,032	0,033
Test t	-8,699	2,754	-5,384	Test t	-4,962	4,457	-1,571
p-value	0,000	0,003	0,000	p-value	0,000	0,000	0,059

Table 4 shows the calculation of the Average, the Standard Deviation, the Standard Error, t test value α, for the difference between the first and second, third and second, and the third and first observation for each of the brands. The values are then analyzed.

The results, in general, shows that less sustainable brands fell on the preference of the participants after they received information about the sustainability aspects of that type of product, but regained preference when they were told on the price of these products. This is justified by the fact that the most sustainable brands are more expensive than less sustainable. It is noteworthy that despite the less sustainable brands have gained preference after the presentation of the prices, they have not returned to the same level of preference they had prior to exposure of information on the sustainability of the product types.

This general condition, has not been shown statistically to the Parmalat brand between the two observation and observation three (O_3-O_2) that is, in the first phase of the test. Although the simple average show that Parmalat brand has gained 0,030 positions. The t test and p-value showed that average cannot be considered statistically different from zero and, therefore, should reject the hypothesis of the Parmalat brand has gained the preference of participants to check their price.

Other changes that could not be confirmed statistically were the brands Fazenda Bela Vista and Timbaúba between observation four (O_4) and observation six (O_6). The simple average shows that the Bela Vista Farm brand lost 0.04 position, while the brand gained Timbaúba. But with the result of t-test and p-don't indicate that these changes in positions are relevant, so in this case, the hypothesis must also be rejected. And the difference between the ninth observation (O_9) and seventh (O_7) to Timbaúba and Native marks in the third test phase.

In all, five of the eighteen hypotheses presented on the Table 2, were statistically rejected. Hence, we conclude that the proposed model is consistent and relevant, so the purpose of this research was reached.

6 Conclusion

The goal set for this research was to propose a model of brand management to guide consumer choice to more sustainable options. And the secondary objective was to test this model through a quasi-experiment. As result of the marketing efforts to propose sustainable solutions, using theories as consumer behavior and marketing mix, appeared conscious consumers, who are those who acquire products with a low environmental impact. However, sustainable consumption also involves other actions, as seen, which are to reduce, reuse and recycle.

It is observed that among the analyzed sample, there are different reactions to put interventions, and some consumers have changed their choices and thus changed the characteristics of the sample, other participants have not changed. Importantly, the Brand Management Model for Sustainability also includes those consumers who despite receiving information on the sustainability aspects of products would not change your brand preference consuming.

The model seeks to cater to consumers with varying degrees of awareness of sustainability and thus categorizes the marks with respect to these aspects. However, it is important to highlight that does not mean that brands are better or worse. Brands are more sustainable or less. The market comprises all those consumers and all these brands, and more than the choices of consumers are more sustainable, there will always be demand for each brand in each of the model levels. Thus, an essential function that the model provides is to position the marks with respect to sustainability in this universe (market).

The central point of understanding that brands are not better or worse is the price. If a family has a low income, you cannot make more sustainable purchasing, and then mark it consumes is adequate. Moreover, reducing hunger in the world it is also a goal of sustainable development - ODS.

There is much more to do regarding the continuity and completeness of research on the topic, and the possibilities that this model offers. It would be interesting to test the model with other types of products, as well as another research approaches such as the use of interviews and a survey application.

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Research on the Influence of Purchase Intention from Film Consumers by Electronic Word-of-Mouth

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Abstract: Based on relevant research at home and abroad, this paper chooses the special film industry to judge whether the number, direction and interest of electronic Word-of-Mouth have influence on the purchase intention by using Pearson correlation coefficient analysis method. In addition, the paper tests three hypotheses of the study by using regression analysis and points out the number, direction and interest of electronic Word-of-Mouth will affect the reception of electronic Word-of-Mouth for film consumers, thus affecting the purchase decision. Finally, the relevant countermeasures and suggestions are put forward.

Key words: Electronic word-of-mouth; Number; Direction; Interest; Film consumption

1 Introduction

With the popularity of online shopping, the internet has gradually become an important consumption channel. At the same time, product information on the internet platform, especially electronic Word-of-Mouth, plays a key role on consumers' decision, shopping behavior and product cognition. Especially for cultural consumption, due to the lower degree standardization of its products or services, various forms and limited objective properties, it is difficult for consumers to judge the actual value of cultural consumption like they perceive ordinary physical products(Sweeney J.C., Soutar, G.N., &Mazzarol, 2012;Berger, J., & Schwartz, E.M. , 2011).This has also caused various manifestations of consumers' purchasing results in the field of cultural consumption, while the film industry as the cultural consumption field is developing rapidly, and the most systematically perfect field of online shopping is better to show the influence on information type and quality for the purchase intention(Buttle F A, 1998;Smith D N, 2002; Barki H, Hartwick J, 1994)

It can be found in research at domestic and foreign that scholars mainly conduct relevant research on the effect and relationships of e-WOM on purchase intentions and decisions. It is worthwhile to affirm electronic e-WOM has a direct impact on purchase intension and decisions in areas or industries of online shopping popularity(Que keru, 2004). With the continuous enrichment of the internet, e-WOM information types are becoming more and more widespread, especially cultural consumption products like movies, and different information types show different quality of information as well as the consumers recognition degree is also different(Frenzen J K, Davis H L, 1990;Gefen D, 2000). Therefore, the analysis regarding the effects of e-WOM and purchase intention from the fundamental aspects cannot reveal the true relationship and chemical reaction between the two parties. Also, the logic paradox of "lower word-of-mouth but higher box office" is unable to be explained in film industry(Mitchell, Vincent-Wavne,1999; MARSHA A, 2015)

2 Research Hypothesis

This study proposes hypothesis including:

H1: There is a positive correlation between the number of e-WOM and the purchase intention of movie consumers.

H2: There is a positive correlation between the direction of e-WOM and the purchase intention of film consumers.

H3: There is a positive correlation between the interest of e-WOM and the purchase intention of film consumers.

3 Questionnaire Design and Preliminary Investigation

Pre-study data is obtained through on-site filling and online distribution. Through factor analysis, the validity test was conducted, the items with low correlation were removed, and the items with unreasonable expression and phrasing were revised. An official questionnaire including 12 measurement

items was formed (as shown in Table 1).

Table 1   Scale Design

Variable	Subject item
The number of e-WOM	The commentary on the film was supported by a lot of comments
	Many people commented on the film
	Many people commented on the same issue of the movie
The direction of e-WOM	The general tendency of comments on the movie is positive
	The overall suggestion for the movie is to suggest buying
	Compared to positive reviews, I believe in negative reviews
The interest of e-WOM	Interesting comments will attract my attention
	Funny comments will attract my attention
	Very interesting comments will attract my attention
The purchase intention of film consumers	I am eager to purchase this movie's tickets
	I am very likely to buy this movie's tickets
	I may (or have) recommend(ed)this movie to my friends and family

4 Research Results and Data Analysis

4.1 Reliability and validity analysis.

The internal consistency method was adopted for reliability analysis, and the questionnaire items were measured by Cronbach's α coefficient. Think of chart 2 as an example. Nunnally believed that if the Cronbach's α coefficient was greater than 0.7, the reliability would be high, but 0.5 would be the lowest acceptable reliability level. It can be seen that Cronbach's α value of all four variables were above 0.7 by Table 2, indicating that the questionnaire used for measurement had a high reliability.

Table 2   Results of Reliability Analysis

variable	The number of e-WOM	The direction of e-WOM	The interest of e-WOM	The purchase intention of film consumers
Cronbach's α	0.872	0.864	0.756	0.826

By the validity test, we found that the variance of these 4 factors accounts for 86.547% of the total variance. In another word, these 4 factors have reached an acceptable level for the interpretation of the electronic word-of-mouth. Therefore, the revised scale can be tested by investigation, which has good validity.

4.2 Correlation analysis

In this study, the Pearson correlation coefficient analysis method was used to determine whether the independent variables (the number of e-WOM, the direction of e-WOM, and the interest of e-WOM) had a significant impact on the dependent variables (purchase intention).

The results of correlation coefficient between independent variable and dependent variable are shown in Table 3.

Table 3   Correlation Analysis of Influencing Factors and Purchase Intention

Influence factor	The degree of influence on purchase intention	
	Pearson correlation coefficient	Significant level P
The number of e-WOM	0.748**	0.000
The direction of e-WOM	0.846**	0.000
The interest of e-WOM	0.624**	0.002

According to table 3, the correlation coefficient between the variables and the dependent variables had statistical significance, and the Pearson correlation coefficient was more than 0.5, indicating that the variables were positively correlated with the dependent variables. Therefore, by studying the results of correlation analysis, we can preliminarily determine the positive influence of consumers' purchase intention on the number, direction and interest of e-WOM.

4.3 Regression analysis

In order to judge whether there is causal relationship between independent variables and dependent variables, this paper further uses regression analysis. Excluding the factor of the interactions among variables, the 3 hypotheses were tested in this study.   The overall effect parameters of the regression model are shown in Table4

Table 4   Regression Coefficient of Consumer Willingness to Buy Films

	Nonstandard coefficient		Standard regression coefficientBeta	significant levelP
	B	Standard error		
Constant	2.265	0.217		0.000
The number of e-WOM	0.472	0.037	0.336	0.000
The direction of e-WOM	0.348	0.034	0.324	0.000
The interest of e-WOM	0.186	0.032	0.078	0.006

From table 4, we can see that the number, direction and interest of e-WOM are significant regression analysis on purchase intention of dependent variable. Also, the significance probability of the beta coefficients of variables is less than 0.01, indicating that 3 independent variables have significant effects on dependent variables. According to the standard regression coefficient, the regression coefficient of the number of e-WOM and the direction of e-WOM is close, and the regression coefficient of the interest of e-WOM is smaller. The order of the regression coefficient of the 3 variables is the same as the correlation coefficient.

Regression analysis shows that the number of e-WOM has a positive impact on consumers' purchase intention. Usually, the more the number of e-WOM comes into contact, the greater the probability that consumers can obtain useful information from the relevant clothing products, the more the benefit for consumers with understanding and buying the film. The direction of e-WOM indicates the direction of purchase. Usually, positive e-WOM indicates satisfaction and pleasure consumption experience. On the other hand, negative e-WOM conveys dissatisfaction and disappointing consumption experience.

The vivid and interesting e-WOM information can impress consumers deeply, and enhance consumers' acceptance of information, product cognition and memory.   Therefore, compared with other e-WOM information, the role of the interest of e-WOM is relatively indirect and concealed.

To sum up, through the correlation analysis and regression analysis, it is found that the number of e-WOE, the direction of e-WOM, and the interest of e-WOM have a significant positive correlation with the purchase intention of the film consumers. Therefore, this paper assumes that H1, H2 and H3 are established.

5 Conclusion

The amount of electronic Word-of-mouth in Internet is the most significant factor that influence the purchasing invention of film consumers. The latest research suggests that consumers will get a more comprehensive understanding about a film when there are more relevant electronic Word-of-mouth about that film, which will have a greater effect on their purchasing invention. Consumers intend to evaluate their purchasing decision by taking a page from choices of others. Depending on the particularity of film products, consumer need to know relevant information about the film by a host of electronic Word-of-mouth information. Therefore, it is rational for enterprise to apply marketing method of electronic Word-of-mouth effectively, leading consumers discuss and communicate with each other about the film products actively. Meanwhile, it is advisable for enterprise to show their advantages and features of products by means of the introduction about films and pictures of details, which will reduce the perception uncertainty of consumers and enable them to purchase appropriate film products.

There are obvious influences on purchasing decision of film consumers fromboth positive and negative electronic Word-of-Mouth. Positive electronic Word-of-Mouth influence the purchasing will of consumers in a positive way, however, the excessive praise will cause suspicion on its credibility. Accordingly, there will be more positive effect on purchasing will of consumers when positive and negative electronic Word-of-Mouth are moderately combined. The conclusion above suggests film enterprise that, it is of great necessity for them to focus eyesight on the preference of electronic Word-of-Mouth about their products in Internet, especially the negative one, and to resolve the problems which have been mentioned in the internet information timely, making efforts to eliminate the negative sentiment from consumers about products and promote the propagation and diffusion of positive

electronic Word-of-Mouth which will enhance the prestige of enterprise, instead of hiding or deleting the negative electronic Word-of-Mouth simply.

Acknowledgement

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Research on Product Diffusion of Shared Bicycle Based on Bass Model

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Abstract: The flourish of Mobile Internet stimulates the creation of shared bicycle which is extremely popular among Chinses. This study picked one of the shared bicycle companies-MOBIKE as a research object, dividing the registered users into four categories (Users aging 18-25,26-35,36-45, over 45), then carried out linear regression analysis according to the existing data. After that the model of MOBIKE's product diffusion was established based on Bass modal. The optimal fitting method was used to predict the future number of registered users in different age groups of the different time points. Finally, the study came to the conclusion that the total registered users would reach the market saturation in 2018.The study also compared the result of product diffusion in difference age groups, expecting to provide the companies and the government with the information for reference.
Key words: Shared bicycle; Bass model; Product diffusion; Market saturation point

1 Introduction

Owing to mobile Internet technology and GPS (Global Positioning System) positioning technology, "Internet + bicycle" model of a new generation of shared bike was born. Shared bicycle, represented by "MOBIKE", makes a great contribution to solve the "last mile" problem.

At present, the study of shared bicycle mainly focuses on its technological innovation, profit model, business efficiency and sharing economy. Articles about the diffusion of shared bicycle and its market saturation have been rarely seen. This study concentrated on the spread of shared bicycle. The common models used for product diffusion research are Compertz life cycle curve (TRAPPEYC, WUHY, 2008), Logit regression prediction model (Ma Jun, Wang Ning, Kong Deyang, 2009), Norton model (NORTON J A, 1987), Bass model (F M BASS, 1969), etc. Among all of these, Bass model and its later optimization model has been widely used in product diffusion, especially in the diffusion prediction of innovative products and innovative technology.

XieJianzhong, Yang Yu,Chen Qian, Li Fei (XieJianzhong,Yang Yu,Chen Qian and Li Fei, 2015) predicts the demand of short-period products based on the improved Bass model, having verified the scientific and effective effect of the method utilizing the example of the demand forecast of a mobile phone ; MengFudong, He Mingsheng (He Mingsheng, 2008) uses the optimized Bass model to study the diffusion of China IPV4 standard, having predicted the diffusion trend of it; Wang Rishuang, Zhang Xueli (Wang Rishuang and Zhang Xueli, 2015) and so on apply Bass model into the field of Internet finance, estimating the spread of online payment behavior; Song Zhijie, Qiao Fen, Shi Rui (Song Zhijie,Qiao Fen and Shi Rui, 2016)studies the diffusion of rumors in unexpected events based on the Bass model.

By using Bass model, the above study has achieved good results, so in this paper we studied the product diffusion of shared bicycles, utilizing the optimized Bass model which divided the users into four different age categories respectively and studies each of them, having obtained the most reliable product diffusion model of the shared bicycle from abundant alternative models.

2 Establishment of Product Diffusion Model Based on Bass Model

2.1 Construction of the product diffusion model for shared bicycle

Dating back to the birth of shared bicycle in 2014 and its first appearance in the Peking University campus in 2015, after the spread to the major cities across the country, the increasing number of registered users now has reached tens of millions. The shared bicycle causes widespread public concern, and some people   use shared bicycles for short-distance travel or visit, saying that these people are innovators, who are not affected by social pressure and the adopted; the early shared bicycles users influence other people to begin to use shared bicycles through the behavior, verbal communication, social media and other ways, such as riding a bike raising public attention, sharing experience with friends through the text messages and telephone or QQ, friends circle, microblog. This part of the affected citizens are followers. In order to build a model of product diffusion for shared bicycles, the

following assumptions are made:

    a. Market potential remains constant over time;

    b. Product diffusion is independent of other products;

    c. There is no product performance difference brought by product iteration;

    d. The geographical boundaries of the social system do not change with the diffusion process;

    e. Shared bicycles' product diffusion is only a two - stage process that is adopted and not used;

    f. Shared bicycle products is not affected by the marketing strategy;

    Based on the Bass model, the product diffusion model of the shared bicycle is directly obtained:

$$N_0(t) = m_0 \left[\frac{1 - e^{-(p_0+q_0)t}}{1 + \frac{q_0}{p_0} e^{-(p_0+q_0)t}} \right]$$

Where$N_0(t)$ is the total registered user; m_0 is the maximum market potential; p_0 is the innovation coefficient; q_0 is the imitation coefficient; t is the time.

The adoption of shared bicycle varied among different age groups, so the registered users are divided into four categories, 18-25 years old; 26-35 years old; 36-45 years old; over 45 years old, the model is optimized and the optimized Bass model is as follows:

$$N_0(t) = \sum_{i=1}^{4} N_i(t)$$

$$N_i(t) = m_i \left[\frac{1 - e^{-(p_i+q_i)t}}{1 + \frac{q_i}{p_i} e^{-(p_i+q_i)t}} \right]$$

Where$N_i(t)$(i=1,2,3,4)respectively represents the number of registered users of 18-25 years old; 26-35 years old; 36-45 years old and over 45 years old; m_i(i=1,2,3,4) represents the market potential of the above four age groups respectively;p_i(i=1,2,3,4) represents the innovation coefficients of the above four age groups respectively; q_i(i=1,2,3,4) represents the imitation coefficients of the above four age groups respectively.

3 Parameter Estimation and Model Test

3.1 Data selection

    Currently there are more than 25 companies of shared bicycle, including MOBIKE, OFO, Yonganxing, Xiao Ming cycling, etc., where MOBIKE and OFO occupy most of the market. "2017Q1 China Shared Bicycle Market Research" puts forward by iResearch. The Research shows that the market share of OFO is nearly 63% and the market share of the motorcycles is 25%. OFO put into use in colleges and universities in 2015, to the end of 2016 they began the "city sharing plan" into the city, during this two periods OFO could only be used in colleges and universities, which cannot be called real city shared bicycle. MOBIKE was put into cities at the beginning and users were required real name registration, also they used GPS positioning. So its data is more reliable and accurate. Therefore, this paper used the relevant data of MOBIKE to estimate the parameters.

    In this paper, the number of people registered in bicycles, the number of active users every week and the proportion of users in different age from May 2016 to February 2017 were comprehensively considered. The results were analyzed by the method of linear regression. According to the model, the relevant data is shown in Table 1:

Table 1　Data of Registered Users of MOBIKE from May 2016 to February 2017

Time	Total	18-25	26-35	36-45	over 45
2016.05	79.41	17.55	44.07	13.90	3.89
2016.06	86.26	19.06	47.87	15.10	4.23
2016.07	108.40	23.96	60.16	18.97	5.31
2016.08	158.09	34.94	87.74	27.67	7.75
2016.09	303.42	67.06	168.40	53.10	14.87
2016.10	406.37	89.81	225.54	71.11	19.91
2016.11	443.73	98.06	246.27	77.65	21.74
2016.12	690.94	152.70	383.47	120.91	33.86
2017.01	817.18	180.60	453.53	143.01	40.04
2017.02	908.46	200.77	504.20	158.98	44.51

Unit: ten thousand people

According to the results of the 2010 census and the average growth rate of the domestic population in recent years, the total market potential (m_0) of MOBIKE and the sub-markets potential（m_i） were calculated. The results are shown in Table 2:

Table 2   Market Potential of the Whole Market and Sub-markets of MOBIKE

Total potential	18-25	26-35	36-45	Over 45
21241648	4957932	5294456	5549750	5439510

3.2 Parameter estimation and model inspection

The nonlinear least squares method is used to estimate the model parameters. The values of the parameters run by matlab2017 are shown in Table 3. Zeng Ming, Zeng Fanxiao, Zhu Xiaoli(2013) pointed out that the empirical value of p concentrated from 0. 01 to 0.03, the empirical value of q concentrated in from 0.3 to 0.7 and rarely greater than 0.5. In this model parameter p <q, it is proved that the diffusion of MOBIKE is successful. Among them, the p value is relatively small, that is, the acceptance of innovator on MOBIKE is not predominant. It may be because the public are cautious with the product on which they need to scan the QR code; The small value of p illustratesthatpotential users are less affected by the social atmosphere.

Table 3   Parameter Estimates of the Empirical Model

parameter	estimates
m_0	2124.16
p_0	0.0138
q_0	0.2727

The model established with the above estimated parameters is compared with the actual situation, as shown in Figure 1. The model fitting coefficient R ^ 2 is 0.986, which is close to 1, indicating that the fitting effect is ideal.
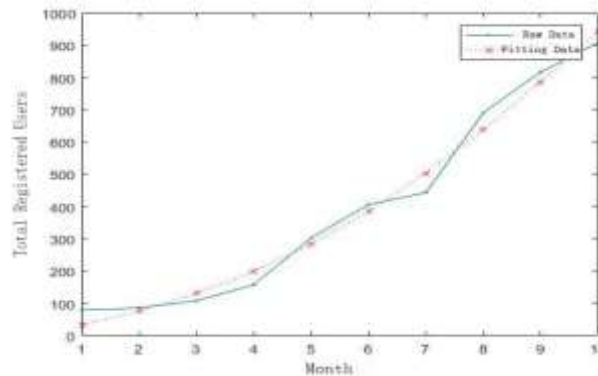
Figure 1   Model Results Fitting

In figure 1 ,y-axis represents the total number of registered users, the unit is million; x-axis represents time, the unit is month. February of 2016 is recorded as 1. For example x = 3 means 2016 April.

The same method was used to estimate the parameters of the four age group - markets. The model fitting coefficient R ^ 2 is close to 1 in MATLAB2017, and the adaptability of model is good. Finally, the parameter estimation is shown in Table 4 below.

Table 4   Parameter Estimates of Sub-markets

	18-25	26-35	36-45	Over 45
p	0.0134	0.0125	0.0103	0.0033
q	0.2647	0.5842	0.2282	0.1797

4 Analysis

4.1 Comparative analysis of different age sub - markets

The following conclusions can be drawn from the estimated values of the above four age sub-markets:

(1) The innovation coefficients p of the four sub-markets are less than the imitation coefficient q, indicating that the product diffusion of shared bicycle products in different age groups is successful.

(2) In the sub-market of users over 45 years old, the innovation coefficient p is significantly smaller than that of other sub-markets, indicating that users over 45 years old are less receptive to the shared bicycle, and they are less innovative. This sub-market imitation coefficient q is also smaller than other sub-market, indicating that the spread of shared bicycle in the 45-year-old users is relatively slow.

(3) There is no significant difference in innovation coefficient p of 18-25 years old, 26-35 years old, 36-45 years old, which are within the experience value range, indicating that there are more innovators in these sub-markets. However comparing the imitation coefficient q, it is found that the q value of the 36-45 year old market isobviously greater than the other two sub-markets, indicating that the diffusion of shared bicycle products among the 36-45 year-old users is better.

4.2 Future market forecasts

(1) Total registered user volume forecast

The total registered user volume image was established according to the above estimated parameters, as shown in Figure 2:
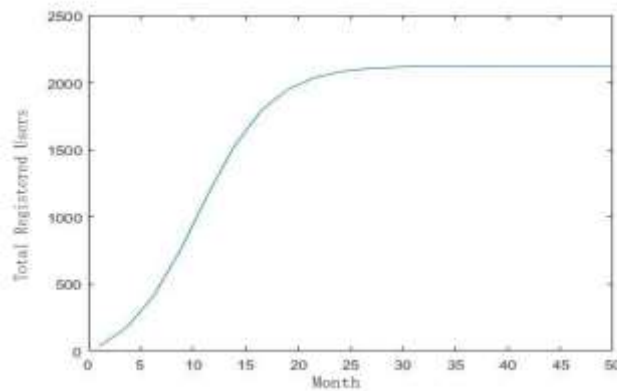
Figure 2   Total Registered User Model Image

In Figure 2, y-axis represents the total number of registered users, the unit is million; x-axis represents the time, the unit is month. February of 2016 is recorded as 1. For example, x = 20 means October 2017.

According to the model and image the following conclusions were drawn:

a. The spread of MOBIKE is consistent with the S-curve;

b. Between May 2016 and February 2017, MOBIKE was in the bud, which is also in line with the actual situation;

c. In the next two years, MOBIKE grows quickly. By the middle of 2017, the number of registered users grew at the fastest rate, reaching 20 million in August 2018.

(2) Comparative analysis of registered users forecast in four sub-markets

The registered user volume image of four sub-markets were established respectively according to the above estimated parameters, as shown in in Figure 3,Figure 4, Figure 5, Figure 6.
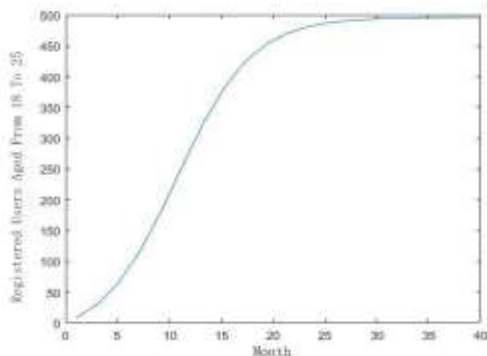
Figure 3   18-25 Years Old Sub-market Model
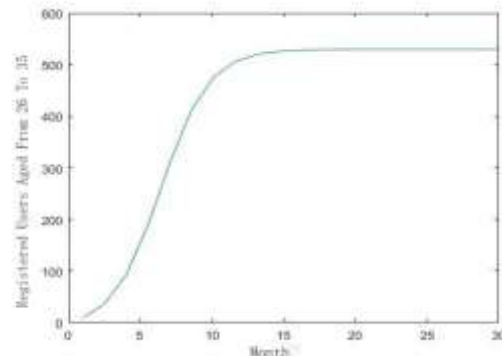
Figure 4   26-35 Years Old Sub-market Model
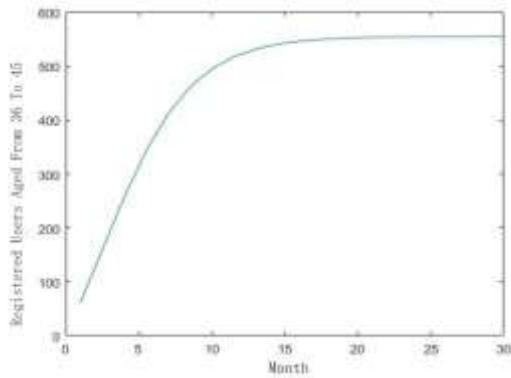
Figure 5   36-45 Years Old Sub-market Model   **Figure 6   over 45 Years Old Sub-market Model**
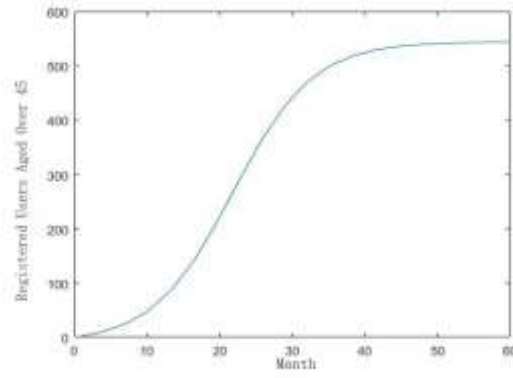
The result of comparative analysis are shown in Table 5.

Table 5   Prediction of Sub-markets Development

	18-25	26-35	36-45	45-60
Growth period	August 2017	January 2017	December 2016	December 2018
Mature period	November 2018	July 2017	July 2017	July 2021

5 Conclusion

Based on the Bass model, a product diffusion model of shared bicycles was established in this study. By using the research data of the MOBIKE with industry representative and the least square method through MATLAB2017, the model and the actual data were fitted according to the estimated parameters. Finally, a better fitting effect was obtained, and comparing the four age sub-markets we get the following conclusions:

1. The small value of the total innovation coefficient p_0 in the model indicates that the public's acceptance of shared bicycle is not high enough. This is actually detrimental to the development of new startup products. The government should better further strengthen social innovation and publicity so as to encourage citizens to accept Innovative products.

2. The total simulation coefficient q_0 in the model is relatively small, indicating that potential users are less affected by the adopters. In the latter stage, the company can accelerate the diffusion of products by strengthening its marketing efforts.

3. In 2018, the shared is in a period of rapid growth. In mid-2017, the number of registered users had the highest growth rate and is predicted to reach the market saturation point in August 2018.

4. In the four sub-markets, the innovation coefficient p is not significantly different, while the innovation coefficient p in markets over 45 is significantly lower, indicating that the older potential users are relatively not interested in shared bicycle. This may be related to the fact that most of their participation in the internet is poor. Companies can offer other non-mobile internet bicycle services to meet their needs.

5. The imitation coefficient q in the 26-35 age markets is significantly higher than that in other sub-markets, indicating that the shared bicycle in this sub-market is rapidly spreading. In this market, young office workers have higher demand for short-distance travel, and the Internet has been integrated into their lives. These are good reasons for products diffusion effect. In contrast, the imitation coefficient q in markets over 45 is small.

The conclusions obtained in this study can provide reference data for the company and the government and the methods used have some reference significance. But there are still some deficiencies in several aspects: 1. Although the Bass model was optimized for users of different ages. However, the Bass model is still simple. Only the effect of registered users on the current users was regarded. Many factors were neglected. For example, government policies, product quality, advertising investment, users' differences except age. In later study, other researcher can introduce these variables to establish an optimized product diffusion model to get more reliable conclusions. 2.The data in this study is insufficiency. More data will be obtained for further study. To optimize model is the method for accurate data.

Acknowledgement

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Research on the Influencing Factors of Brand Value of E-commerce Shopping Websites from Consumers' Perspective

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Abstract: The development of the Internet and the rise of e-commerce have changed people's lifestyles and shopping methods, and e-commerce shopping websites have come one after another. The fierce market competition poses challenges for the e-commerce shopping website to enhance brand value. Therefore, this paper builds a research model of brand value influencing factors based on the framework of brand value, and uses the structural equation model to study the influence of three dependent variables of brand knowledge, service value and image value on brand loyalty. As a conclusion, the three factors have significant positive impacts on brand loyalty, and the greatest impact is the service value, followed by the image value, and the least affected is the brand knowledge. This research also provides direction and basis for the increase in the brand value of e-commerce shopping websites.
Key words: Brand value; Brand loyalty; Service value; Image value; Brand knowledge

1 Introduction

With the rapid improvement of network infrastructure, more and more enterprises have begun to use the Internetand carried out trade activities through e-commerce.The development of the Internet has also brought about rapid changes in people's lifestyles. Online shopping has become the shopping mode that more and more consumer groups have chosen. The e-commerce shopping sites have also risen with great enthusiasm. Tmall Mall, Jingdong, Amazon, and Taobao have come one after another. In the fierce competition, the main problem that e-commerce shopping websites face is how to retain consumers and cultivate their brand loyalty, which involves the issue of e-commerce shopping website brand value enhancement. Therefore, the first thing is theinfluencing factor of brand value, which is the basis and direction for taking measures to enhance the brand value. Brand value has different value focus from three different perspectives: business, society and consumers.

When understanding the value of a brand from the perspective of a company, or from a financial point of view, most scholars emphasize the added value (Farquhan, 1990) or net present value (Shocker&Weitz, 1988). This is a brand premium arising from the joint action of the company, relevant stakeholders and the market (Sun Ning, 2016). The domestic scholar GuLihan (2012) simply defined the brand value as the price of purchasing a brand or resetting a brand. The definition of brand value mainly emphasized the attitude and behavior of customers to a certain brand(Raggio&Leone, 2007; Yu Junying, 2011), including the perception or understanding of the brand, the loyalty of the brand, and the added value of the product or service(Keller, 2003; KSDSingh&MA Islam, 2017). When defining brand value based on the perspective of stakeholders, scholars emphasize the excess value of all stakeholders related to the brand, including companies and consumers (Zhang Qian, 2006; Wang Xiaoling, 2010). Considering the influencing factors of brand value, Markéta&Lhotáková (Markéta and Lhotáková, 2012)believed that the value of the brand depends to a large extent on the quality of the brand. In addition, most of the literature attributed the main factors to consumers, including consumers' satisfaction with the brand (Eunha Choi, EunjuKo, 2016), consumers' perceptions of the brand's perception of the marketing program, behaviors and feelings (KSD Singh & MA Islam, 2017).

After reviewing these documents, we will find that most of the scholars' research on brand value has gathered on the analysis of traditional brand values. However, the current environment, with the development of networke-commerce platforms, is greatly different. Under this background, the traditional brand value development system can no longer meet the needs of the current corporate brand development. In conclusion, this article will focus on the brand value from the consumers'perspective, starting from the three aspects of customer transfer value, brand awareness and brand loyalty to explore the factors of the hot e-commerce shopping sites' brand value.

2 Research Design
2.1 Model construction

This article combines the actual situation of the e-commerce shopping site as a research object and carefully analyzes the constituent elements of the brand value (Figure 1). In the fiercely competitive market, the advantages of products and prices are no longer prominentwhich can increase consumer satisfaction.This increase in brand loyalty can be attributed mainly to the shopping experience brought to consumers by the website.Therefore, the research in this paper mainly focuses on the brand knowledge (BK), service value (SV) and image value (IV) as dependent variables. Combined with the review of the literature, this article uses brand loyalty (BL) to express brand value as the dependent variable of this study. Based on the above review, the brand value research model of this paper is constructed (Figure 2); and the measurement indexes of each variable are established by referring to the measurement schemes in existing studies.
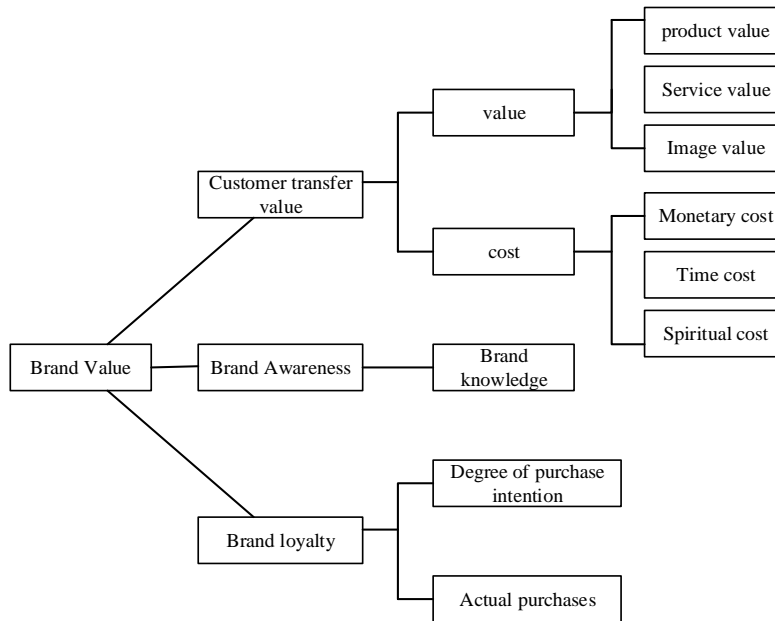
Figure 1   Corporate Brand Value Theory Framework
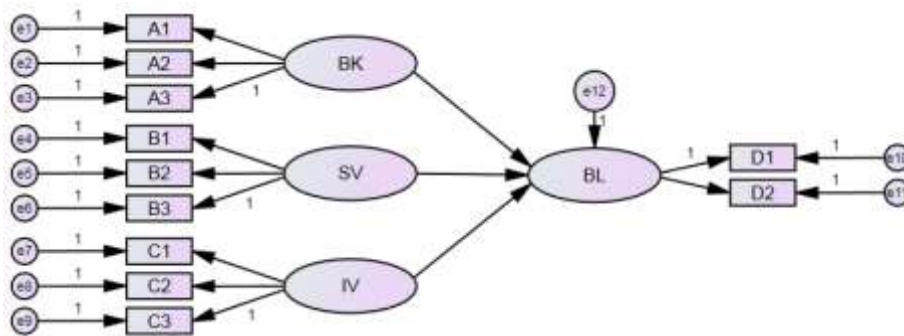
Figure 2   Brand Value Research Model Based on Consumers

2.2 Assumptions

Brand knowledge refers to the consumer's ability to identify and understand the brand of the website. If consumershad a deep understanding of a website brand, they would consider the website immediately when they need to shop online. They are very willing to spend on the website. The service value of a shopping website is mainly reflected in the website's ability to provide service to consumers. As consumers' living standards improve and their spending power increases, they increasingly focus on the quality of service during the shopping process.The image value of a shopping website is mainly reflected in the website construction of the website. New and unique web pages and convenient search pages will contribute to the image of the website, and consumers will be more likely to leave high

ratings and loyalty to the brand.Therefore, this paper proposes assumptions:

H1: Brand knowledge has a positive impact on the brand value (brand loyalty) of e-commerce shopping sites.

H2: The service value (customer service capability) has a positive influence on the brand value (brand loyalty) of the e-commerce shopping sites.

H3: The image value (website construction) has a positive influence on the brand value (brand loyalty) of the e-commerce shopping sites.

3 Data and Methodology

3.1 Data collection

This study mainly collects the data required for the study through questionnaires. The research object of this paper is the broad consumer groups distributed in various cities, mainly concentrated in large cities with relatively good degree of network development, such as Beijing, Shanghai, Guangzhou and Wuhan.Therefore, the questionnaires of this study are mainly distributed through online communicationto satisfy the diversification of the city where the surveyed people are located and the level of the survey target group.

In this study, 300 questionnaires were distributed finally and 290 questionnaires were successfully recovered. The recovery rate reached 96.7%. Among these successful questionnaires, 280 were valid and the effective rate was 93.3%.

3.2 Data analysis

(1) Descriptive statistics

A total of 280 valid questionnaires were recovered in this study, and of which 42.50% were male. The largest number of respondents in the 20-25 age group was 176 people, accounting for 62.86% of the total number. The second is the consumer groups in the 26-30 age group, accounting for 22.50%. In terms of educational level, most of the respondents are undergraduate or master's degree, accounting for 80.35% of the total. And their monthly income is mostly below 3,000 yuan. Among them, the monthly income of less than 1,000 yuan has exceeded half of the total, accounting for 51.07%. Moreover, 55.36% of these surveyed consumer groups use the Internet for a period of 6-7 years. In addition, descriptive statistical analysis shows that the data skewness statistic under each indicator satisfies the absolute value within 3, and the absolute value of the kurtosis statistic is within 10. Based on this, we can conclude that the data in this study basically obey the normal distribution.

(2) Reliability and validity test

The overall Cronbach's Alpha values for the four variables are all greater than 0.7, which is consistent with reliability test requirements. And the CITC values of 11 small indicators are all greater than 0.5, which shows that the measurement scale used now has a good reliability value. In addition, the analysis results show (Table 1) that the Bartlett sphere test χ^2 values of the 11 items in thequestionnaire were 1175 (degrees of freedom 55, sig = 0.000) and the KMO value was 0.779.

Table 1   Tests of KMO and Bartlett

Kaiser-Meyer-Olkin metric for sampling enough		.779
Bartlett's sphericity test	Approximate Chi-square	1175.491
	df	55
	Sig.	.000

(3) The fitting degree of the model

The result obtained through the AMOS 23.0 software experiment is as follows (figure 3). For the model of this study, the chi-squared value is 120.0, the degree of freedom is 41 and the ratio of chi-square to the degree of freedom is 2.926 which is less than the critical value 3, which is in accordance with the model's fitness standard. In addition, this article also uses GFI, NFI, CFI, IFI and other indexes that are not affected by the sample size to evaluate the degree of fit of the model. It turns out most of the indicators are within acceptable levels, indicating that the model fits well, but there is still room for improvement.
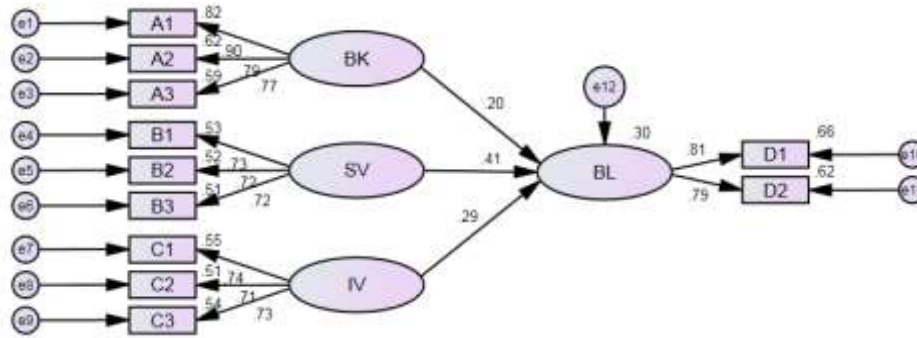
Figure 3   Structural Equation Initial Model Path Coefficient

Therefore, according to the correction index and suggestion provided by AMOS, this paper revised the initial model of the structural equation to reduce the chi-squared value of the model and increase the degree of fit between the model and the data. Figure4 revised from the initial model is as follows.
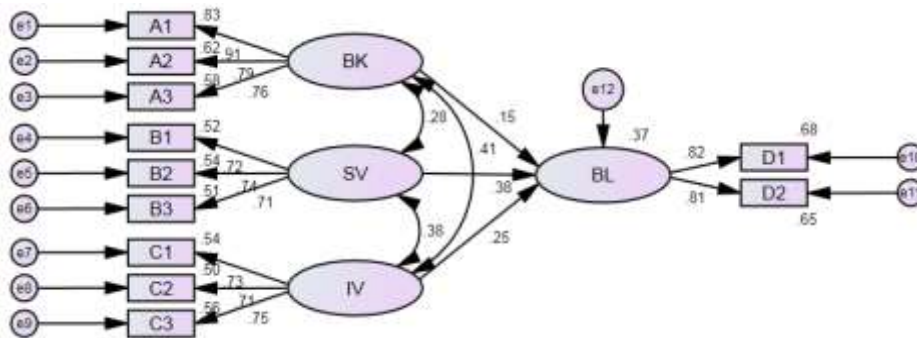
Figure 4   Structural Equation Correction Model and Path Coefficient

The chi-square value of the corrected model is 56.110.The degree of freedom is 38, and the ratio of chi-square to the degree of freedom is 1.477. It is in accordance with the model fitting standard, which is less than the critical value 3. Other indicators are all within the ideal range of standards. Then this model has extremely good fitting degree, and the degree of matching between the model and the data is well.

(4) Hypothesis testing

During the revision of the model, we also obtained the revised model path coefficients (Table 2). Taking brand loyalty as the dependent variable, we can know that the standardized path coefficient of brand knowledge to brand loyalty is 0.150, and its significance is 0.037, which is less than 0.05, indicating that the coefficient is significant at the 5% level of significance. That is, brand knowledge has a significant positive effect on brand loyalty, and the H1 hypothesis holds. The standardized path coefficient of service value to brand loyalty is 0.384, which is less than 0.01, and the H2 hypothesis holds. The standardized path coefficient of image value to brand loyalty is 0.251, with a significance of 0.004 and less than 0.01, indicating that the coefficient is significant at the 1% level of significance, ie, the image value has a significant positive effect on brand loyalty, and the H3 hypothesis holds. And according to the size of the standardized path coefficient, it can be known that the degree of influence of three factors on brand loyalty is service value, image value, and brand knowledge.

Table 2   Path Coefficients of Structural Equation Correction Model

path			Unnormalized path coefficient estimation	S.E.	C.R.	P	Standardized path coefficient estimation
Brand loyalty	<---	Brand knowledge	0.141	0.068	2.084	0.037	0.150
Brand loyalty	<---	Service value	0.448	0.093	4.798	***	0.384
Brand loyalty	<---	Image value	0.302	0.105	2.862	0.004	0.251

In summary, this paper validates several assumptions by using the structural equation correction model of the brand value influencing factors. The hypotheses in this study are all true.

4 Conclusion

According to the analysis of this paper, we can conclude that consumers' awareness of brand, service valueand image value have a significant positive effect on brand value of the website under consumer perspective. The greatest impact is the value of service, the second is the image value, and the least impact is brand knowledge.Based on the above research findings, this article will provide targeted recommendations for the development of e-commerce shopping sites:

(1) To strengthen employee training and enhance website service capabilities. In the fierce market competition, e-commerce shopping websites should strengthen employee standardization training and improve serive level to stand out.

(2) To improve the website construction and increase the value of the website. E-commerce shopping websites should increase investment in website construction, and build a convenient, fast, exquisite and beautiful website page to increase the image value of the website, giving consumers a good impression, and laying a good foundation for brand loyalty.

(3) To pay attention to advertising and improve website visibility. E-commerce shopping websites need to increase investment in advertising and improve their visibility through different channels. For example, "The Red Book" and "Pin Duo Duo" with higher popularity are all implanted in various programs, including TV shows and variety shows.

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Evolutionary Game of Buying and Selling of Real Estate Market Based on Bounded Rationality and Double Housing Prices

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Abstract: Based on the assumption of bounded rationality, this paper constructs a double house price evolution game in the real estate buying and selling market. It uses the principle of replicating dynamic equations to analyze the replicator dynamics, evolutionary stable strategies and phase diagrams of real estate dealers and home buyers, discusses the replicator dynamic and stability of two-players in asymmetric real estate market buying and selling games, and obtains two evolutionary stable strategies - {high price, buy} and {low price, not buy}. Finally, the model was analyzed and corresponding suggestions were given.
Key words: Bounded rationality; Double price; Replicator dynamics; Evolutionary stable strategy (ESS); Evolutionary game

1 Introduction

The real estate industry is related to the national economy and the people's livelihood and it has always been the topic of popular debate. The game problem in the real estate market has attracted the attention of scholars in recent years. Most researches are based on the fact that all players in the real estate market have complete rationality and complete and perfect information. In a single buying and selling game in the real estate market, it is generally assumed that each player involved in the game has a higher rationality, that is, the player always takes his own best interests as the goal, and he has the judgment and decision-making ability of pursuing the maximization of his own interests in a definite and uncertain environment, can trust each other's rationality, has common knowledge of rationality(CKR).However, such high rationality assumptions can be difficult to satisfy when the game is faced with complex decision-making problems in repeated games because not all game players will trust each other's rationality, ability, trust, and trust of trust. There is any doubt or vacillation, that is, the game is "bounded rationality". Information on the process of the game, the benefits(payoffs) and the balance of the parties is also "incomplete" and "imperfect" due to factors such as region, policy, price, collusion, rent-seeking, timeliness, and channels.

Liu Jin-e(2013) analyzed the main players in the real estate market of evolutionary game theory, and pointed out that information asymmetry makes real estate developers choose monopoly pricing strategies, and buyers choose to buy at sight. Y Yang(2014)built an evolutionary game model by introducing a theory of reciprocity based on behavioral economics, believed disordered chaos was a condition of specific parameters in an evolutionary game model. Y Liu et al.(2015)used evolutionary game theory and system dynamics to study the evolutionary game of green building decisions between government and developers, the results showed that there was no evolutionary equilibrium for government static incentives. Chen Zhiyuan(20116)through the construction of evolutionary game model for commercial bank loans the real estate company's main external financing model from the bank and the cooperation of the company's dynamic game angle analysis. On the basis of the tripartite rent-seeking game model, Hong Kairong et al.(2017)conducted a dynamic evolutionary analysis of the behavioral strategies of both the local government and the central government regulatory authorities. Based on the PAB auction mechanism, Luo Guimei(2016) used robust optimization techniques and the concept of "replication dynamics" in evolutionary game theory to propose a concept of robust evolutionary game equilibrium and established a corresponding replication dynamic system. Wang Ting(2016) used evolutionary game theory and methods to model the choices of the subject-government, developer, and consumer included in the real estate market, and analyzed the results of the model.

In the real estate buying and selling market, there is not much research on the combination of double house prices and evolutionary game. The author(2012) once used Bayesian law and reverse induction to study the dynamic game of double house prices and tripartite on the basis of complete but

imperfect information. But now, we will study the buying and selling game in real estate market when dealers and home buyers have bounded rationality.

2 Model Establishment and Analysis
2.1 Basic assumption

Assuming that, in the multi-periodic real estate buying and selling market in a certain area, the same type of houses in the real estate market in the region are homogeneous, single in type, and house prices are relatively stable. Real estate developers own a certain number of new homes, and home buyers have a certain amount of ability to pay for their immediate needs or investment needs. In addition, the government's policies on the buying and selling market are consistent throughout this period.

The real estate dealers(D) and home buyers(F) are bounded rationality. They are the two players generated by the random pairing of the large group of players in the real estate market buying and selling games with very slow learning speed, that is, D and F are the two players of the repeated game generated by random participants of the participants, and the adjustment of the strategy is simulated by the "replication dynamic" mechanism of biological evolution. Because the players of bounded rationality have different levels of rationality, this means that both parties may not be able to find the optimal strategy in certain periods at the beginning, but they can learn and imitation through continuous learning and then gradually find the best strategy through trial and error, which is similar to the "evolution" phenomenon in biology. Bounded rationality also means that in general, at least some game players will not adopt an equilibrium strategy of a completely rational game. That is, the equilibrium strategy is the result of continuous adjustment and improvement rather than one-off selection, and even if it reaches equilibrium, it may deviate again.

The randomly matched game player D has two strategies-high price(k) and low price(l)the player F also has two strategies-buying(F_1) and not buying(F_2)Then, there will be four different combinations of strategies, so that the players that choose different strategies can be seen as different "types". And, this different "type" is not given, but changes with the game player's strategy, i.e. the game has a process of learning to imitate.

In the large group of participants in the game of buying and selling games, the proportion of high price(k) in game player D is x, the percentage of low price(l) is $1-x$, the percentage of players F in game F_1 is y, and the percentage of players in F_2 is $1-y$.When the players in the group are randomly paired to perform a game, each player F may encounter either a high-price type D or a low-price type D. The former has a probability of x, and the latter has a probability of $1-x$(For a large group, it is possible to ignore the influence of the game party itself on the proportion of other types of players). Similarly, the probability that each player D encounters type F_1 is y, and the probability of encountering type F_1 is$1-y$.

As set forth above, it is clear that in this evolutionary game, the proportions x and $1-x$ in the game player D are not very numerical, but instead fluctuate with time, they're the function $x(t)$ and $1-x(t)$ of time t , but for simplicity, still write as x and $1-x$.Similarly, the same is true for the ratios y and $1-y$ in player F.As the core of the game of bounded rationality analysis, the key to the dynamic change in the proportion of game player strategy type is the speed of dynamic change(the direction can be reflected by the sign of speed). The rate of dynamic change (Xie Shiyu, 2009) of this proportion depends on the speed of the game party learning to imitate, which is usually related to the size of the imitated object (It can be expressed by the ratio of the corresponding type of game players, which is related to the difficulty of observation and imitation.) and the degree of the success of the imitated object (It can be expressed by the magnitude of the payoff over the average payoff of the object-mimicking strategy, which is related to the difficulty in judging the difference and the size of the stimulus).

2.2 Model construction

On these bases, the payoff-matrix is as follows:

Figure 1   The Payoff-matrix of Asymmetric Evolutionary Game Between Two House Prices

		player-F	
		$F_1(y)$	$F_2(1-y)$
player-D	$k(x)$	a,v	c,g
	$l(1-x)$	b,w	d,h

We first consider the general situation. Since the two sides of the game are of different types, the payoffs of the two parties under different strategies are also inconsistent and asymmetric. When D is type k and F is type F_1, both parties' payoffs are respectively a, v units; When D is type l and F is type

F_1, the payoff of both parties is b, w units respectively; When D is type k and F is type F_2, the two sides' payoffs are respectively c, g units; When both sides payoff is d units to D for type l and h units to F for type F_2(As shown in Figure 1).Suppose that these payoffs are not negative and $a>b>0$, $d>c>0$, $v>g>0$, $h>w>0$. Thus, the payoff of a game player depends on its own type on the one hand, and on the type of opponents it encounters on the other hand.

According to Figure 1, it is not difficult to calculate that the expected payoffs of player D choosing k and l are:

$$E_k(D) = y \cdot a + (1-y) \cdot c , E_l(D) = y \cdot b + (1-y) \cdot d .$$

Thus the average expected payoff of player D is:

$$\pi(D) = x \cdot E_k(D) + (1-x) \cdot E_l(D) . \tag{1}$$

According to Formula 1, the replicator dynamics equation of real estate dealer D selecting k can be obtained by using the principle of replicator dynamics equation in evolutionary game theory:

$$\frac{dx}{dt} = x \cdot [E_k(D) - \pi(D)] = x(1-x)[E_k(D) - E_l(D)]$$

$$= x(1-x)[y(a-b-c+d) + (c-d)] . \tag{2}$$

In the above formula, $\dfrac{dx}{dt}$ is the rate of change of the proportion x of type k in game player D over time t. When given the specific values of a, b, c, d, $\dfrac{dx}{dt}$ is a univariate function of x, so the equation can be abbreviated as $\dfrac{dx}{dt} = \Phi(x)$.

Similarly, the expected payoffs of player F selection type F_1 and type F_2 are:

$$E_{F_1}(F) = x \cdot v + (1-x) \cdot w , E_{F_2}(F) = x \cdot g + (1-x) \cdot h .$$

Then the average expected payoff of player F is:

$$\pi(F) = y \cdot E_{F_1}(F) + (1-y) \cdot E_{F_2}(F) . \tag{3}$$

Then the F_1 replicator dynamics equation in F is:

$$\frac{dy}{dt} = y[E_{F_1}(F) - \pi(F)] = y(1-y)[E_{F_1}(F) - E_{F_1}(F)]$$

$$= y(1-y)[x(v-g-w+h) + (w-h)] . \tag{4}$$

In the above formula, $\dfrac{dy}{dt}$ is the rate of change of the proportion y of the selected type F_1 in player F over time t. When given the specific values of v, w, g, h, $\dfrac{dy}{dt}$ is a univariate function of y, so the equation can be abbreviated as $\dfrac{dy}{dt} = \Psi(y)$.

2.3 Results and model analysis

To facilitate later analysis, we introduce the concept of evolutionary stable strategy and steady state. The so called evolutionary stable strategy(ESS) is a stable state that can be converged by each game player after learning to imitate, and has a robustness against a small amount of false deviations. Take $\dfrac{dx}{dt} = \Phi(x)$ as an example, as a point of stability strategy x^*, besides itself must be equalized, it must also have the property that if there are certain players that have deviated due to accidental errors, the replicator dynamics will still return x to x^*.In mathematics, this interference causes x to appear below x^*, there must be $\Phi(x) > 0$, and when the interference appears above x^*, there must be $\Phi(x) < 0$.That is, at these stable states $\Phi(x)$'s derivative $\Phi'(x)$ must be negative, which is called "stability principle" in replicator dynamics equation. Using the phase diagram of replication dynamics, that is, the point that intersects the horizontal axis and the slope of the tangent line at the intersection is a

negative point, and replicates the dynamic ESS for the corresponding game.

Let us first analyze the replication dynamic equation at the D position.

According to formula 2,if $y = \dfrac{d-c}{a-b+d-c}$ (abbreviated as m) then $\dfrac{dx}{dt} \equiv 0$,so that all x levels are stable state. If $y \neq m$, then $x^* = 0$ and $x^* = 1$ are two stable states, among them, when $y > m$, $x^* = 1$ is ESS, and when $y < m$, $x^* = 0$ is ESS. This is because:

$$\Phi'(x) = (1-2x)[\, y(a-b+d-c) - (d-c)\,] . \tag{5}$$

Based on formula 5,when $y > m$, $\Phi'(1) < 0$,so $x^* = 1$ is ESS, and when $y < m$, $\Phi'(0) < 0$,so $x^* = 0$ is ESS. Figure 2 (a),(b),(c) below shows the dynamic trends and stability of the above three scenarios, respectively.

(a)y=m   (b)y>m   (c)y<m
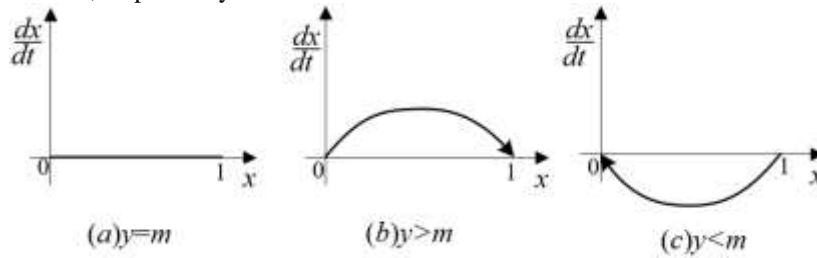
Figure 2   Game group replication dynamic phase diagram at D position

Next, we will analyze the replication dynamic equation at the F position.

According to formula 4, if $x = \dfrac{h-w}{v-g+h-w}$ (abbreviated as n) then $\dfrac{dy}{dt} \equiv 0$, so that all y levels are stable state. If $x \neq n$, then $y^* = 0$ and $y^* = 1$ are two stable states, among them, when $x > n$, $y^* = 1$ is ESS, and when $x < n$, $y^* = 0$ is ESS. This is because:

$$\Psi'(y) = (1-2y)[\, x(v-g+h-w) - (h-w)\,] . \tag{6}$$

Based on formula 6,when $x > n$, $\Psi'(1) < 0$,so $y^* = 1$ is ESS, and when $x < n$, $\Psi'(0) < 0$,so $y^* = 0$ is ESS. Figure 3 (a),(b),(c) below shows the dynamic trends and stability of the above three scenarios, respectively.

(a)x=n   (b)x>n   (c)x<n
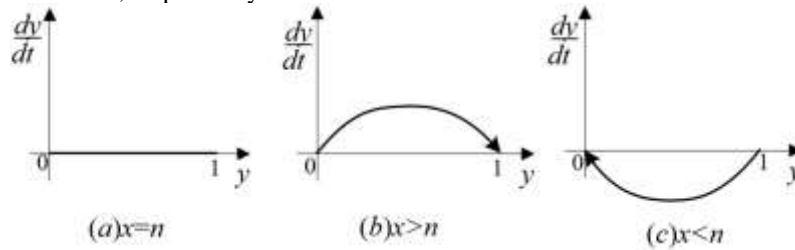
Figure 3   Game group replication dynamic phase diagram at F position

Further, we can reproduce the dynamic relationship between the above two population type ratio changes and represent it in a plane rectangular coordinate system with two scales as the coordinates, as shown in Figure 4 below:
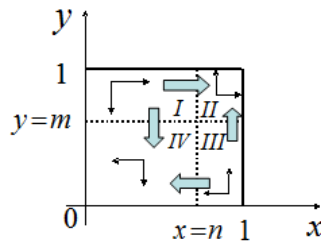
Figure 4   The replicator dynamics and stability of two-group players in asymmetric real estate market

It can be seen from Figure 4 that $\{x = 0, y = 0\}$ and $\{x = 1, y = 1\}$ are two ESSs of this evolutionary game, and the other points are not the steady state of convergence and anti-perturbation in the replication dynamics.

When both sides of the buying and selling game fall in Region *II*, they will converge to ESS-$\{x = 1, y = 1\}$, that is, *D* chooses strategy *k*(high price) ,*F* chooses strategy F_1 (buy) ;

When both sides of the buying and selling game fall in Region *IV*, they will converge to ESS-$\{x = 0, y = 0\}$, that is, *D* chooses strategy *l*(low price) ,*F* chooses strategy F_2 (not buy) ;

When both sides of the buying and selling game fall in Region *I* or *III*, with the increase of *m* and *n* , the area of Region *IV* will increase, that is, after learning and imitating processes, most players will converge to the ESS-$\{x = 0, y = 0\}$; with the decrease of *m* and *n* , the area of Region *IV* will shrink, that is, through the process of learning and imitating, most players will converge to the ESS-$\{x = 1, y = 1\}$.

3 Conclusion and Suggestions
3.1 Conclusion and deficiency
For a player with bounded rationality under multiple cycles, the payoffs of one player depends on his own type on the one hand, and on the opponent type encountered by random match on the other hand. Therefore, the game of bounded rationality can eventually find the optimal solution of evolutionary game through replicator dynamic learning and adjustment of strategy. However, this does not rule out the appearance of sub-optimal results, that is, the game player does not eventually achieve the goal through replicator dynamic learning. Instead of high-efficiency results, there has been a reverse selection.

The development direction of the evolutionary game is not only related to the payoff matrix of both parties, but also affected by the initial state of the system, such as increasing the proportion of real estate developers making high price. The model finally formed two equilibrium points, namely {high price, buy} and {low price, not buy}. However, in reality, the game side does not hope that the game evolves in the direction of {low price, not buy}. For the sake of maximizing profit, all parties will compete in the multi-periodic dynamic learning and adjustment to{high price, buy} direction. In general, home buyers have a range of estimated values for a house. Only the "high price" within the estimated value range threshold has enough attraction and practical significance for home buyers, which is higher than this threshold, will make the buyers in a wait-and-see state.

We only analyzed the evolutionary game of players *D* and *F* under double house prices, haven't discuss the purchase motivation (just-needed, investment) of *F*, nor did we analyze the behavior of government and related stakeholders (banks, investment institutions, etc.)or the information and CKR mastery of each game player. But these will affect the game player's strategies, payoffs, the process of the game, replication dynamics and the final equilibrium. So there is further space for research.
3.2 Suggestions
Here are some suggestions:

For home buyers, in order to reduce the impact of irrational factors and asymmetric information, they should collect information in various ways through relevant channels, improve the ability to discriminate, expand the choice space, and rationally invest to reduce risks.

For real estate developers, when considering their own interests, they should also make reasonable investments and make decisions. Housing prices, so that prices can be a rational return to minimize the real estate market bubble.

For the government, how to control house prices and maintain the healthy and stable development of the housing market is its key choice, especially in the context of rapid macroeconomic growth and the crucial juncture of our country's urbanization, how to coordinate the interests of all parties house prices and suppression of bubbles are the issues that the government must face. We should strengthen supervision, improve relevant laws and regulations, and make timely adjustments and feedbacks so as to reduce bubbles and make the real estate market more stabler and healthier "live and work" together to build and realize the "Chinese Dream".

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The Effect of Apology Strategy on Consumer Repurchase Intention for Online Takeaway Food Industry

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Abstract: With the development and popularization of the Internet, more consumers choose to purchase food online on the APP. In the process of ordering, delieverying and ultimate consuming bad services occured from time to time, and merchants' remedial measures were various. The influence of apology strategy on consumers' repurchasing intention after the occurrence of bad service was mainly researched based on online takeaway food industry, price sensitivity as a moderating variable was introduced and questionnaire survey and SPPS as an analysis tool were applied in this study. It was found that, in the apology strategy, illocutionary force indications , expression of responsibilities, commitment to restraint, provision of compensation, explanation , all had a positive effect on consumer repurchase intention; price sensitivity was positively correlated with the consumers repurchase intention ; price sensitivity has a positive moderating effect on the relationship between 　 illocutionary force indications, expression of responsibilities, commitment to restraint, provision of compensation, explanation and consumers' repurchase intention. while in the relationship between explanation and consumer repurchase intention, the moderating effect is not obvious.
Key words: Bad service; Apology strategy; Price sensitivity; Consumer repurchase intention

1 Introduction

For any service-oriented industry, service quality is an important factor to allure more customers in the fierce competition environment, obtain the advantages of continuing operations, and promote the increase of customer repurchase behavior. In the web3.0 era, many service industries have shifted from offline to online, and the competitive pressure has been further increased. The quality of service has also been more and more valued by online businesses. However, in reality, the occurrence of bad services is inevitable.

When the service provided by the merchant fails to meet the customer's expectations and the customer's interests are harmed, bad services are generated. After consumers have experienced bad services, they will have negative feelings or dissatisfaction. In addition to the possibility of publishing negative comments online, it is more important that consumers' willingness to repurchase may be reduced or even terminated, which is extremely unfavorable for online businesses. For example, on December 5, 2015, Xiao Han, a sophomore at Shandong Weifang University, ordered a take-out from the Internet, finding some hair in the food. Then, he threw it away. Due to the take-away only cost 10 yuan, it was not worth continuing to complain. However, he said that he would never buy take-out from that online store.

After the occurrence of bad services, remedial measures are available and expedient. That effective remedial services can effectively reduce negative impact of bad services was demonstrated in past studies. Effective remedial services can result in higher customer satisfaction compared to not having experienced bad services and "there is a moral remedy to make customers have higher satisfaction (Li C Y, Fang Y H, 2016)." Besides, and the quality of service remedy has a positive correlation with consumer behavior intention was further authenticated (Ma Penghe and Xia Jiechang, 2014). Bell & Zemke have conducted a systematic study on service remedies (Liu Fengguang, Deng Yaochen, Yan Yingru, 2016). They classified service remediation into five dimensions: apology, timely response, understanding, compensation, and remedial action. Timeliness of remediation, timing of remediation, specific strategies for remedy and effect of remedial measures on consumers' subsequent mental and behavioral issues were central part in the previous research, but no further research on the demension of apology and lack of empirical research on the fuction of particular apology strategy towards repurchase intention. In this study, the demension of apology strategy origniating from the research of Olstain and Cohen's in linguistic domain are illocutionary force indications, expression of responsibility, commitment to restraint, provision of compensation, and explanation (Yan Xuhua Wang Huaijun, 2013).

So, under the premise of minimizing operating costs, can effective apology strategy after bad service have a positive impact on consumers repurchase intention? What role does consumer price

sensitivity play in this process? This study took the online ordering APP Eleme as an example to explore above issues.

2 Literature Review

2.1Bad service

The study on the definition of bad service stems from related research on service quality. Since the 1980s, the research on service quality has gradually emerged. Many scholars have studied the quality of service and proposed the definition of service quality from different perspectives. These definitions can be broadly divided into two perspectives. One view is that service quality is the difference between customer-desired services and actually-accepted services; the other view is that service quality is a subjective perception and attitude. One view has been widely recognized— the quality of service as the difference between the customer's expectation of the service and the customer's actual perceived service after receiving the service (Yi Yamin, 2009). If the expected service level is equal to the cognitive service level, it means that the service quality is ordinary; if the cognitive service level is greater than the expected service level, it means that the service quality is high; otherwise, it means that the service quality is low. Other scholar believes that service quality is a subjective attitude response of consumers and cannot be measured quantitatively based on the characteristics of physical goods (Lee J H, 2013). Therefore, this article defines the bad service as the actual subjective experience of the customer after receiving the service is less than the customer's expectation of the service level.

2.2 Apology strategy

"Apologizing" is an act that occurs frequently in daily interactions and work.   apology is a speech act intended to support listeners who actually or potentially have been affected by being offended (Yan Xuhua Wang Huaijun, 2013) or a kind of behavior that an offender acknowledges the offense and dissatisfaction he incurred and is willing to be responsible, and expresses regret to the offended (Ancarno C, 2015). "Apology" is also one of the important dimensions of service remedy. It was divided into five dimensions: apology, timely response, understanding, compensation, and remedial (Liu Fengguang, Deng Yaochen, Yan Yingru, 2016) Later, four important dimensions of service remedies were proposed, which are recognizing service failures, apologizing, explaining reasons, and real compensation (Song Wei, Ji Kai, 2013).

The apology consists of five parts, which are the signs of illocutionary force, acknowledgment of responsibilities, or expression of accepting accusations, Justify and explain, provide remediation programs, and ensure that no such mistakes are made in the future (Agyekum K, 2015). The "illocutionary force" refers to the fact that the act of giving a meaningful discourse in a specific context is a kind of "verbal action power", that is, the language force, and the illocutionary force of a sentence depends on the means of indicating the illocutionary force used in sentences, which include the use of clear verbs, word order, emphasis, tone, and punctuation (Bentley, J, 2015). Olshtain and Cohen proposed a more specific classification framework for apology strategies, including the illocutionary force indications, the expression of responsibilities, the commitment to restraint, the provision of compensation, and the explanation. This study will also follow Olstain and Cohen's classification of apology strategies.

2.3 Consumer repurchase intention

Willingness is one of the criteria for measuring customer behavior. The willingness to repurchase has always been a research concern in the academic world. After customer experiencing products or services based on their commitment to the brand, the tendency to make a continuous purchase of the products or services is a repurchase intention (Shi Wei, 2014). Later scholars' definitions were developed on this basis. Chen, L.Y. & Lauffer believe that repurchase intention is only a subjective desire of the customer for continuous purchase, rather than a promise. Whether to continue purchasing in the future is Subjectively decided by customer (Chen, L.Y. & Lauffer, 2012，Yang K, Kim H Y, 2012). This study will follow Oliver's definition of repurchase intention.

Factors that affect repurchase intention have been frequently presented on previous research. It was discovered that customer satisfaction positively influences repurchasing intentions (Har L.C, Eze U.C, 2011; Chiu Chao-Min, Chang Chen-Chi, 2009). Sun Y, Liu L, Peng X, et al and others studied consumer repurchasing intentions from the perspective of customer perceived value and believed that the factors affecting consumer's repurchase intentions are perceived easiness of use and perceived usefulness and perceived entertaining.

2.4 The relationship between bad service, apology strategy and repurchase intention

At any time, the occurrence of bad services is unavoidable. Therefore, the corresponding remedial measures are very important to reduce or even eliminate the adverse effects of bad services. He Qichen and Xu Yanghua conducted research from the perspective of fair cognitive theory. They believe that interaction fairness (such as apology, interpretation, etc.) is more important than outcome fairness (such as material and monetary compensation) when performing service remedies. Zhou Xi believes that when the online store implements specific measures for service remedy, increasing consumers' fairness perceptions regarding service remedial attitude, service remedy methods, and service remedy compensation will greatly enhance customer satisfaction and trust. Yang Qiang studied the effects of service remedial effects and perceived control on consumers' positive word-of-mouth communication intentions. The results show that perceived control, as a personality trait, has important mediation between the effect of service remediation and positive word-of-mouth communication among consumers The research results of Yang Qiang, Wu Yibo, and Zhang Yu showed that the response speed, apology, remedial initiative, and tangible compensation all have a positive effect on consumers' positive word-of-mouth communication willingness; brand attachment has positive effect on consumers' positive word-of-mouth communication willingness; brand attachment plays a positive regulatory role in the relationship between response speed, apology and tangible compensation for positive word-of-mouth communication intention. The researches of Jian Zhaoquan and Ke Yun found that customers experiencing process errors are more likely to obtain psychological remedies, and if they encounter result errors, they are more likely to obtain substantive remedies; Substantive remedies will lead to higher customer second satisfaction and loyalty; Subsequent satisfaction positively affects customer loyalty. In summary, the quality of the merchant's remedies, the consumer's own emotions, perceived control capabilities, and consumer attachment to the brand will have an impact on subsequent behavioral intentions.

In past studies, many scholars have proposed different measurement dimensions for service remedies. Bell & Zemke divided service remediation into five dimensions: apology, timely response, understanding, compensation, and remedial follow-up. Bitner et al. recognition of the service failure, apology, explanation, and physical compensation are four important dimensions of service remediation. Although the views on the dimensions of remedial measures vary, most scholars will always include the apology dimension. However, "apology" as one of the main dimensions of service remedies has always been a lack of in-depth research

Thus, this study proposes the following hypothesis:

H1a: illocutionary force indication has a positive effect on consumer repurchase intention

H1b: expression of responsibility has a positive effect on consumer repurchase intention

H1c: commitment to restraint has a positive effect on consumer repurchase intention

H1d: provision of compensation has a positive effect on consumer repurchase intention

H1e: explanation has a positive effect on consumer repurchase intention

2.5 Price sensitivity

The study of price sensitivity originated in the field of economics. Goldsmith et al. defined price sensitivity as the degree to which the individual's perception and response to changes in the price of a product or service. Cao Li et al found that the higher the education level and income level of consumers, the less sensitive to price, and the more tolerant of price increase or price reduction (Cao Li et al, 2016). Fullerton's research suggests that customers with higher price sensitivity are more likely to make computational commitments, and customers with lower price sensitivity are more likely to make emotional commitments to suppliers. James et al. found that low-price-sensitive customers are more likely to be loyal, enjoy full-service, purchase value-added services, and spend more money than high-price-sensitive customers. Sourabh Arora and others found that "better online service quality" and "lower online price" prompted customers to purchase online later. Price-sensitive customers and those who are able to use multiple channels are more likely to go online to buy. Therefore, this study believes that price sensitivity has a direct effect on the repurchase intention, and it also has a moderating effect on the relationship between apology strategy and repurchase intention.

Thus, this study proposes the following hypothesis:

H2: Price sensitivity has a positive effect on consumer repurchase intention

H3a: Price Sensitivity has a moderating effect on illocutionary force indications and consumer repurchase intention

H3b: Price Sensitivity has a moderating effect on Expression of Responsibility and consumer repurchase intention

H3c: Price sensitivity has a moderating effect on commitment to restraint and consumer repurchase intention

H3d: Price sensitivity has a moderating effect on provision of compensation and consumer repurchase intention

H3e: Price Sensitivity has a moderating effect on explanation and consumer repurchase intention

The theoretical model of this paper is shown in the Figure 1 below
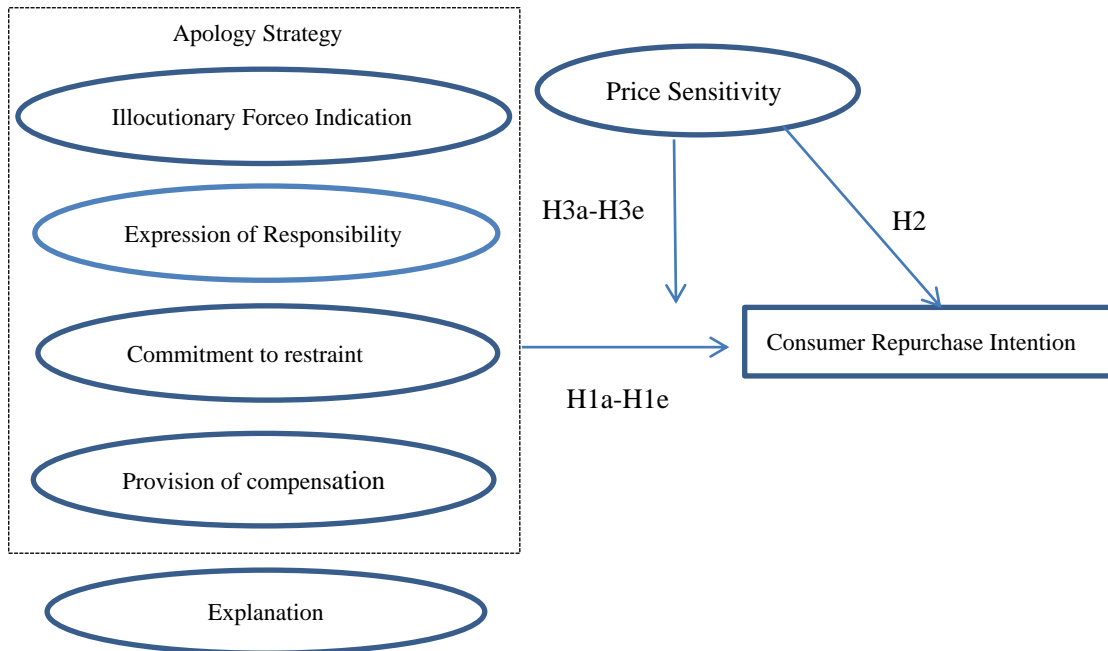
Figure 1　Theoretical Model

3 Methodology

3.1 Sample

Nowadays, the online catering and offline distribution services represented by Eleme and Meituan are popular in the web3.0 era, and the probability of bad service is high. Therefore, this study will focus on Eleme. the online catering service APP, as a research context and collect data through questionnaire surveys. The target of the survey was mainly the people in Wuhan who had ordered online experience on Eleme APP.

3.2 Variable design

In this study model, the mature scale was used for variable measurement, and was modified according to the actual situation. In the questionnaire, the apology strategy was measured by the five dimensions of "Illocutionary Force Indication",, "Expression of Responsibility", "Commitment to restraint", "Provisions of compensation", and "Explanation" according to study of Liu Fengguang et al and Zhou Yi . The price sensitivity scale refers to the research of Cao Li et al.. The measurement of repurchasing intention was performed using the scale used by Blodgett, Granbois & Wanger. All measuring question options are measured by Likert 5-grade scale.

3.3 Samples and data collection

Due to the limitation of some objective conditions, a total of 53 e-questionnaires were sent out in this study and 53 questionnaires were returned. After removing 8 invalid questionnaires, 45 questionnaires were analyzed by SPSS 18.0. The effective recovery rate was 84. 9%. The demographic information of the total sample is as follows: 57.78% of females, 42.22% of males, 73.33% of 18-25 years old, 15.56% of 26 to 30 years old, 4.44% of 31 to 40 years old, 6.67% of 41 years old and above; 13.33% of specialists and specialists below. Undergraduate 35.56%, Master and above 51.11%.

3.4 Exploratory factor analysis and confirmatory factor analysis

This study uses SPSS 18. 0 conducting an exploratory factor analysis on the apology strategy, price sensitivity, and consumer repurchase intention. The statistical results showed that the KMO value was 0. 883, 0. 765,0. 808, indicating that the questionnaire is suitable for exploratory factor analysis. In

addition, Cronbach's α coefficient was used to test the reliability of each scale, and the coefficient values were all greater than 0. 7, indicating that the scale has a good level of confidence. The confirmatory factor analysis of the sample was performed using AMOS software. When the χ^2/df was between 1 and 3, the fitting degree was better, and the smaller the better, the χ^2/df values of all variables in this study were consistent, and the RMSEA value was less than 0. 08, each variable NFI, CFI, IFI, GFI and other indexes are all greater than 0.9. Therefore, the fitting effect of each model in this study is good. In addition, the measurement methods adopted in this paper are all selected from the more mature scales in the existing literature, and the related personnel were consulted before the formal investigation to ensure the content validity of the questionnaire.

3.5 Hypothesis testing and analysis

3.5.1 Effect of apology strategy on repurchase intention

As shown in Table 1, gender, age, education, and occupation were controlled in Model 1 to avoid the influence of these factors on the regression results. Model 2 mainly examines the causality of the Illocutionary Force Indication, the expression of responsibilities, the commitment to restraint, the provision of remedy, the explanation, and the consumers repurchase intention. After controlling for variables such as the expression of responsibilities, commitment to restraint, provision of remedy, and explanation, the   Illocutionary Force Indication has a significant positive effect on consumer repurchase intentions, which is expressed as β = 0. 071, p < 0. 001, Then H1a is verified. Similarly, H1b~ H1e is verified. In Model 3, this study examines the relationship between price sensitivity and consumer repurchase intention. From the table, price sensitivity has a significant positive effect on consumer repurchase intention.，which is expressed as β = 0.578, p < 0. 01. Thus H2 is verified.

3.5.2 Verification of the moderating effect of price sensitivity

In order to avoid the problem of multiple collinearity between interaction terms and independent variables and control variables, this study firstly decentralizes each of the regulated variables and independent variables before analysis, and de-centers the variables and multiplies them to obtain the value of the interaction term. Since there are multiple interaction items in this study, multiple collinearity problems between interaction items may still occur in the specific analysis process. In order to solve this problem, we gradually put the interaction items into the main model, and then test the regulation effects separately. The results are shown in Table 1. In the main effect model 2, the price-sensitivity variable was put into the model 4, and the explanatory power of the model was significantly improved, showing ΔR^2 = 0. 068,p < 0. 001. Model 5 was added to the interactive item "Price sensitivity × Illocutionary Force Indication" to model 5, and the explanatory power of the model was also significantly improved, showing ΔR^2 = 0. 049, p < 0. 001, and price sensitivity can positively modulate the relationship between the means of indicating the power beyond the verbal and the repurchasing intention of consumers, expressed as β = 0. 034, p < 0. 01. Thus H3a is verified. In the same way, H3b - H3d are verified. In addition, Model 9 was added to the interactive model of "price sensitivity × explanation " in model 4, although the explanatory power of the model was improved, but the effect of price sensitivity on interpreting and explaining consumer repurchase intention was not significant. Then H3e failed the test.

Table 1   Hierarchical   Regression   Analysis

Variable	Consumer Repurchase Intention								
	M1	M2	M3	M4	M5	M6	M7	M8	M9
Controllable Variable									
Gender	0.028	0.029	0.0.26	0.030	0.031	0. 031	0.033	0.032	0.031
Age	0.054	0.046	0.026	0.062	0.051	0.015	0.022	0.020	0.025
Education	0.037	0.057	0.082	0.085	0.077	0.057	0.048	0.857	0.049
Occupation	−0.031	−0.066	−0.058	−0.031	−0.057	−0.041	−0.068	−0.040	−0.049
Independent Variable									
Illocutionary Force Indication		0.071***		0.050***	0.054***	0.054***	0.044***	0.049***	0.051***
Expression of Responsibility		0.043**		0.041**	0.034**	0.046**	0.040**	0.047**	0.039**
Commitment to Restraint		0.062**		0.077**	0.077**	0.077**	0.077**	0.077**	0.077**
Provisions of Compensation		0.545***		0.421***	0.391***	0.510***	0.540***	0.332***	0.419***

Continural Table 1

Variable	Consumer Repurchase Intention								
	M1	M2	M3	M4	M5	M6	M7	M8	M9
Explanation		0.062*		0.084*	0.084*	0.084*	0.084*	0.084*	0.084*
Moderating Variable									
Price Sensitivity			0.578**	0.369**	0.211**	0.234**	0296**	0.252**	0.267**
Cross Effect									
Price Sensitivity× Illocutionary Force Indication					0.034***				
Price Sensitivity× Expression of Responsibility						0.027**			
Price Sensitivity× Commitment to restraint							0.041**		
Price sensitivity× Provisions of compensation								0.374***	
Price sensitivity× Explanation									0.074
F	0.525	6.247	9.168	8.569	8.812	8.420	8.857	8.122	8.256
R^2	0.017	0.125	0. 139	0.265	0.371	0.294	0.327	0.272	0.329
ΔR^2	0.011	0.169***	0.138**	0. 068***	0.049***	0.071***	0.115***	0.027***	0.027*

4 Conclusion

This study is based on 45 samples of on-line ordering experiences. The study explored the relationship between apology strategies, price sensitivity and consumer repurchase intentions in the context of bad services and discussed the moderating effects of price sensitivity. The main conclusions reached in the study are the following two aspects:

(1) After the occurrence of bad service, the merchant's apology strategy (illocutionary force Indication, expression of responsibility, commitment to restraint, provisions of compensation, and explanations have a positive influence on consumers repurchase intentions, and   there is a positive correlation between price sensitivity and consumer repurchase intentions.

(2) The effect of apology strategy on consumers' repurchasing intention will be regulated by price sensitivity. the study found that price sensitivity has a obvious regulatory effect on the means of indicating extra-legal power, expressing responsibility, expressing commitment, providing restraint, and compensating consumers' repurchase aspirations. However, this moderating effect on the relationship between explanation and consumer repurchase intention is explained is not obvious. This may due to, when bad service occurs, the more explanations, the more the consumer feels that the merchant just wants to shirk responsibility instead of really solving the problem, so that consumers can't be satisfied with the apology for this bad service. then costumer has less intention to repurchase. Therefore, whether the price sensitivity is high or low, it is difficult to have a positive impact on this process.

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Influence of Brand Ritual Sense on Purchase Intention: The Mediating Effect of Consumer Involvement

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Abstract: With the increasing enrichment and popularity of Internet entertainment, many online video platforms have transformed from a single video playback platform into an online community of rich online and offline activities. The online community of social, video playback, entertainment and information has organized many ritual activities online and offline, and developed many functions to increase customer stickiness, greatly increasing its added value. Based on brand ritual and Brand participationtheory, this article puts forward the assumption of the relationship between brand ritual sense, consumer involvement and purchase intention through literature learning, electing 287 users of IQIYI Bubble Community as a sample, using questionnaire survey to collect primary data. Using the SEM to conduct empirical tests, it was found that the sense of brand ritual has a positive effect on consumer involvement and purchase intention, and consumer involvement as a mediator has a positive effect on purchase intention.
Key words: Brand ritual; Involvement degree; Purchase intention; SEM; Online community

1 Introduction

In recent years, with the rapid development of the entertainment industry, the fan-focused economy dominated by celebrities has become a focus of capital chase and the focus of market attention. The online video community, which is closely related to celebrities, is not satisfied with the function of only playing video and broadcasting, wants to become the entrance of entertaining society, form a new platform for social film and television, mainly for film and television, stars and fans.For example, IQIYI Bubble Community, with the precipitation of video content and star resources, has created distinctive features and interactive modes such as "stars have come" and "vote", and has carried out "fan public interest" and "film release conference" offline activities. Through ritualized activities, the user's cognition of the self is strengthened, and the desire to participate in the activity is further generated. In the process, self-recognition is updated and a sense of belonging is shared among the groups that participate in the activity. The above factors enhance the user's involvement in the bubble community from the three dimensions of cognition, behavior, and emotion, and in turn affect the purchase of bubble community related products.

Therefore, this article will study the relationship between brand ritual sense, consumer involvement and purchase intention.

2 Literature Review and Theoretical Hypothesis

2.1 Brand ritual sense (F_1)

Brand ceremonies are ceremonial interactions between consumers and a brand. Brand ceremonies bring special emotional experiences to consumers through this ritualized interactive behavior, and enhance the emotional connection between consumers and brands (XueHaibo, 2015;Raj, 2012;Prexl and Kenning, 2010).Based on the concept of brand ceremonies, brand ritual sense refers to the emotional connection between a consumer and a brand in the process of ceremonial interaction with the brand. The significance of brand rituals includes four dimensions: self-concept, self-display, self-participation, and self-renewal.Self-concept refers to the consumer's understanding of self-identity through ritual process; self-display means that the consumer displays and expresses himself through the ritual process; self-participation means that the consumer perceives a sense of participation through the ritual process; update means that consumers improve and change themselves through the ritual process (Ran Yaxuan and Wei Haiying, 2017;Wei Haiying and Zhang Lei, 2010; Wei Haiying and Luo Ziwei, 2014).Studies have shown that brand rituals can not only bring consumers a sense of comfort, efficacy and order brand experience, but also affect the consumer's perceptions and emotions, the long-term purchase behavior of consumers and brand value judgment (Vohs K, 2013; Vohs K and Wang Y, 2012).For users of online video communities, the special brand experiences brought about by brand ritual activities in the

community can deepen their involvement in the online community and may also motivate them to purchase the products or services related to the brand.

This article measures the sense of brand ritual from the four dimensions of self-cognition(X11), self-display(X12), self-participation(X13), and self-renewal(X14), and proposes the first two assumptions. H1: Consumers' sense of brand ritual has a significant positive impact on their involvement. H2: Consumers' sense of brand ritual has a significant positive effect on their purchase intention.

2.2 Consumer involvement (F_2)

The degree of involvement is expressed as the individual's intention and interest in a goal or activity. If consumers think they understand that a product is more helpful to their goals, the more likely consumers are to actively learn about the product. When consumers show a high degree of involvement, it means that they will have a high level of concern and a high level of perception and will be presented as a result of a series of active information collection, processing, and decision-making (Lin Dan, 2017).Involvement can measure the psychological state of consumers and have a positive effect on consumers' purchase intention. For online video community users, the object of consumer involvement may be a product or brand, an advertisement or a platform community, or a structure associated with a consumer's goal. Either an antecedent element concerning individuals, objects or emotions may trigger it.The brand ritual sensation, as a kind of emotion triggered by a specific brand ritual, is very likely to prompt consumers to engage and promote their purchase intention.

This paper divides consumer involvement into cognitive involvement(X_{21}), emotional involvement(X_{22}), and behavioral involvement(X_{23}), and examines the mediating role of consumer involvement in the influence of brand ritual on purchase intention. Based on this, the third and fourth hypotheses of this paper are proposed. H3: Consumer involvement has a significant positive effect on their purchase intention. H4: Consumer involvement has a mediating effect on the influence of brand ritual sense on purchase intention.

2.3 Purchase intention (F_3)

Consumers' willingness to buy refers to the possibility that consumers try to buy a particular product. Under the influence of external factors, consumers' attitudes toward a particular product constitute the consumer's willingness to buy. This attitude is the product that consumers make. The subjective inclination of the choice (Liu Cuiping, 2013).Through the influence of various external factors, consumers will have a higher or lower willingness to purchase certain products, and higher purchase intentions may prompt consumers to purchase. On the basis of the definition of purchase intention, online video community users' willingness to purchase indicates that users are willing to make purchases on the platform.From the perspective of consumers, the perceived value and perceived cost of video sites, the personality characteristics of users, and word-of-mouth information received can all influence consumers' willingness to purchase products related to video sites.

After checking the reliability of the scale, the validity test of the scale is carried out. This article measures consumers' willingness to buy from consumers' strong desire to pay for on-demand online video(X_{31}), recharge members(X_{32}), purchase peripheral products(X_{33}), and pay for votes(X_{34}).
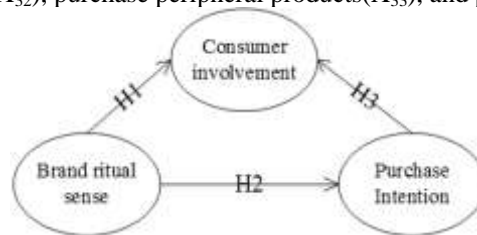
Figure 1   Research Hypothesis

3 Data Analysis and Hypothesis Testing

3.1 Model selection and data collection

This paper uses the Likert five scale questionnaire to obtain the required data. In this survey, 287 questionnaires were distributed. This study intends to select the SEM to examine the relationship between brand ritual sense, consumer involvement and purchase intention.The SEM establishes a causal model to observe causal relationships between variables. SEM is divided into measurement model and structural model in two parts: 1. measurement equation describes the relationship between latent variables and observed variables, observation variables are through the scale or questionnaire and other measurement tools to obtain the intuitive data. 2. Structural equations describe the relationship between

latent variables. Exogenous latent variables refer to latent variables as causal factors, and endogenous latent variables are latent variables that can act as outcomes.

The measurement equation is expressed as:

$$Y = \Lambda yn + \varepsilon \tag{1}$$

Among them, X is the observed variable of ξ, Y is the observed variable of η, ξ and η are exogenous latent variables and endogenous latent variables. Λ x and Λ y A are the relationships between latent variables and observed variables, respectively, Which is factor load matrix, δ and ε are the errors of the X and Y variables, respectively.

The structural equation is expressed as:

$$\eta = B\eta + \Gamma\xi + \varepsilon \tag{2}$$

Among them, η indicates endogenous latent variables, ξ indicates endogenous latent variables, B is the relationship between endogenous latent variables.

3.2 Reliability and validity analysis

In this paper, statistical software SPSS23.0 is used to analyze the reliability of the brand ritual, consumer involvement and purchase intention. Cronbach's α reliability coefficient is used to check the internal consistency and stability of the scale, which is between 0-1. The larger the α value, the higher the data reliability. The reliability test results are shown in Table 1.

Table 1 Reliability Test Results

	Corrected item and total relevance	Squared multiple correlation	Clone Bach after deleting items Alpha
X_{11}	.582	.478	.937
X_{12}	.749	.725	.930
X_{13}	.774	.731	.929
X_{14}	.744	.724	.930
X_{21}	.794	.759	.928
X_{22}	.832	.811	.926
X_{23}	.799	.779	.928
X_{31}	.576	.536	.937
X_{32}	.656	.678	.934
X_{33}	.798	.759	.928
X_{34}	.776	.742	.929

The Cronbach's α value of the measured variable satisfies a critical condition greater than 0.7, and is all above 0.9. The revised correlation coefficient between the post-item and the total is above 0.5, and there is a high degree of credibility between the research variables. Therefore, there is no need to eliminate the indicators.

Validity test. This paper uses SPSS23.0 to process the observed variables, and obtain the load value of each factor and KMO sample measure and Bartlett sphericity to test the validity of the data. The KMO value is 0.916, which is above 0.9. The Bartlett's spherical test Sig. is 0.000<.005. The questionnaire has good validity and is very suitable for factor analysis.

3.3 Hypothetical test

Figure 2 Structural Equation Model Path Diagram

Table 2   Model Fit Test Results

Index classification	Index name	Model fitting value	Critical value	Fit evaluation
	X^2/DF	3.627	<5	Good
Absolute fit indicator	RMSEA	0.076	<0.08	Acceptable
	GFI	0.919	>0.9	Acceptable
	AGFI	0.897	>0.9	Acceptable
	NFI	0.947	>0.9	ideal
Value-added adaptation indicator	RFI	0.929	>0.9	ideal
	IFI	0.961	>0.9	ideal
	CFI	0.961	>0.9	ideal
	PGFI	0.571	>0.5	Acceptable
Simplified fitting index	PNFI	0.706	>0.5	Acceptable
	PCFI	0.716	>0.5	Acceptable

287 sampledatas were substituted into the covariance structure model to fit. According to the hypothetical structural equation path diagram, the effective samples were calculated using Amos24.0, and the path coefficients among the variables of the structural model were obtained. To ensure the adaptability of the structural equation model, check the fitted index of the model in the output. The chi-squared-degree-of-freedom ratio is 2.411. In the well-adapted range of 1-5, it indicates that the model has a good fitting effect. The RMSEA value is 0.062, indicating that the model fits well and the model can be accepted. The goodness-of-fit index, the revised goodness-of-fitness index, the norm-fitting index, the incremental fit index, and the simple fit index are within a reasonable range , indicating that the model is well-fitted.

Table 3   Hypothesis Test

Latent variable	path	Observation variable	Influence direction	Path coefficient	S.E. value	T value	P value	test result
X_{11}	←	Self-awareness	+	0.70	0.062	14.082	***	Pass
X_{12}	←	Self-display	+	0.88	0.047	20.938	***	Pass
X_{13}	←	Self-involvement	+	0.89	0.047	21.073	***	Pass
X_{14}	←	Self-renewal	+	0.88	0.038	18.732	***	Pass
X_{21}	←	Cognitive involvement	+	0.94	0.049	20.963	***	Pass
X_{22}	←	Emotional involvement	+	0.91	0.035	26.834	***	Pass
X_{23}	←	Behavioral involvement	+	0.90	0.036	25.627	***	Pass
X_{31}	←	Recharge members	+	0.64	0.059	12.446	***	Pass
X_{32}	←	Pay-on-demand	+	0.77	0.053	16.636	***	Pass
X_{33}	←	Peripheral products	+	0.91	0.041	22.555	***	Pass
X_{34}	←	Paid voting	+	0.90	0.047	24.438	***	Pass

In order to test the mediating effect of consumer involvement in the influence of brand ritual sense on purchase intention, this article removes the "consumer involvement" latent variable and its observed variables from the structural equation model, through the sense of brand ritual to purchase. The change in the path coefficient of the willingness to influence is used to test whether the hypothesis is passed or not. The results show that after removing the "consumer involvement" as a mediator variable, the path coefficient that reflects the influence of brand ritual sense on the purchase intention changes from 0.11 to 0.67, which is a very significant improvement. Therefore, this paper accepts hypothesis 4.
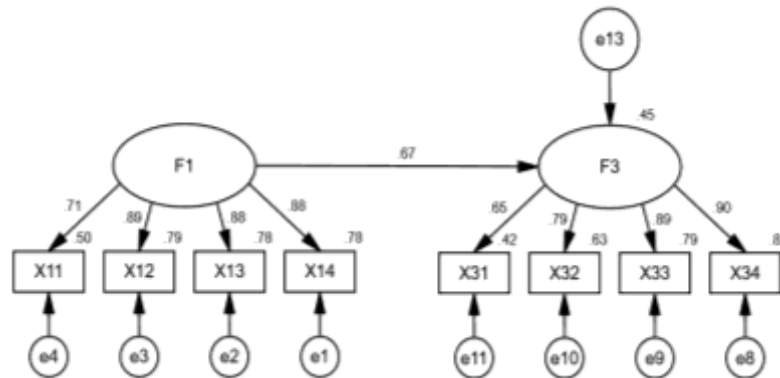
Figure 3   Mediation Test

4 Conclusion

Based on the empirical analysis results, this paper draws the following conclusions: First, the sense of brand ritual has a significant positive impact on consumer involvement, and ritualized activities in online video communities will increase consumer involvement in the community. Second, the sense of brand ritual of consumers has a significant positive impact on their purchase intentions. The rituals of online video communities enable consumers to purchase desires for a range of products or additional services. Third, consumer involvement has a significant positive impact on purchase intentions, and consumers' high involvement levels make them have a stronger desire to purchase online video community products. Fourth, the degree of consumer involvement has an intermediary effect in the influence of brand ritual sense on purchase intentions. The sense of brand sponsorship of online video communities increases their willingness to purchase peripheral products or additional services by enhancing consumer involvement.Therefore, it is recommended that relevant online video platforms carry out distinctive brand activities, develop ritualized platform functions, enhance consumers' emotional attachment to the community, increase consumer involvement, and ultimately increase consumers' willingness to purchase and increase platform profits.

Here are some deficiencies in this article. First of all, the theoretical hypothesis proposed in this paper is based on interviews and literature analysis only. It has certain limitations. In the future research, the online community users can obtain and analyze the first-hand text data of online community users, and enhance the reliability and validity of the theoretical construction. Second, this article only studied one case of the bubble community. Future research can conduct multiple case studies on different types of online communities. Thirdly, this article only empirically tests the relationship among brand ritual sense, consumer involvement and purchase intention.In the future, it should be based on this to study the online community's implementation path to increase consumers' willingness to purchase, thus providing guidance for corporate practice.

Acknowledgement

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Research on the Brand Personality of TOYOTA

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Abstract: Brand personality is a collection of human characteristics, which are associated with the brand. It has four main functions: the integration of brand elements, the definition of brand sign, the composition of brand differences and the analogy of brand associated. The brand personality system is formed by matching positive and negative side of the fixed personality characteristic adjectives, making up five temperaments and then establishing the relation system. Through this system, TOYOTA brand has investigated and contrasted between the users and the similar brands, got the focus that brand personality needed to strengthen in the future of user experience and market competition.

Key words: Brand personality; Personality characteristics; Attributes and interests; TOYOTA brand

1 Introduction

When it comes to the brand, there are the study of brand image, brand culture, brand communication and so on, but the brand personality as the general definition of the brand has always guided each brand elements. However domestic and overseas research on brand personality has focused on the dimension and scale of brand personality. The five dimensions and scale of brand personality, which was made by Aaker in 1997, is a relatively systematic measurement scale for brand personality. In 2003, with Chinese traditional culture, Huang Shengbin and Lu Taihong have summed up the five brand personality dimensions and scale system of "benevolence, wisdom, bravery, pleasure and elegance" on the basis the study of Aaker, which is significant in the localization attempt to research on brand personality dimension. But the establishment of brand personality evaluation system and how to use it to evaluate, all these need further research.

Based on this background and the excellent achievement, this paper has proposed the brand personality evaluation system based on ten groups of personality characteristic adjectives and their antonyms. The system has been used to compare between the users and similar brands for the purpose of strengthening brand personality points.

2 The Overview of Brand Personality

2.1 The meaning of brand personality

In 1997, Aaker had summed up brand personality into five dimensions: sincerity, exciting, competence, Sophistication and ruggedness, and developed a systematic measurement scale (Aaker Jennifer L, 1997）, which has effectively explained the difference between brand personalities. At home, Huang Shengbin and Lu Taihong have made the localization study of brand personality dimensions, which are "benevolence, wisdom, bravery, pleasure and elegance". "Benevolence" is used to describe people's noble quality. "Wisdom" is a description of people's wisdom quality. "Bravery" is a strong image characteristic. "Pleasure" is the meaning of optimism and self-confidence. "Elegance" is used to describe the refined behavior (Huang Shengbin, Lu Taihong, 2003).

In psychology, the personality is defined that a person, to some extent, has maintained a definite self-action and experience, which resulted in the unified model of psychology and physiology (Guo Weipan, 1972). And the view of brand personality is formed by applying the knowledge of personality to the brand research. In a manner of speaking, brand personality is a collection of human characteristics, which are associated with the brand. Just as everyone has his own personality, so is the brand.

2.2 The function of brand personality

2.2.1 Brand personality can integrate each element of the brand

Brand personality has the function of summing up various elements of the brand. It is that converting the brand into "obvious" thing through human character metaphor (Caprarag V, barbaraneil, 2001). At the beginning of the first contact with brand, consumers get the overall understanding of brand through the integration of a unified brand personality. As to enterprises, recognizing brand image from the perspective of brand personality can understand the content and cultural essence of the brand in whole.

2.2.2 Brand personality can fully define the brand sign

With the premise of different brand personality, even if the enterprise has conveyed the same

information to consumers, it will result in different views. For example, the beverage advertising will promote the message with high vitamin C and can eliminate fatigue to the audience. But if the brand is defined as "full of youthful spirit and energy", the brand will be mistaken for nourishing nutrition. In other words, it's possible to be considered as a better taste of fruit juice when "sensitive and delicate" brand personality instead. Therefore, the brand personality is the core of the brand.

2.2.3 Brand personality has formed the difference of the brand

Consumers tend to distinguish the same kind of competitive brands from brand personality. Grasping the advantages and shortage of own brand by analyzing the brand personality of similar competitive brand is favorable to determine brand positioning in market competition. Such as snow beer "Globe Trekker", it's often selected by consumers because of the deep impression on the synonymous with courageous, tenacious, brave brand personality.

2.2.4 Brand personality can analogize things that related to brand

Brand personality can make it easier for people to infer the relationship between business consumers, and other stakeholders (Zhang Junni, Jiang Minghua and Pang Jun, 2005). Enterprises need to establish their own personality, clear consumers' mind on brand personality at the same time. If the gap of relative relationship is appearing, there will be a corporate phenomenon between the two personalities. For example, the unconventional enterprise has produced an egoistic image among consumers however. This situation can be settled by strengthening the components of brand personality, or clarifying the consumer's impression on this brand.

3 The Construction of Brand Personality System

The complex and changeable human character make it difficult to describe, this is also true in the research on personality psychology. The construction of brand personality system can be able to carry out modular management for specific brand personality, take the advantages and weaknesses of brand personality, improve and optimize the vulnerable, and gradually upgrade the brand personality characteristics (Shi Leishan, Ding Jiayong, 2005).

3.1 Identifying the characteristics of the brand personality

As the first step, establishing the characteristics of the brand personality can clearly grasp brand. The adjective used to describe personality characteristic can be selected in the limited vocabulary. In order to draw the conclusion, we have selected ten personality characteristic adjectives to describe the object. They are consistent, independent, optimistic, flexible, capable, energetic, advanced, caring, exquisite and honest.

3.2 Pairing the antonyms of ten personality characteristic adjectives

In order to better identify the complexity of the brand personality system, we must associate the antonyms of ten personality characteristic adjectives and then combine the two relative adjectives with a group (Figure 1).
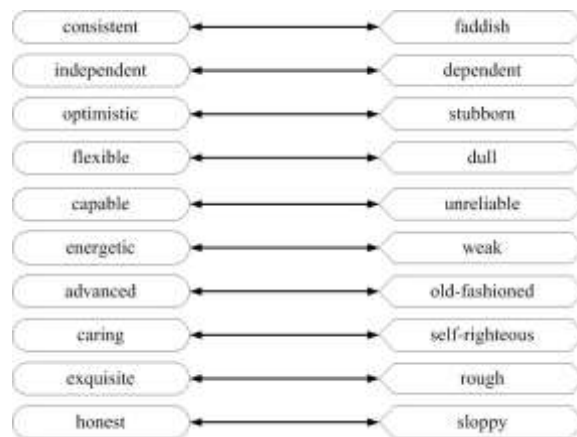
Figure 1   Ten Groups of Personality Adjectives and Their Antonyms Formed by Associating Two Adjectives into Each Group According to the Opposite Meaning

3.3 Matching the positive and negative side of ten groups

Based on ten groups of personality adjectives and their antonyms above, we choose one adjective from them to describe the positive and negative side of each group and to match (Figure 2).
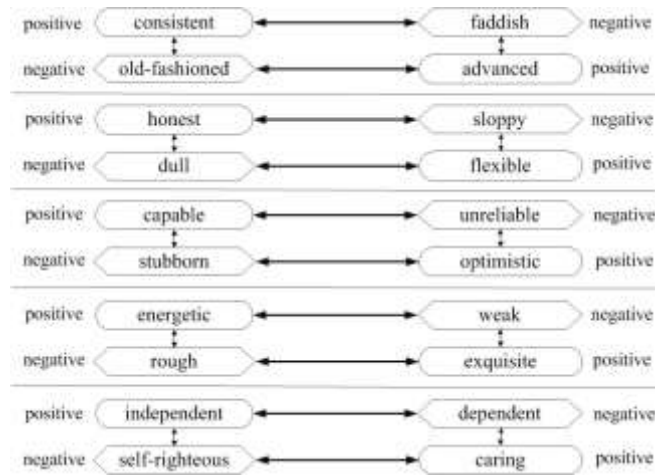
Figure 2　The Positive and Negative Side Defined by Choosing One Adjective from These Groups to Describe the Positive and Negative Aspect of Each Adjective

3.4 Inferring the relationship between each groups and forming brand personality system

Temperament is the innate characteristics, which forms the deep relationship between the personalities. Such as the group of consistent and faddish, old-fashioned and advanced, the formation in fact is a kind of stable relationship, so we define this group as stable temperament. Therefore, other groups can also be defined as loyal temperament, exploring temperament, active temperament and dominant temperament (Figure 3).
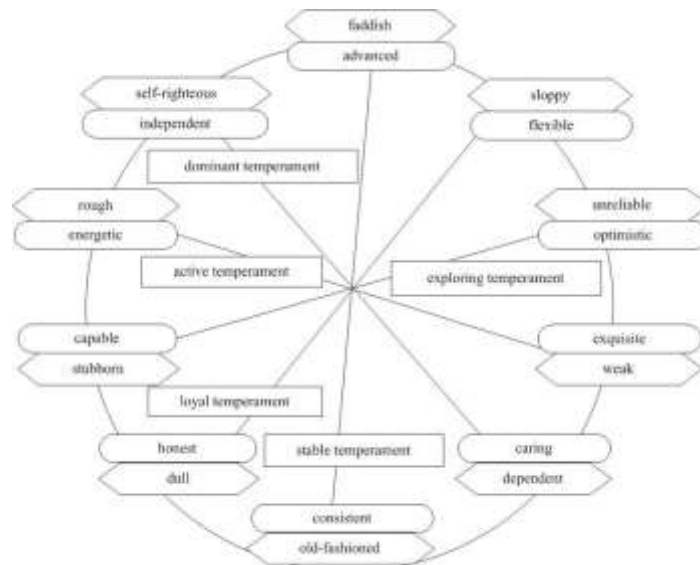
Figure 3　The Brand Personality System Formed by Associating Ten Groups of Related Adjectives into Five Temperaments

4 The Brand Personality of TOYOTA

As the starting point, we choose TOYOTA brand and investigate the consumers' minds of its brand image. The TOYOTA Corporation owns the whole product line-up from the general car to the commercial vehicle. Its activities extended from actively participating in environmental protection, traffic safety protection to holding F1 and other racing activities. Both the company itself and consumers have got a lot of knowledge about TOYOTA (Ambler T.D, 1997). But the knowledge system of TOYOTA is so huge that it's hard to explain in just a few words. Therefore, it is very important for TOYOTA Corporation to clear their brand personality.

4.1 The survey group of TOYOTA brand personality

So the TOYOTA Corporation has done a survey in the United States, which is mainly aimed at the

major consumers of the United States to make a questionnaire survey based on brand personality and brand image. By analyzing and comparing the differences between TOYOTA and non TOYOTA group, we will sum up the brand personality of TOYOTA and make the further development strategy.

We have set two standards in order to distinguish between TOYOTA and non TOYOTA group. One is "Do you have a TOYOTA car" and the other is "Do you want to buy a TOYOTA car in next purchase". According to the results, there are the four different groups (Figure 4). Group A: it's a TOYOTA user now and will consider buying a new TOYOTA car in the next purchase; Group B: it's a TOYOTA user now but no longer continue to buy TOYOTA; Group C: it's not a currently TOYOTA user but will buy a new TOYOTA car; Group D: it's not a currently TOYOTA user and doesn't consider to the use of a new TOYOTA car.
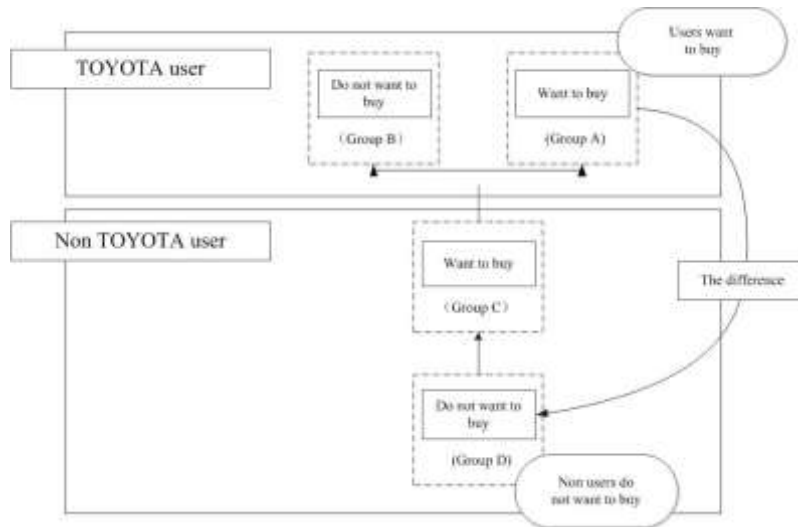
Figure 4   The Four Groups in Survey Divided from Their Consumption Experience for the Purpose of Finding Out the Big Differences Between These Groups and Comparing

Due to differences in consumption experience, Group A has given the high evaluation of the brand and Group D has got the worst. Therefore, we choose the biggest difference between Group A and Group D to compare(Figure 5). As Figure 5, the size of the circle indicates the strength of the brand impression and the adjectives used are the ten personality characteristics adjectives above (Chen Jiangjun, 2005).
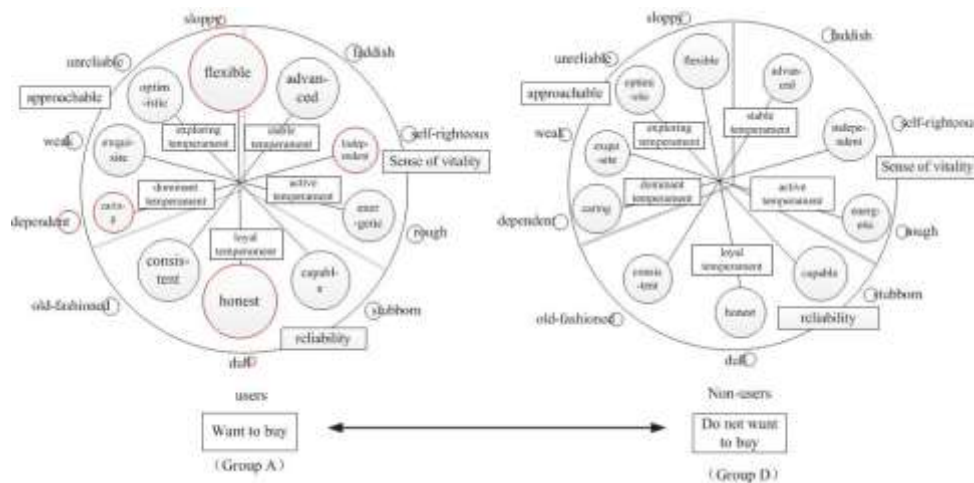
Figure 5   The Comparison Between Group A and Group D Shows That TOYOTA Has Got Different Impressions between Groups with Different Consumption Experience.
(Note: The Size of the Circle Indicates the Strength of the Brand Impression and The Red is the Emphasis Section)

The results show that: Group A has got the impressive "honest" circle, which reflects the company's biggest strong point is high quality. And we should see the big "flexible" circle at the same end of coaxial line, which indicates that the company has obtained an ideal impression on loyal temperament. And the "dull" and "sloppy" circle, the negative side of the same pair, are relatively small. As to dominant temperament, the circle of "caring" and "independent" is slightly weaker than the others, but the negative "dependent" circle is particularly large. The big "flexible" and "honest" evaluation is mainly attributed to the function and quality of the TOYOTA (Xia Xianglong, Yin Liuying, 2005). It's possible that TOYOTA hasn't shown its advantage when compared with other brands because of the relatively weak circle of "independent" and the large "dependent" ring. But each circle in Group D is very small. It's possible that the overall brand impression is relatively weak for its slight consumption of this brand in Group D.

4.2 The comparison between TOYOTA and other car brands

Next, we will compare the TOYOTA with similar competitors, selecting Ford and Chevrolet as comparison object which have occupied the first and second market share in United States (Figure 6).
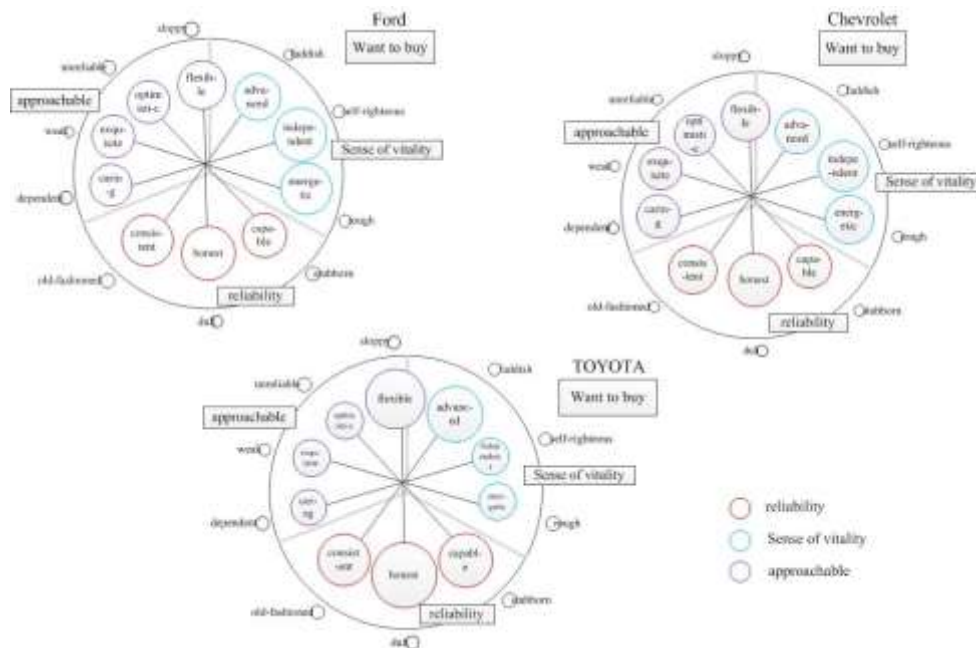
Figure 6   The Comparison Between Ford, Chevrolet and TOYOTA Shows That There Are Different Sections of "reliability", "sense of vitality" and "approachable" among Three Brands

(Note: The Size of the Circle Indicates the Strength of the Brand Impression and the Red is the "reliability" Section, the Blue is "the sense of vitality" Section, the Purple is the "approachable" Section)

As Figure 6, there are higher evaluations of "honest" impression in three brands, and the "honest" ring of TOYOTA is the largest. In addition, TOYOTA also has a strong feature of "capable", so we can get a comprehensive reflection that the TOYOTA owns the powerful reliability. Secondly, the Ford and Chevrolet get the bigger "energetic" and "independent" points, however the "advanced" point of TOYOTA is relatively high, which results in the imbalanced sense of vitality. When it turns to approachable section, TOYOTA's "flexible" personality characteristic is superior, but the remaining three rounds on this section aren't so obvious that don't give the overall growth in approachable part.

With the strongest "reliability" of TOYOTA and the prominent "approachable" impression of Ford and Chevrolet, we can drawn that Ford and Chevrolet as the United States manufacturers is affected by the consumption quantity of indigenous residents, which can also explain the reliable but unapproachable performance of TOYOTA. In other words, foreign companies must improve the "approachable" impression in order to increase their market share in the United States.

4.3 The comparison of Group A and Group D between interests, attributes and brand personality

Based on Group A and Group D above, we add several interests including the functional interest, emotional interest, self-expression interest and attributes to investigate two groups (Jin Liyin, 2006). As the result below (Figure 7): Group A has a deep understanding of the relationship between the emotional

interest and the attributes. Taking advanced / excellent technology as the starting point, supplying with safety and design attribute, connecting with the sense of security and pleasure in emotional interest and creating the sense of youth or thrill in self-expression interest, we can infer that the advanced technology, safety and design of TOYOTA has being fully recognized by users and affected emotional level in further. Although Group D have obtained a certain knowledge of high quality, economic, advanced / excellent technology, but these have just affected on the sense of security in emotional level, so the association system is relatively weak.
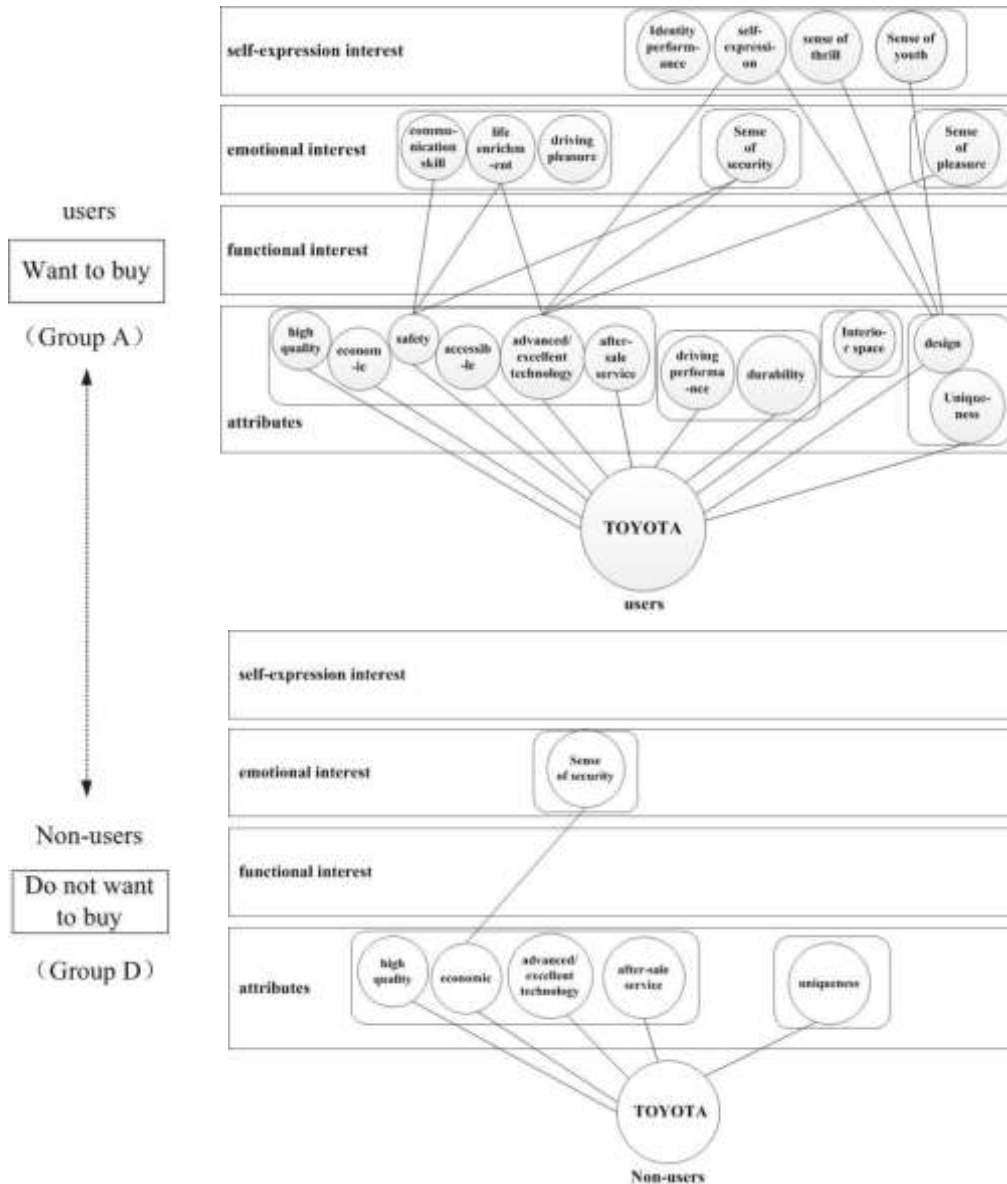
Figure 7   The Comparison of Group A and Group D Shows That TOYOTA Has Got Difference Interests, Attributes and Brand Personalities in Each Group Due to the Distinguishing Consumption Experience.
(Note: The Attributes and Interests Generated by Different Groups are Connected by Line)

The contrast between Group A and Group D can be drawn: Group D only has connected economic attribute with the sense of security, which refers to spend little money and saving. However Group A has connected advanced / excellent technology with the sense of security, which can be supposed that the brand make people safe and comfortable through advanced technology. So the same sense of security means two different meaning. One has experienced the latest TOYOTA car and obtained advanced brand impression, the other hasn't experienced the new car and got brand impression in view of economic

considerations.

5 Conclusion

After several survey results above, we can conclude that for TOYOTA brand's personality. Group A has got the "honest" "flexible" and "dependent" impression, and Group D's impression is generally weak. If there is too much "honest" feature in Group A, it is easy to turn negatively to "dull" impression and "flexible" feature will also be changed to "sloppy" one. Therefore, the two sides of loyal temperament must be kept in positive balance, avoid turning to the negative side. In addition, it is necessary to emphasize the "independent" personality characteristics. In comparison with Ford and Chevrolet, there is a strong reliability in TOYOTA but the remaining two personalities in sense of vitality except for the "advanced" are not obvious, so the "energetic" and "independent" points must be pressed. In the long run, TOYOTA as a foreign company should promote the development of "approachable" personality in U.S. market. For the views of attributes and various interests, the differences of Group A and Group D in the sense of security manifest that TOYOTA should connect advanced / excellent technology with design for the promotion of "advanced" personality and the general sense of vitality in further. And the price of TOYOTA cars should also be given an control for that users won't experience new cars for the high price.

However, there are some limitations in this research, such as the difference between users in diverse regions and the survey results of Group B and Group C, which may affect the overall evaluation of TOYOTA's brand personality. That needs further research to supplement and improve.

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Research on Brand Ritual Dimension Based on Structural Equation Model

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Abstract: This research designed an investigation questionnaire of the brand ritual dimensions through in-depth interviews and related literature. SPSS was used for exploratory factor analysis. Six influencing factors were obtained: scene, emotional experience, empathy, brand characteristics，memory enhancement and interaction, then using the structural equation model for confirmatory factor analysis of the extracted factors. Research has enriched the theoretical system of brand ritual and has practical reference significance of the brand management and promotion of enterprises.
Key words: Brand ritual; Factor analysis; Dimension; Structural equation model

1 Introduction

In the increasingly severe market competition, cultivating a brand ritual suitable for consumers is an effective way to build relationships between consumers and brand emotions. The so-called brand ritual is a kind of ritualized interaction between consumers and a certain brand (XueHaibo, 2015). Brand ritual can help companies and consumers create value together; create identity for community members, build common beliefs, increase consumer's sense of belonging to the brand community and brand culture; help to enhance consumer and brand emotions Relevance and brand loyalty (XueHaibo, 2015; Wang Yufen, 2017). Prexl& Kenning (2010) found through research that participation, brand trust, intrinsic rewards and external rewards have a significant positive effect on brand ritual intensity. The strength of brand ritual has significant positive effects on the four stages of the loyalty concept of Oliver (1997, 1999): cognitive loyalty, emotional loyalty, intentional loyalty, and behavioral loyalty. Ran Yaxuan and Wei Haiying (2017) explored the mechanism of brand ritual and its influencing factors through grounded theory. The research results showed that the brand basic meaning formed a brand ritual through the interaction process to the brand ritual meaning flow.

In light of the concept of this study and the theoretical gaps between existing literature, this paper explores the possible dimensions of brand ritual with exploratory research methods in order to compensate for the theoretical gaps and provide theory and practice for companies to design brand ritual, formulate brand strategies, and build brand image.

2 Theoretical Background and Research Design
2.1 Theoretical background
2.1.1 Ritual

In general, ritual consists of a series of symbolic symbols, actions, processes, etc. The expression and propagation of its meaning is mainly represented by symbols (Gu Hong, 2017). Collins (2009) proposes that rituals are aggregates of various symbolic symbols, the essence of which is to reveal the meaning of value and thus exert its meaning at the core of the product. Rook (1985) proposed that the ritual experience has four elements: ritual symbols, ritual scripts, ritual role and ritual audience.

2.1.2 Brand ritual

XueHaibo (2015) proposed that brand ritual is ceremonial interactions between consumers and a certain brand. Based on the concept of ritual, Ran Yaxuan and Wei Haiying (2017) proposed that brand ritual refers to a series of formal, repetitive patterns, values, and meanings surrounding brand activities. Brand ritual is characterized by stylized actions, routine behaviors, symbolic exhibitions, intentional unity and increasing influence (XueHaibo, 2015).The brand consumption ritual refers to a ritual constructed by the brand design and used in the process of consumer consumption. It is an interactive ritual activity between the consumer and the brand (Zheng Ling et al., 2017).

Therefore, this article believes that brand ritual refers to a series of non-functional behaviors related to brand activities that have repeatable patterns and symbolic meanings.

2.2 Research design

The study first conducted heuristic in-depth interviews with 12 consumers that had experience in brand ritual activities. Then, interview results and literature research are combined to form a brand

ceremony dimension pre-survey scale. In March 2018, 100 college students were selected for a preliminary survey. After analyzing the 73 valid data obtained from the preliminary survey and deleting the measurement items that did not meet the requirements of the pre-survey, the analysis results show that the pre-survey scale of the brand ritual dimension is a reliable and valid research tool. In April 2018, 300 questionnaires were distributed to consumers through offline paper questionnaires and online questionnaires. A total of 279 valid questionnaires were collected, and the effective questionnaire recovery rate was 95.9%.

3 Data Analysis

In the valid questionnaires, males and females accounted for 35.5% and 64.5%, respectively; those aged between 19 and 22 accounted for the highest proportion, 55.9%; respondents with monthly incomes ranging from 2001 yuan to 5,000 yuan accounted for the highest proportion, at 35.5%.

3.1 Reliability and validity analysis

3.1.1 Reliability Analysis

Reliability refers to the reliability of the data, that is, whether repeated measurements under similar conditions give consistent and stable measurement. In this paper, internal consistency coefficient Cronbach α value is used for reliability test. This paper used SPSS22.0 for the reliability test of the scale. The results showed that the alpha coefficient of the scale was 0.921, indicating that the questionnaire was highly reliable and the measurement results were reliable.

3.1.2 Validity Analysis

Validity refers to the accuracy of the measurement. At the beginning of the study, in-depth interviews were conducted with 12 interviewees. Through Nvivo11's coding and qualitative analysis of the interview content, the existing literature was combined into a brand ritual dimension scale. Therefore, it is considered that the scale has good content validity.

3.2 Factor analysis

3.2.1 Exploratory factor analysis

IBM SPSS Statistics 22.0 is used for factor analysis of the scale. IBM SPSS Statistics is a statistical analysis software that provides tools that enable users to quickly view data, formulate assumptions for other tests, perform processes that clarify relationships between variables, create clusters, discover trends, and make predictions. The results show that the KMO statistic reaches 0.937, the Bartlett's sphere test approximates the chi-square value of 10767.069, the degree of freedom is 435, and P=0.000, which is significant at the 0.05 level. The data are suitable for factor analysis.

In this paper, the principal component analysis method is used to extract factors, and the maximum variance method is used to rotate the factors. The brand ritual dimension scale is used to extract factors, and the eigenvalue >1 is the principle of the extraction factor. Using Kaiser's normalized orthogonal rotation of maximum variance, a total of 6 factors were extracted, and 79.67% of variance were interpreted cumulatively. The extracted factor loads were all above 0.5, indicating that the scale had a good structural validity (see Table 2). After the orthogonal rotation, R1 "requires brand ritual in many aspects of life", R18 "brand ritual occur at specific times, places, or events" and R19 "does not arbitrarily participate in a brand ritual or not" in each The load on the factor is not significant, so R1, R18, and R19 are eliminated and the subsequent indicators are reordered.

As showed in Table 2, R1~R3 describe the importance of the brand ritual scenes and atmosphere to the consumers, so the F1 is named scene. F2 contains six indicators of higher factor loads with R4~R9. These six indicators collectively describe the brand ritual to create a good emotional experience of consumers, and therefore define it as an emotional experience. R10~R13 indicate that brand ritual must meet certain psychological needs of consumers and therefore define F3 as empathy. R14 ~ R17 show the brand's characteristics and the importance of culture in the brand ritual, so the F4 named the brand characteristics. R18 ~ R19 show that brand ritual needs to create a deep impression for consumers, strengthen memory, so the name of F5 memory strengthening. R20 ~ R27 indicate that brand ritual requires the interaction between consumers and brands and the interaction between consumers and others. Therefore, F6 is named interactive.

Table 2　Brand Ritual Dimension Factor Analysis Results

Extraction factor	Measurement Statement	Factor loading
F1 scene	R1:Need to create a scene.	0.908
	R2: Need to create an atmosphere or feeling.	0.911
	R3: Some parts need to be carefully designed.	0.863

Continural Table 2

Extraction factor	Measurement Statement	Factor loading
	R4: To make consumers have a good experience.	0.731
	R5: Can create emotional experience for consumers.	0.784
F2 emotional experience	R6: Can make people have a good mood.	0.798
	R7: Can trigger participants' emotional expression.	0.797
	R8: Meets consumer characteristics.	0.790
	R9: Fits consumer's emotions.	0.757
	R10: Can enhance the mindset of consumers and make people more active.	0.870
	R11: Meets the psychological needs of consumers.	0.778
F3 Empathy	R12: Pinpoints some kind of consumer desire.	0.873
	R13: Can do the next thing better.	0.602
	R14: Should highlight the brand's characteristics.	0.840
F4 brand features	R15: Can convey brand culture and spirit.	0.833
	R16: The products involved should reflect the brand values and brand spirit.	0.838
	R17: The products involved should be able to highlight the differences in the brand.	0.829
F5 memory enhancement	R18: To impress people.	0.847
	R19: Strengthen the memory in the minds of consumers.	0.858
	R20: There may be "constrained psychology".	0.829
	R21: High operability.	0.756
	R22: It is widely circulated, many people will do this.	0.876
F6 interactivity	R23: Sometimes people need someone to teach.	0.831
	R24: Brand ceremony should be fun.	0.858
	R25: Through this kind of activity, people can express some of their own opinions.	0.858
	R26: Sometimes you need someone else to interact with yourself.	0.860
	R27: Sometimes people have to "play a role" in this activity.	0.866

3.2.2 Confirmatory factor analysis

In this paper, AMOS 21.0 software is used to verify the samples and the maximum likelihood method is used to verify the model's fitness. The result is as follows:

Table 4   Model Goodness of Fit Indicators

	χ^2/df	RMSEA	GFI	AGFI	NFI	CFI	IFI
Initial model	2.718	0.079	0.818	0.777	0.924	0.950	0.950
Revised model	1.765	0.052	0.881	0.851	0.953	0.979	.979

Table 5   Confirmatory Factor Analysis

factor	Items	Estimate	t-value	CR	AVE
	R1	0.983			
F1	R2	0.988	62.495	0.973	0.923
	R3	0.91	33.5		
	R4	0.797			
	R5	0.894	17.881		
	R6	0.894	19.895		
F2	R7	0.927	18.564	0.955	0.781
	R8	0.828	16.028		
	R9	0.952	19.399		
	R10	0.683			
	R11	0.927	13.848		
F3	R12	0.93	13.871	0.862	0.621
	R13	0.541	8.53		

Continural Table 5

factor	Items	Estimate	t-value	CR	AVE
F4	R14	0.858		0.947	0.817
	R15	0.919	21.795		
	R16	0.898	20.83		
	R17	0.939	22.806		
F5	R18	0.931		0.9227	0.857
	R19	0.92	18.348		
	R20	0.946			
	R21	0.813	18.264		
F6	R23	0.958	36.491	0.985	0.902
	R24	0.967	38.562		
	R25	0.979	41.333		
	R26	0.988	44.274		
	R27	0.985	43.25		

As can be seen from the table, the normalized factor loadings for all measurement indicators are all 0.5, Ave values are all greater than 0.5, and CR values are all greater than 0.8, indicating that the convergent validity is good. The initial model's indicators, χ^2/df value is 2.718, less than 3, RMSEA(0.052) is less than 0.08, GFI value is 0.818, AGFI value is 0.777, NFI value is 0.924, CFI value is 0.950, and IFI value is 0.950, the model needs to be revised. Modify the model according to the model modification index, and increase the relative path of e5 and e6, the relative path of e7 and e9, the relative path of e20 and e21, and the relative path of e4 and e6. The fitting indicators have been improved and the model has reached a good fitting degree.
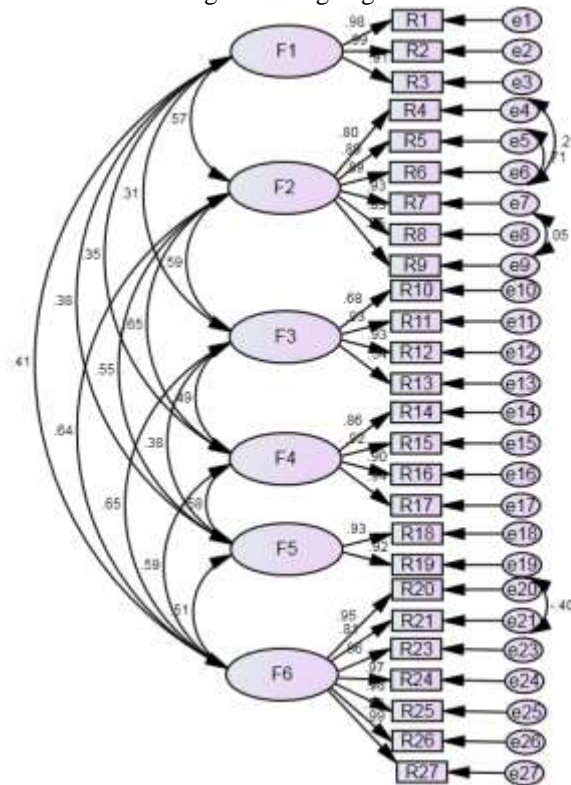
Figure 1   Revised Confirmatory Factor Analysis Chart

4 Conclusion

Based on the research of existing brand ritual, this paper proposes the research concept of brand ritual dimensions, and uses in-depth interviews to obtain research items for measurement. Then six factors are obtained through exploratory factor analysis, and structural equation model is used for verification. Factor analysis. This study concludes that there are six dimensions of brand ritual: scene, emotional experience, empathy, brand characteristics, memory enhancement and interaction. Theoretically, this study proposes the dimension of brand ritual and enriches the theory of brand ritual. In practice, this study also serves as a reference to companies to carry out brand ritual.

There are still some deficiencies in this study. First of all, the survey sample of this study is mainly from Wuhan City. The use of more effective measurement tools to collect consumer information and reduce sample bias needs to be strengthened. Second, this study focuses on the dimensions of brand ritual. It is still necessary to further study how companies can take effective measures to strengthen the impact on brand ritual on customers and increase customer loyalty.

Acknowledgement

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An Investigation on the Factors Influencing Organic Food Purchase Intention in Wuhan

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Abstract: This paper aims to investigate the factors influencing the purchase intention of organic food in the mid-sized city of Wuhan (China). After reviewing relevant literature, the research method was developed based on five hypotheses and a handed survey online have been conducted with a total of 162 valid responses. The finding of this study revealed that purchase intention in Wuhan is influenced by similar factors as larger cities. Indeed, despite a lack of knowledge and trust, very few experiences with organic food products, high prices and lack of distribution channels, it does not stop consumers to intend purchasing organic food products.
Key words: Organic food; Purchase intention; Mid-sized city; Convenience

1 Introduction

With a population over 1.3 billion people, China is the fourth largest country in the world by land size. Its continuous growth in economy and society leads to an emerging middle and high income class, more and more concerned to live a healthy lifestyle (Li, 2006). But for decades, China has been facing the problem of a seriously contaminated environment, especially in the food industry. Associated with an increasing disposable income, the recurrent food scandals allow the organic industry to grow and expand in China, creating potential consumers emerging from mid and big-sized cities (Yin et al, 2010). This paper intends to review the factors influencing the purchase of organic food and to analyze them to the mid-sized city of Wuhan. With more than 10 million inhabitants, Wuhan is considered to have an excellent growth prospect city despite a slow adoption of trends, and lower income factor than bigger cities.

Moreover, previous studies on organic food consumption mainly focus on consumer behavior, purchase intention and demand for organic food in Europe and western countries. Since related studies in China have been only led in big and major cities, it is essential to study the factors influencing Chinese consumer's purchase intention towards organic food in developing cities where the approach about culture and knowledge of organic products is less developed in order to reach a better understanding on a larger scale of population.

2 Literature Review

2.1 Organic food consumer

International publications on organic consumers mainly research on a consumer profile or try to understand the attitudes towards purchase intention in the field (Harper et al, 2002; Padel et al, 2005). Literature can also be found about the main drivers of organic consumption through different approaches such as demographic variables, attitudes, motivations, personal factors, willingness to pay and beliefs. Most of studies describe organic food buyers in China to be a middle to high income consumer, educated females, from 28 to 50, married, pregnant or with infants; or to be senior population, or with health issues (Magnusson et al, 2001; Giannini et al. 2014; Thompson et al. 1998（Li et al, 2015). Official reports and market overviews add other profiles having different consumption behavior and preferences: white collar families, overseas returnees, government officials, young people, foreigners living in China, and corporations.

2.2 Factors influencing consumer purchase intention towards organic food

With the expansion of organic food in China, demographics barriers and cultural differences influence the intention to buy, even though similar factors and attitudes can be found in different countries. Indeed, most of studies led in different countries show the same concerns for health motivation issues, food quality and the environment (Pearson et al, 2007).

2.2.1 Health and environmental awareness

A large amount of literature covers the relationship between health and organic food. Most of findings defines health as the main factor for consumers to buy organic food because of its positive association (Zanoli and Naspetti, 2002; Kyriakopoulos and Van Dijks, 1997); but other researches

suggest otherwise. Michaelidou et al. (Michaelidou et al., 2008) and Tarkianen and Sundqvist (Tarkianen and Sundqvist, 2005) demonstrate that food safety and ethical concerns are the most important factors when purchasing organic food. Regarding environmental awareness, Chen (Chen, 2007) states that consumers involved in an environmental behavior are more likely to have strong intention to purchase organic food products.

2.2.2 Economic development

For some authors, the factor 'price' negatively affect organic food purchase and its frequency (Hughner, 2005; Shepherd et al., 2005) because of its high value on everyday products (Briz and Ward, 2009) ; when others explain that consumers who already have purchased organic food at least once do not consider price as an essential factor (Zanoli and Naspetti, 2002). Moreover, Krystallis and Chryssohoidis (Krystallis and Chryssohoidis, 2005) state that willingness to pay is driven by food quality, food safety and trust in certifications; more than price. However, studies show that 'availabity' (or convenience) has a negative impact on organic food purchase, as product varieties and places to shop are often limited (Zanoli and Naspetti, 2002; Dettmann and Dimitri, 2010).

2.2.3 Demographics

Regarding demographic variable, most of studies show the correlation between consumers with middle to high income and higher educational background; and organic food purchase (Tsakiridou et al.,2008; Thompson,1998; Magnusson et al. 2001, Li and Xin, 2015).

2.2.4 Standards and regulations

Padel (Padel, 2005) found the absence of trust in organic labelling and certification to be the most significant barrier to purchase. According to the author, governments should enforce and intervene in the food supply chain through laws and regulations. Magnusson et al., 2003 defend the organic label as a sign of higher quality for consumers.

2.2.5 Transparency of production process

Food safety is considered as primordial when purchasing organic food, and composition and methods of production are important factors (Michaelidou et al.,2001). The trust in quality standards and integrity influence organic food intention (Lockie et al.,2004; Thompson, 1998); while a brand reputation and positive corporate image promoting common values towards the environment and health concerns can influence a consumer purchase intention in accordance (Onyango et al.,2007).

Based on extant literature, the following hypotheses have been developed, affecting (positively, neutrally or negatively) the organic food purchase intention in Wuhan.

Table 1   Hypotheses

Hypotheses	Factors	Influence
1	Health and environmental awareness	Positive - **Main driver**
2	Transparency of production process	None
3	Standards and regulations	None
4	Economics development	Negative
5	Demographics	Positive

3 Methodology

A survey has been designed using 25 items relevant to the consumer's purchase intention towards organic food, and then conducted in the city of Wuhan. These questionnaire statements have already been conducted in previous researches from different countries, and are based on relevant literature. Moreover, they are divided into four variables containing on average 4 items, and demographic variables: Health and Environmental Awareness, Transparency of Production Process, Standard and Regulations, and Economics Development. A five points Likert scale going from [1] I strongly disagree to [5] I strongly agree, where [3] indicates neutrality has been used (Bryman and Bell, 2007). Regarding quality criteria, each concept has been tested with Cronbach's alpha test, reveling positive results with a minimum value of 0,602 and maximum value of 0,838; 0,60 considered as an accepted level of internal reliability (Bryman and Bell, 2007). Regarding data analysis methods, this study used frequencies, descriptive analysis, Chi-square test, and Phi&Cramer's V values.

During 60 days, 200 questionnaires have been administrated online through social communication tools (wechat, qq) with snowball sampling, and then reached randomly through convenience sampling with QR codes and links to the survey. The questions were first written in English and then translated in Chinese by a native expert, before conducting a successful pilot testing. Finally, over 162 respondents,

162 valid questionnaires were collected.

4 Hypotheses Results and Discussion

H1: Health and environmental awareness are the main driver and positively affect organic food purchase intention in Wuhan

Five items have been included in Health and Environmental awareness concept, but item 2 (Health is important to my lifestyle) has been removed based on the Skewness and Kurtosis criteria. The author will remind the reader that the Likert scale is going from [1] I strongly disagree to [5] I strongly agree.

H1 is rejected. The results for this concept show that 69,8% of respondents are concerned about food safety and believe that organic food is better for their health (53,1%). The respondents show a little knowledge when 32,7% strongly believe in organic food produced without chemicals. Even though 27,8% remain neutral, this score can be explained by the skepticism people can have towards organic food products and its production process. Only 0,6% of respondents declared to not pay attention to the environment when 61,7% do pay attention to the environment. Regarding the last item, 56,2% of respondents believe that organic food support the environment protection when only 4,9% disagree. The statistics results get along with previous theories suggesting that health awareness has the least strong influence on driving consumers to purchase organic food and that food safety and ethical concerns are the main drivers (Tarkianen and Sundqvist, 2005; Michaelidou et al., 2008). H1 is rejected.

H2: Transparency of production process have a neutral influence on organic food purchase intention in Wuhan

H2 is partially supported. 25,3% of respondents have already experienced organic food in the past, with 14,2% never did. This result can be explained by the fact that organic food can be experienced in different ways such as reading in magazines, or watching an ad. As an experience is personal to one, the author does believe that the respondents choosing the neutral item (24,7%) have by deduction, never experienced organic food before as they are not able to make a clear statement. Regarding the role of public administration and ecological organizations on organic food advertisement, 26,5% of respondents strongly disagree and 24,1% have a neutral opinion which can reflect an absence of interest/knowledge in this area. 60,5% strongly agree to have information access to the food they buy, supporting the theory that composition of products is an important factor in the purchase intention (Tarkianen and Sundqvist, 2005; Michaelidou et al, 2001; Lockie et al, 2002). The interest of respondents to know the reputation of the brand (56,2%) also supports another theory stating that brand reputation has a positive influence by reflecting the quality of a product. To conclude, neither a previous organic experience nor an organic food advertisement positively or negatively affects the purchase intention. But information access and brand reputation do have a positive influence on purchase intention.

H3: Standards and regulations have a neutral influence on organic food purchase intention in Wuhan

H3 is partially supported. 30,9% of respondents are neutral about the food standards and regulations awareness when buying food, and only 13,6% strongly agree to be aware. This result shows that the majority of respondents are not aware of any food standards and thus, are blind to food dangers when shopping. Respectively 29,6% (neutral,) 19,8% (agree) and 16% (strongly agree) do not possess the knowledge to identify labels and names of organic food products. Therefore it can be concluded that this factor appears to be a personal knowledge most of respondents in Wuhan do not have. Regarding the trust in organic food standards and regulations, respondents are most likely to trust them, even though 21,6% of respondents do not have an opinion about it. This results falls in line with Aryal et al (2009) findings claiming that Chinese consumers experience a lack of trust when certifying organic food products. As a result, respondents do not seem to be aware about the authenticity or organic food products, and its standards and regulations. Therefore it does not influence their purchase intention.

H4: Economic development factors negatively affect organic food purchase intention in Wuhan

H4 is partially supported. The majority of respondents tend to agree that organic food is more expensive (51,9% - strongly agree; 23,5% - agree) and therefore support the literature review stating that price negatively affect organic food purchase and its frequency (Sheperd et al, 2005). Indeed, the frequency results indicates that 17,9% never buy organic food 26,5% - sometimes, and 28,4% - usually. This result can be explained by the fact that some organic food products are less expensive than others, or represent a necessity which can lead to a usual purchase (ex: health concerns). Moreover, price is not the only factor to consider during purchase process. Indeed convenience factor respectively shows 21,6%

and 24,7% of respondents strongly disagree and disagree about easily finding and buying food in Wuhan. This finding supports Li and Xin (2015) research claiming that consumers who have the least access to organic food tend to go to organic farms and organic food specialty stores more often. Finally, respondents show positive results about willingness to pay (agree 32,1%, strongly agree 19,8%), even though they think that price is expensive.

H5: Demographic factors positively affect organic food purchase intention in Wuhan

H5 is rejected. Demographics analysis showed that 61,1% of respondents were female, and 38,3% were male. This result might be biased as an equal number of men of women would have been more representative of the population. Age of correspondents ranged between 26-35 years old (53.1%), followed by 25,2% (18-25), 18,2% (36-45) and 2,5% (46-55): with 54,3% being undergraduate and 30,9% postgraduate. The highest range of income was found between 3,000-6,000 yuan/month (23,5%), followed by 6001-9000 yuan/month (21%), with 26,5% of respondents working as Company staff/clerical, and 21,1% as 'other'. Regarding the family situation, 51,2% chose the item 'not married' and 'no children' (57,4%). These demographic results found in Wuhan seems to match to the organic food consumer profile already analyzed by previous studies as: 'a middle to high income consumer, educated females, from 28 to 50'. The absence marital and children situation can be explained as most of respondents were undergraduate and postgraduate students, therefore may not be engaged in serious relationships yet and are committed to their careers. In addition, results from educational background support previous researches stating that high level of education is important when purchasing organic food products (Zhu et al. 2013).

5 Conclusion

The findings of this paper have revealed that purchase intention in Wuhan is influenced by similar factors found in large cities' studies (e.g Beijing, Guangzhou etc.). However, it can be noticed that some aspects diverge. This study reflects that higher educated and higher income profiles are more concerned about their health as well as environmental issues. Therefore, they intend to buy organic food products, despite not having the knowledge to identify it. An important point to notice is that people show an interest in the information process about a product, as well as the brand reputation. If this issue could be solved, their trust in organic food certification would be restored, leading to purchase and not only intention to buy. Regarding purchase habits, more expensive prices do not stop the respondents when considering buying organic food products, even though there is a serious problem of product availability to solve. These findings support a previous research led in Wuhan stating that the reason why people do not buy organic food is because of a poor knowledge, channels to buy are few, and consumer willingness to pay is low (Wang, 2014).

5.1 Managerial limitations

Many marketers of organic food can benefit from this research study, especially as the organic food market is yet to be fully developed and covered in China. The author encourages marketers to educate their target audience, and better promote organic food products. This study provides enough data and information to assist strategic management with decision-making process.

5.2 Limitations and future research

Future research should be conducted narrowing the range of demographic factors, and researching deeper into each factor to better understand the choices of respondents. Because the final sample was quite small, it would be interesting to reach a larger sample in order to be more representative of Wuhan population.

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The Practice of Marketing in Law Offices: Professionals Opinion

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Abstract: Brazil is one of the countries that, in proportion to its population, has one of the largest numbers of lawyers, losing only to the United States and India. In this scenario of demand for the profession, and given a large number of corporate law firms in Brazil, and especially in the south-east of the country, this research aims to explore the practice of marketing in lawyer's office based on concepts of service marketing. To reach the objective of the study, the first part of the research aims to clarify the functioning and some particularity of law firms, as well as the disclosure and marketing restrictions that the sector has. The research presented is made up of two studies: a market study conducted in 2015 on legal marketing of corporate-oriented offices, and the other by a survey conducted with professionals from the same market research field, law firms focused on corporate service, updating part of the issues raised and confronting possible changes in the perception of this public. The main analyzes point to the importance of all tools or a set of tools working together, but in the research done with professionals in 2018 reveals a perception that staying present in the events is a more effective way to do marketing in this sector, reinforcing the concept of relationship in service marketing.
Key words: Legal marketing; Digital legal marketing; Professional services marketing.

1 Introduction

In proportion to its population, Brazil is a country with a high number of lawyers, losing only to the United States and India. According to data collected by the Brazilian Lawyers Organization - Ordem dos Advogados do Brasil (OAB), the institution that regulates the activity nationally, in 2008 there was one lawyer for every 322 Brazilians (JusBrasil, 2008)[1].

Among the main elements to explain this number of professionals trained in law is the fact that the profession of lawyer is one of the most traditional in the history of professions, considered one of the three highest paid professions in business (Positive World, 2016), and has power in governmental roles, potentialized by Brazilian bureaucratic procedures.

In this context of demand for the profession, it is also observed the big number of law schools in the country in relation to all other countries in the world: in Brazil there are about 1240 law schools, practically the same number as all the faculties of the rest of the world (GGN, 2015)[2].

In this scenario of demand for the profession, and given the large number of corporate law firms active in Brazil, and especially in the southeast of the country, this research aims to explore the practice of marketing in lawyers office, based on marketing concepts services, with special focus on relationship marketing (Las Casas, 2012) and also digital marketing.

To reach the objective of this study, the first part of the research aims to clarify through theoretical research the functioning and some particularity of law firms, as well as the disclosure and marketing restrictions that the sector possesses. The second part brings results of two types of research, one with secondary data (Intelijur, 2015)[3] and one made by the researchers of this paper in a survey form.

The first study is a market study carried out in 2015 on legal marketing of corporate-oriented offices (Intelijur, 2015), and the other by a survey carried out with professionals from the same universe of market research, or law firms ,focused on corporate care, updating part of the issues raised and confronting possible changes in the perception of this public.For the purpose of this article, only the questions that really fit the objectives of this study were selected.

Research questions focused on the importance of the application of marketing tools and how these tools apply to market customer as well as talent recruitment, and the perception of how new topics like big

[1]Jusbrasil. (2008). Brasil É Terceiro Pais Do Do Mundo Com Maior Número De Advogados: Um Para Cada 322 Pessoas. Disponível em: <https://Espaco-Vital.Jusbrasil.Com.Br/Noticias/92936/Brasil-E-Terceiro-Pais-Do-Do-Mundo-Com-Maior-Numero-De-Advogados-Um-Para-Cada-322-Pessoas>. Acesso em: 15 Jun 2018.

[2]Jornal GGN. (2015).Brasil Tem Mais Faculdades De Direito Que Todos Os Outros Países. Disponível em: <http://Jornalggn.Com.Br/Noticia/Brasil-Tem-Mais-Faculdades-De-Direito-Que-Todos-Os-Outros-Paises>. Acesso em: 10 Jun 2018.

[3] Intelijur. (2015). Marketing Jurídico Dos Escritórios Voltados Para O Setor Corporativo. Disponível em:<https://www.Intelijur.Com.Br/Gejur>. Acesso em: 10 Abr 2018.

data and internet of things can affect legal marketing.Few articles address marketing in law firms. None of them seeks to identify the perception of professionals as to the achievement of better results. This article will fill this gap. This study results will bring new insights concerning marketing for the academy and professionals.

2 Theoretical Framework
2.1 Law firms
Law firms in Brazil are constituted by a specific body, the OAB, or "Ordem dos Advogados do Brasil", and Law No. 8,906 of July 4, 1994, which constitutes and regulates this branch of activity. The Statute of the Lawyer and the Brazilian Bar Association provides in chapter IV, article 15, that lawyers may meet in civil society to provide legal services.

However, when the norm refers to society whose purpose is to practice law, it means that the activity is performed through its partners and other lawyers linked to it, and Paragraph 3 of this same article requires that the proxies be granted individually to lawyers with an indication of the company of which they are a part, since the names of the offices must always represent the first and last names or only the surname of at least one of the partners, as referred to in Article 16.

Another peculiarity of law firms is the fact that they can not function by presenting commercial characteristics, or adopting a fancy name or performing different legal activities.
According to the jurist Gonçalves Neto (2006), "society exists to support the joint activity of lawyers, manage their accounts and facilitate their work." In this same line of thought, Selem (2012) in dialogue with other authors puts the differentiation of the lawyers' societies for the purpose of regulating and disciplining reciprocal relations between lawyers, fundamental to the administrative and financial life of the group, disciplining the office's file and the distribution of remuneration.

The Brazilian Statute of the Lawyer (Law 8.906, July 4th, 1994) predisposes to the unit of professional qualification, that is, all partners must be lawyers, the society should only have the purpose of practicing law, have its registration in the Order and do not present market characteristics.

These characteristics have made law firms models apart in the history of management since any publicity or even a recruitment and selection program must be carefully developed so as not to hurt any of the regulations.

Despite the restrictions, this peculiar characteristic has evolved and gained prominent proportions, considering international experiences, most of the American references, and experiences of the administrative evolution of large and medium law firms, as reported by Esequiel (2016), especially when the subject is the perenniality and growth of law firms.
2.2 Contextualization of legal administration
Administration in law firms is still addressed in a specific way, mainly due to the fact that a law firm has not been compared during a long time with a company, positioning itself from the interpretation of Law No. 8.906 (1994), which provides for the Statute of the Advocacy and the Brazilian Bar Association, OAB.

Additonally, there are some limitations on the following topics:

• **Strategic Planning and Marketing:** Aimed to positioning the company to its target market (Las Casas, 2015) and defining the potential to growth. According to Selem (2012), strategic planning for legal administration is very focused on the internal methodology of work. Strategic planning also covers issues related to marketing communication, although specifically legal, that defines and explores possible channels of communication to convey news and articles, and consequently the image - taking into account the restrictions of the Code of Ethics of the Order (Law 8.906 of 1994) - in addition to other related issues.

• **Financial Management:** Within an office, financial management is responsible for setting budgets for resource use and procurement of supplies, verifying what is feasible or feasible to advance to a client at recourse costs, measuring and compiling the economic and financial results of the period, in addition to analyzing the possible points of saving and which are the most profitable. According to Hipólito (2011), cash flow and the available budget are also assessed in the verification of cost advances for clients, and timesheet or record of time spent with process activities or legal opinions of a certain client for collection of values and pricing of the work developed, using this information to generate indicators of profitability and financial performance.

• **Information Management**: With the emerging technologies facilities, business has gained speed in the interconnection of available data and information (Taurion, 2014), The offices that have a portfolio of medium to large processes need a registration and information management system to help optimize

customer response time and the lawyer's performance. The interconnection between systems serves precisely to achieve integration of information and speed in obtaining answers, either in the sharing of customized spreadsheets or properly developed systems for process registration and judicial follow-ups, such as the popular systems in the sector: Thomson Reuters, Totvs, and Tedesco.

• **Human Resources Management:** in the law firms, the human resources management policy is divided into three specific groups: lawyers, trainees, and administrative staff. According to Esequiel (2011) and Castro (2012) for lawyers, it is necessary to periodically maintain and review the policy of division of labor, the possibility of ascension predefined by the career plan, as well as factors that influence motivation and engagement and the improvement of the professional, and there is room for the use of intern marketing tools (Brum, 2010). For trainees in law it is necessary to maintain a scholarship-internship policy, as well as promotion policies, recognition for good work and time spent at home, and for administrative staff also the development of a career plan, salary policy based on the evolution professional, continuous stimulation to the learning and the improvement. These strategies are linked to the retention of talents, and to the better development of the people in the accomplishment of their attributions.

Due to the fact that the structure of the law firms are very peculiar and peculiar, many differences have been generated in office management, but in recent history a large number of large and medium-sized banks have applied management concepts by administrators with specific knowledge and training in the area, called administrators or legal managers, acting along with the direction of the members (Goes, 2011).

2.3 Legal marketing

To support legal marketing, which is marketing in a professional service sector, we will explore the theory of service marketing. Service is understood as an act, an action or a performance, according to Rathmell (apud Las Casas, 2012).

This act can be presented in several ways. In the case of the law firm, the service provided is the act of the law firm assisting or defending the client company in a judicial proceeding, or an acquisition involving more details, or in the closing of sales and service contracts between the client company and a third, or countless other activities, based on the legal knowledge that the lawyer can offer to assist his client.

One of the possible tools for use by the legal public is relationship marketing, which is the process of identifying, establishing and improving customer relationships so that the objectives of all parties involved are met. Relationship marketing refers to business relationships between economic partners, service providers, and customers, and is a process where trust is essential (Las Casas, 2012).

Legal business is based on relationship marketing: the law firm use to expose its brand in trade promotions, give references of work done and its results , disseminate relevant content in lectures or events, presence in the digital environment through the dissemination of news, respecting the Restriction Resolutions of the OAB Statute (1994), exploring the niches according to banking or lawyer specialization, as well as using networks of associations and content marketing through lectures and social networks.

• **Niche Market**: In advocacy, the niche of action can justify even more its "added value".An article in the Conjur portal (Melo, 2017)[1] explored the power niche issue applied to law firms: that is, a specialized niche within the law not yet explored with prominence or proficiency. This has been the case, for example, with offices that emphasize their proficiency in assisting the corporate establishment of startups, or of offices that collaborate with the elaboration of new security or financial products, that is, the office and lawyers become specialists in the area of business of the client and apply the right to this, showing more explicitly their niche of action.

• **Global Advocacy Networks:** The networked society (Castells, 2010) has exponentiated access to information and interconnected consumer markets and service providers, and this was no different with law firms. Although they go through rigid regulatory aspects for association with foreign entities, accessibility networks have narrowed these barriers. Among the main characteristics for the formation of alliances between Brazilian laws firms with offices in other countries are:

1) A company aiming at the overall improvement of matters related to national and international laws, regulations and procedures, for clients in Brazil and abroad.

2) Society tends to have better acceptance among younger professionals.

3) It has rigid norms to be accepted by the OAB, according to project of 2012:

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[1] Melo, J. O. (2017). Power Niche É A Mais Nova Ideia De Marketing Aplicável A Advogados. Disponível Em: <http://Www.Conjur.Com.Br/2017-Abr-02/Power-Niche-Ideia-Marketing-Advogados>. Acesso em: 1 Jun 2018.

I - the foreign office can not influence the decisions of the office of which it is associated in Brazil.

II - it is vetoed the submission of societies of lawyers in the country, before societies of other nations.

III - the foreign lawyers / offices, can only act as consultants in Brazil with previous authorization of the OAB.

IV - any type of association that implies loss or diminution of the institutional identity or the autonomy of the administrative, financial, professional or strategic planning management by Brazilian law firms is Prohibited.

V - a foreigner who violates the rules will have the authorization to act as a consultant in Brazil revoked. The cases will be analyzed by the sections where the defendant can defend himself and, according to the result, to appeal to the Federal Council. Lawyers and Brazilian companies that contradict the norms will be subject to the disciplinary process in the OAB, besides administrative, civil and even penal sanctions, according to the provision. (OAB, 2012).

According to the opinion of the lawyer Miguel Reale Junior, the administration of the office does not have to be done by a lawyer, which has opened a field for administration as well, legal administration.

In Brazil the foreign lawyer needs authorization from the OAB, which will grant" leave to act" as a foreign legal adviser. The authorization must be requested in the section of the Order where the professional wants to work. A residence visa in Brazil is required, proof of enrollment as a lawyer in your country of origin, proof of good reputation, certified by an organ of the country of origin and corroborated by three Brazilian lawyers. In the case of offices, the corporate name may be the same as that used abroad, provided that preceded by the expression "Consultants in Foreign Law", and the authorization must be renewed every three years. Table 1 shows the International Corporate Advocacy Associations. Its possible to realize the importance to global market for Law firms due to the high number and offices and several countries Associations operate**.

Table 1   International Corporate Advocacy Associations

Association	Countries	No. Offices	Offices Representativesin Brazil
ABL Global	34	57	DDSA - De Luca Derenusson Shuttoff Azevedo Advogados; R. Amaral Advogados
Advoc Corporate Alia, Abogados	70 N/D	94 N/D	Siqueira Castro Advogados Main Office in Madrid, represented in Europe, Latin America and Brazil.
Geneva Group International	120	736	Santos Neto Advogados; PMS - Pigatto Monteiro, Schuster e Advogados Associados
Globalaw	85	110	Almeida Advogados
Inter Law	60	75	Tess Advogados; Manucci Advogados; Villemor Amaral Advogados; Carvalho, Machado e Timm Advogados
Inter-American Bar Association - IABA	N/D	N/D	Network among offices and universities. In Brazil: Lefosse Advogados
International Bar Association - IBA	160	190	In Brazil: SABZ
IR Global	N/D	500	Carrion Advogados; Montgomery & Associados; Flávio Gonazaga Advogados
Latin America Tax and Legal Network Lawyers Association	N/D	N/D	Machado Associados
WorldWide - LAW	50	95	Lacaz Martins, Pereira Neto, Gurevich & Schoueri Advogados
Legal Netlink Alliance - LNA	35		Nogueira Elias, Laskowski & Matias Advogados; Moura Tavares Figueiredo Moreira e Campos Advogados
Legal Network International - LNI	50		Azevedo Sette Advogados
Legalink	55	65	Felsberg Advogados
Lex Mundi	100	160	Demarest Advogados
Mackrell International	60	170	Castro, Barros, Sobral, Gomes Advogados

Association	Countries	No. Offices	Offices Representativesin Brazil
Meritas		177	Felsberg Advogados
MSI Global Alliance	100	250	Sim ões Pellegrino Coelho, Castro Advogados
Multilaw		70	Mattos Filho, Veiga Filho, Marrey JR e Quiroga Advogados
Pannone Law Group E.E.I.G. - PLG	33	29	Murray Advogados
TagLaw	85	150	PVG - Perlman Vidigal Godoy Advogados
The Interlex Group	60	45	Demarest Advogados
World Law Group	90	350	TozziniFreire Advogados
World Services Group	N/D	130	Veirano Advogados

Source: SABZ, 2016.

2.4 Market research on legal marketing

One of the marketing channels used by law firms is directories and associations, including to gather some market information, such as action markets, new laws, and even legal marketing, as was the case of the study published by the portal Intelijur in 2015 on the theme (Intelijur, 2015).

Among the information published in the study, carried out with professionals of business law firm, we highlight as follows:
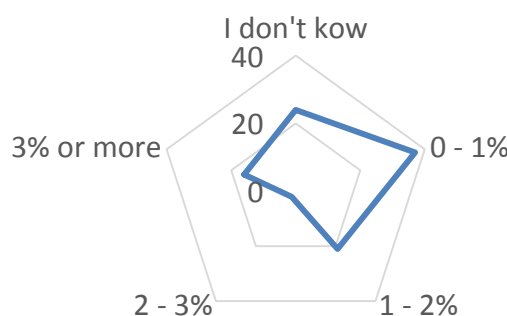
Figure 1   Marketing Budget in Relation to Annual Billing
Source: Intelijur, 2015.

This research was carried out with 38 professionals from corporate law firms, all affiliated to the institution called legal management, designated by the acronym GEJUR.

Based on the survey data in graph 1, 55% of the interviewed reported that the firm invests up to 2% of annual marketing revenue, 35% investing from 0 to 1% and 20% investing from 1% to 2%. About 25% of the respondents did not respond, or declared not to know this data.

Table2   Main Marketing Tools Used by Law Firms

Tool	% cited
LinkedIn	65%
Site	62%
Gifts	51%
Conference talks	51%
Internal marketing	49%
Associations	49%
Events	45%
Facebook	43%
Sponsored events	38%
Pro-bono activities	30%

Continual Table 2

Tool	% cited
Blogs	24%
Market research	16%
Directories	13%
Twitter	13%

Source: Intelijur, 2015.

Table3   Marketing Tools Considered Most Efficient

Tool	% cited
Conference talks	80%
Customer Relationship Management - CRM	57%
Events	51%
Sponsored events	46%
Associations	46%
LinkedIn	34%
Site	31%
Pro-bono activities	30%
Internal marketing	26%
Blogs	24%
Market research	16%
Directories	13%
Twitter	13%

Source: Intelijur, 2015.

According to the results presented in Table 2, LinkedIn's professional network was the most cited marketing tool, followed by an institutional website. However, what the respondents considered most effective was the keynote speeches at events.

2.5 Legal marketing case study

Fifty professionals answered the questionnaire, which was sent via link by email and LinkedIn message during the month of juny.

To identify industry insiders' perceptions of what tools might represent good opportunities for legal marketing, a questionnaire was directed to the same public profile of market research conducted in 2015, corporate law practice professionals.

To identify the profile and the experience of the professional, the question about the career of the respondent made it possible to cluster the perceptions of lawyers with more than five years of career, young professionals such as trainees and legal assistants, and backoffice professionals in offices.
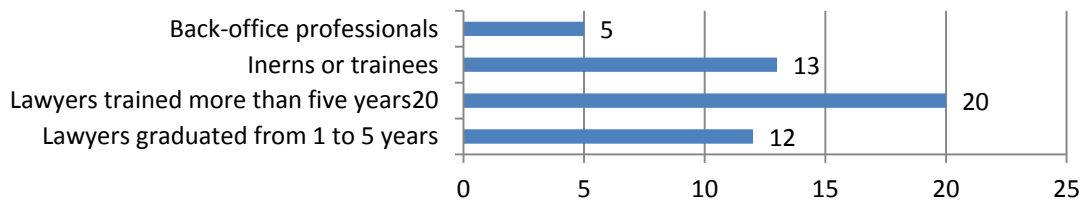
Table 4   Profile of Professionals
Source: Survey, 2018.

The questions ranked on a Likert scale the importance for the visibility of a law firm attributed to each listed marketing tool, with scale 1 being not relevant and 5 being very relevant. The following tools were added to: LinkedIn, Facebook, Instagram, Twitter, News Blog, Institutional Site, Event Participation, Event Sponsorship, Event Speech, Relationship in associations and chambers, Texts or articles published in the media, Pro-bono activities and Participation in directories.

It was also questioned on the same scale of Likert being 1 disagree and 5 agreeing quite well to ask how much the respondent believed that these tools collaborated with the marketing for the capture of clients as much as for the attraction of talents or human resources, and how much the interviewee believed new technologies such as big data and internet of things, can impact the legal marketing.

The last question was opened and not mandatory if the interviewee wanted to list some other item that could assist in the disclosure of the name of the office that was not previously listed.

3 Results

Normalizing the likert scale to percentage using Microsoft Excel software, the following results were found:

Table 5　Results– Tools

Tool	General perception of effectiveness
LinkedIn	82.8%
Facebook	62.0%
Instagram	54.4%
Twiter	45.2%
Blog	68.8%
Site	87.6%
Participation in Events	91.6%
Sponsor Events	82.8%
Conference Talks	93.6%
Associations	82.4%
Articles & publications	89.2%
Pro-bono activities	77.2%
Directories	69.6%

Source: Survey, 2018.
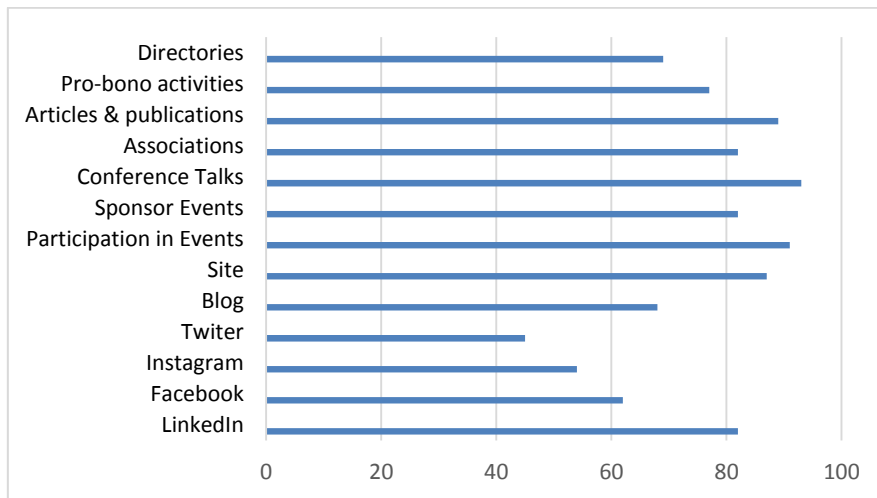
Figure 2　Results – Tools
Source: Survey, 2018.

Table 6　Results – Question about IoT, Big Data and HR

Question	General perception
Do you believe that these tools help you attract customers (marketing) as much as attract talento (Human Resources)?	83.6%
Do you believe that new technologies like Big Data and Internet of Things (IoT) can impact the Legal Marketing?	82.0%

Source: Survey, 2018.

4 Conclusion

This study aimed to evaluate the practice of marketing in law offices. Initially, the restrictions for the practice were evaluated according to the Brazilian legislation, the opinions of the professionals of the sector were evaluated in two researches. One of them, a sectoral survey pointed, among other data, the main forms of commercialization. The complementary research of the type survey was made in the São Paulo market to identify the practice of marketing including digital marketing

The studies point to congruences, especially regarding the use of social networks, the use of websites and blogs and the prominence that the events cause in the sector.
Facebook and LinkedIn had a greater prominence only after the market research date of 2015, and scored with average strength in applied research.

In general, lecturing at events has proven to be more effective in respondents' opinion than sponsoring events.

The main analyzes point to the importance of all tools or a set of tools working together, but in the research done with professionals in 2018 reveals a perception that staying present in the events is a more effective way to do marketing in this sector, reinforcing the concept of relationship in service marketing.

Others responses: lectures in colleges, strategic location of the office, acting in relevant cases, talent attraction policy, joint action with social media resources.

Possible future studies: to understand whether the legal departments or the businessmen who contract the legal services have a similar perception of the scale of the marketing tools that the offices use. Crossing information may be possible to identify more assertively in which marketing tool can be invested with more intensity, of course, although it is important to consider several possibilities together, not only for the customer conversion but also for brand appreciation.

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Strategies for E-C Translation of Western Brand Names: A CIS Perspective

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Abstract: English-Chinese (E-C) Translation is essential when a Western enterprise firstly sets foot on China. Currently, there are many globally eminent enterprises that have achieved remarkable success, to some extent, ascribing to their translation strategy informed with Corporate Identity System (CIS). This paper firstly touches upon the background of E-C brand name translation. Then, the origin and main segments of CIS as well as brand name translation have been discussed. In the main body of this paper, with careful elaboration on Corporate Identity System and some eminent translation examples, success can be found from translations informed CIS and positive impact on corporations according to their interactions. Also, the author wishes to show the huge effects between the E-C brand name translation and the development of enterprises with the help of CIS.

Key words: Corporate Identity System (CIS); Brand name; Brand name translation; Translation strategy

1 Introduction

More and more Western brands can be found in China. Except for their quality, the very first factor that attracts the attention of consumers is the translated brand name. To compete with local brands in China, Western brands would adopt diverse translation strategies and methods to complete their translation in tune with the Corporate Identity System (CIS) of their firms, which makes their trademarks more recognizable, novel and fascinating.

Corporate Identity System is composed of three main parts, mind identity system (MIS), visual identity system (VIS) and behavior identity system (BIS). They help companies to render brand names in accordance with their exclusive form which presents unique characteristics and captures the public. Also, the English to Chinese translation and CIS can be advanced by each other which, to some extent, this phenomenon can serve as a driving force propelling the improvement of the enterprise itself.

The CIS perspective is rarely adopted by scholars and researchers, and people who realize the connection between them provided a little discovery. Actually, according to the author's discovery, the advancement that CIS offers to translation is enormous which can be conducive to each party of them. All in all, the development of CIS will exert significant influences on the English-Chinese (E-C) translation.

2 Corporate Identity System (CIS)

After China joined the WTO, competitions have raged between Chinese corporations and foreign companies. Gradually, Western businessmen adopted a management strategy, Corporate Identity System (CIS), to help a company to translate its brand accurately with the its culture and concept, in order to establish its own visual identification, gain popularity and increase sales volume. It emerged in 1940s in America, during which time, IBM adopted this strategy to design and manage its own business which proved successful afterwards. The year 1967 was the time when Japan enjoyed the sudden rise in economy and that was also the time when Japanese introduced the CIS. And it was then found in Hong Kong and Taiwan shortly. Gradually, mainland China learned the mindset of CIS since the reform and opening-up started.

CIS, namely, mind identity (MI), visual identity (VI) and behavior identity (BI), sees an enterprise from a static view but fully expresses the standardized mind, vision and behavior which make a brand highly recognizable, extremely valuable and extraordinarily distinctive.

Corporate mind represents the values and concepts upheld by staff in the long-time and the corporate management philosophy and strategies formed in this process. Visual identity means the advertisements, trademarks, brand names, and the environment of the corporation itself and its corporate culture. Corporate behavior identity is directed by the conduct of a corporation, including how staff reacts on various occasions and its commercial activities.

3 E-C Brand Name Translation

In terms of marketing, brand mirrors the core value, guarantee and intangible asset of a corporation which renders its product recognizable. Besides conveying the meaning of a brand, brand name translation should be simple and easy to pronounce and remember. People attach great importance in giving name to a new-born baby, for an auspicious name may bring good luck to it. So does the outstanding brand name to a company.

Full expression of product, avoiding of taboos and mystery are three major principles governing brand name translation. Also, in E-C brand name translation, it should be noted that novel names can leave strong impressions on customers while intense cultural belonging of Chinese characteristics can be found in a truly brilliant E-C name.

Just like some cosmetics manufactures and footwear companies, special features should be paid more attention to correspondingly. Besides, brands should follow traditional culture. Like the French fragrance trademark OPIUM, it is inappropriate to translate it into "鸦片"(yapian, the Chinese name for opium), for this Chinese version may be detested or even boycotted in China. In addition, translators may adopt transliteration to render brands in a mysterious and exotic way, in order to attract public attention.

During the process of rendering, it is sound for companies to blend the concept, image and conduct of themselves in their brand name translation.

4 Case Studies: Translation of Famous Western Brands Informed by CIS

In the light of the CIS system, firms can combine its idea, image and even the outlook within the little E-C trademark which contains pregnant meanings. Also, it is an adoptable method for companies to seek further development in years to come. As companies develop, the CIS system, perceived as the guideline of planning of the translation of Western brands, can also be pushed forward as well.

4.1 Lancôme and its translation strategy

France is the biggest cosmetics manufacturing paradise all over the globe. And Lancôme, established in 1935, is one of the most eminent cosmetics manufacturers, covering perfume, skin care product and cosmetics. It is translated into "Lancôme" (lankou, orchid and cardamom, which are two types of herbs) in Chinese, with two characters exhibiting different well-known herbaceous plants respectively, which indicates that all the materials Lancôme adopt are extracted from plants. And it is not hard to find that every single product of Lancôme has a print of rose embedded on the package.

The mind identity (MI) of Lancôme is fully shown by the rose and the translated name, "Lancôme". "lan" (lan, orchid in Chinese) and "kou" (kou, cardamom in Chinese) are two popular Chinese herbal medicines which would attract Chinese customers for the long-lasting traditional Chinese medicine history and consumer fervor towards naturally-produced goods. And the first character "lan" could represent a beautiful girl with elegance in the Chinese tradition, so when Chinese clients firstly see this character, they may strongly perceive the uniqueness of it.

Concerning about the whole package, Lancôme has three colors for different functions and one typeface for all, but the decorations of no matter sunblock or foundation or lipstick are all designed in a simple style but comprehensively expressing the characteristics of feminine except for the products for men only. And this is all about the analysis of visual identity (VI).

When it comes to the behavior identity (BI) of "Lancôme", Lancôme would show its trademark at the end of the 15-second or 30-second advertising film for about 3 to 5 seconds. Along with the brand, a gentle and deep voice articulating "lankou" in the advertisement has also left impression on the masses of China.

4.2 Nike and Its translation strategy

A piece of news swept the Internet several years ago about how crazy Chinese middle school students are about Nike sneakers. Nike was translated into "耐克" (naike, endurance and conquering, the Chinese meaning for each Chinese character) in Chinese market. It can be learned from the two characters that "nai" (nai, endurance) and "ke" (ke, conquering or overcoming) both have the meaning of overcoming, surmounting and conquering. Furthermore, as a sportswear enterprise, the product of it should be suitable, comfortable and durable. And in the Chinese tradition, people appreciate the characteristics of durability and quality, especially in the manufacturing industry. So this translated brand is comprehensively welcomed by Chinese people, which fully expresses the MI of this internationally popular brand.

In terms of VI, people may think of its classic logo and unique advertisement, its simple typeface and concise promotional slogan upholding its high fashion in high quality. Moreover, black and white

are selective colors to attract no matter female or male as long as you love sports.

Few Chinese people may know that Nike is the name of the Goddess of Victory and the logo tick is the embodiment of her wings. As a matter of fact, Nike frequently puts emphasis of victory on its product. Behavior identity system is fully shown in front of customers in a comprehensive way combined with the idea and visual effect of the brand, the large sales and tremendous popularity, which render Nike one of the most noted and prosperous sports manufacturers in the world at large.

4.3 Jaguar and its translation strategy

Jaguar, a well-known automobile brand, enjoys the longest carriage maker history in Britain. As a brand of racing car and limousine trademark, it is famous for its instantaneous acceleration and aerodynamic body. This motor brand is translated into "jiebao" (jiebao, fast jaguar in Chinese) in mainland China, although some people may call it "meizhouhu" (meizhouhu, American tiger) or "jijia" (jijia, transliteration of jaguar in Cantonese) in Cantonese. "jiebao" may be the best translated version for its similarity of pronunciation with the original name and it can express more profound meanings for itself.

No matter you take a look at the logo of Jaguar or see "jiebao" in Chinese characters, the first thing comes to your mind may be a fleeting jaguar on a grassland. So, the customers, no matter from the West or China could embrace the same perception of it. Firstly, "jiebao" is the literal translation of jaguar in Chinese. Then, the character "jie" (jie, fast or rapid) denotes swiftness seen as a must of a luxurious automotive, with "bao" (bao, leopard in Chinese), one of the fastest-running animals in the globe. From this Chinese version, the core performance of its car can be easily summarized and at the same time, conveying the MI in all directions.

In VIS, Jaguar adopted an image of a galloping jaguar as its logo, fully presenting its brand name and unfolding the extraordinary speed it will bring to customers. On the whole, "jiebao" interprets its idea, visual sense and genuine performance thoroughly by analyzing "jie" in distinct dimensions.

5 Implications for the Translation of Western Brand Names

5.1 Gaining popularity

Popular companies own celebrated brands which reflect the CIS of the firm. In other words, a brand can be seen as the epitome of the CIS of its own. Technically, a successful Western E-C name shoulders the responsibility of expressing unique concept, presenting appropriate image and providing equal service.

Like the world-renowned record company, Rock, is translated into "gun shi" (gun shi, rolling rock). With "gun" (gun, rolling or rock music) representing rock music—"yao gun yue" (yao gun yue, rock music in Chinese) in Chinese, and "shi" (shi, rock) the literal translation of a rock, Rock has been quite famous in China since many years ago.

5.2 Projecting better image

Along with the expansion of the popularity, a brand will become a unique image kept in the mind of customers. To put it in another way, when customers want to buy one type of product, there may be multiple choices in this field. In their mind, the preferential brand image should possess high quality, exquisite package and thoughtful services.

Take Rock as an example, it is now regarded as one of the most prestigious record companies in the whole world and the most classic Western music brand in China.

5.3 Establishing status

Successful brands can capture the attention of Chinese consumers. In recent years, exported products are flocking into Chinese market. It is quite normal that almost everyone, impoverished and affluent alike, owns something from the outside world. At any place in the world, products with Chinese translated names can be found. This could also be considered as a way to explore market, a method to build up the brand status in China and conquer their market.

Rock entered Chinese market with "gunshi" instead of other fancy names grasping people attention. From that time on, rock has fully entered Chinese people's life.

6 Conclusion

Due to the economic boom in China, a large number of Western enterprises are turning their eyes to Chinese market. In order to publicize their products, foreign entrepreneurs would try their best to express the concept of their companies. However, difficulties could be easily found during the English to Chinese translating process because of the obviously diverse cultures, traditions, mindsets, etc. Apart

from this, successfully demonstrating the corporate idea is also a hard task.

Corporate Identity System (CIS), composed of mind identity, visual identity and behavior identity, is a system measuring and presenting the idea, image and performance of a firm. If the rendering process is blended with CIS, the E-C translated brand names could show the core idea of its company besides the product itself, while CIS could also be advanced in line with the prospect contained in this newly translated name.

According to study, there are researchers working on the connections between the CIS and E-C translation. Nonetheless, few of them have found the mutual effects between each other. As a matter of fact, the CIS could serve as a guideline for E-C brand name translation in order to create a more fascinating trademark for its enterprise to attract more consumers, and then, to establish a brighter vision for the company.

The analysis of these aspects in this paper may give readers a little enlightenment encompassing emphasis being put on the promotion of the CIS and translation in order to gain a better E-C translation under the CIS perspective.

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A Study on the Influence of Brand Personality and Brand Communication on Brand Loyalty

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Abstract: In today's complex and ever-changing environment, the competition between enterprises has also gradually changed from the original quality war and the price war slowly to the brand war. Therefore, how companies create unique and attractive brand personality to obtain more loyal consumers has become an important research topic. At the same time, this study considers that when the brand personality of a brand influences the loyal attitude of consumers, the interaction process between consumers and brands which is brand communication plays an especially important role. This research selects the smartphone brand as the research object. And the empirical research finds that brand personality and brand communication play a positive role in promoting brand loyalty and brand identity plays a mediating role in the process of brand personality and brand communication affecting brand loyalty. This study has enriched the literature on brand theory and provided useful inspiration for companies to build strong brands.
Key words: Brand personality; Brand communication; Brand identity; Brand loyalty

1 Introduction

The maturity of product technology has made the homogenization of market products more and more serious and the competition between enterprises has become more intense than ever.Since Ogilvy (1950) put forward the concept of brand, domestic and foreign companies have begun to pay attention to the importance of brand building. By shaping the brand personality to meet the emotional needs of customers, attractive brand personality will make customers deeply love the brand and become a brand loyal customer. Today, consumers are more eager for the emotional functions provided by the brand and use their products to express their emotions and display their own personalities. Therefore, the unique and distinctive brand personality can obtain the consumer's favor and recognition.However, brand communication provides a channel for consumers to understand brand personality and maintains a long-term relationship between brands and consumers (Parvatiyar, 1995). In interaction with consumers, consumers will form a good relationship with the brand and form a brand identity. Then they will become loyal consumers of the brand.

This study believes that brand personality and brand communication have a significant direct impact on brand loyalty. At the same time, they also indirectly influence brand loyalty through brand identity. Although there have been studies on brand personality, brand communication and brand loyalty in the literature, they have been analyzed from a single variable to analyze its impact mechanism. For this reason, this study uses brand personality and brand communication as independent variables and brand identity as an intermediary variable to explore the direct and indirect effects of brand personality and brand communication on brand loyalty.

2 Literature Review

2.1 Brand personality

The term "brand personality" comes from the personality of the person in psychology. Later, some scholars introduced personality into brand science and gradually formed the concept of brand personality. Therefore, the personality of a brand and the personality of a person are common in certain aspects (Epstein, 1977). In the process of interaction between consumers and brands, customers will understand the personality of the brand and then will judge whether brand personality is in line with their own personality. Consumers also desire to express their own personality through brand personality (Plummer, 1985). For the study of brand personality measurement, the most classic and most widely used is Aaker's five dimensions: sincerity, excitement, competence, fineness and crudeness according to Goldberg's "Big Five" model. This study is based on the brand personality scale developed by Aaker and focuses on the characteristics of the research object which is the smart phone brand.

2.2 Brand communication

Brand communication is a bridge between consumers and brands and it is also an important form

for consumers to understand brand personality. The concept of brand communication can be summarized as the brand's philosophy and personality are conveyed to consumers through the channels of promotion and other channels based on the core of the brand's philosophy and culture. The researches on brand communication is not much. The domestic research on brand communication is rare. Cheng Binbin (2016) studied brand communication strategies under the new economic situation and proposed social marketing strategies that focus on consumer emotional appeal. Huang Minxue (2017) and other scholars proposed that brand communication in the social media will promote consumer brand community recognition.

2.3 Brand identity

Compared with brand communication, researches on brand identity at home and abroad are very rich. Sven & Sue (2008) believes that brand identity is the degree of integration of the personality conveyed by the brand and the self-perceived personality of the consumer. Consumers may perceive the identity of the brand more when they recognize that the brand personality is consistent with themselves.

Reviewing the researches on brand identity in recent years, we found that many studies analyzed the influence of brand identity on consumer's attitude and purchase intention. Scholar Zhang Jinxin (2017) studied the impact of online negative reviews on online purchase intentions and analyzed the regulatory role of brand identity. Li Huamin and Li Rong (2013) studied how customer's experience influenced brand loyalty and empirically analyzed the mediating role of brand identity.

2.4 Brand loyalty

The concept of brand loyalty was first put forward by Brown. He described the brand loyalty as the repetitions of buying behavior. He thought that when consumers repeatedly purchased the same brand product more than four times, he could be regarded as the loyal consumers of the company. Day (1996) first outlined brand loyalty in terms of attitudes and behaviors and believed that brand loyalty is not only reflected in consumers' repeated purchase behaviors of products, but also reflected in whether consumers have a unique favorite attitude toward brands.Brand loyalty has always been a research hotspot in marketing. Based on social exchange theory, Wang Jun (2016) finds that brand reliability has a significant positive effect on brand loyalty, in which consumer's brand trust plays an intermediary role between brand reliability and consumer brand loyalty and consumer's emotional attachment plays a regulatory role between brand reliability and brand trust.

3 Experimental Model and Assumptions
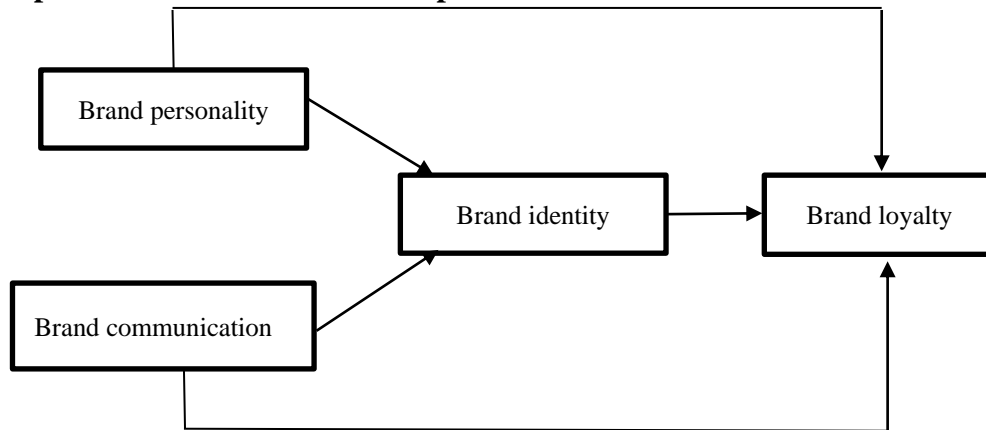
Figure 1   The Experimental Model

Based on the literature review and the experimental model, the following hypotheses are proposed:

Hypothesis 1: Brand personality has a significant positive effect on brand loyalty.

Hypothesis 2: Brand communication has a significant positive effect on brand loyalty.

Hypothesis 3: Brand identity has a significant positive effect on brand loyalty.

Hypothesis 4: Brand identity plays an intermediary role in the process of brand personality and brand communication affect brand loyalty.

4 Survey and Data Analysis

4.1 Measurement method

The research object selected in this study is the smartphone brand which is understood and used by most consumers today. This study also investigates college students as target groups and use electronic

questionnaires to collect data. A total of 127 questionnaires were recovered, 3 invalid questionnaires were filled out and 124 were valid questionnaires.

This article uses the brand personality scale developed by Aaker for the measurement of brand personality. Chinese scholar Xiao Chuanliang (2007) divided the brand communication effect into two dimensions: psychological effect and purchasing effect to measure brand communication. The internal consistency reliability coefficient of this scale is Cronbach's $\alpha=0.79$. This study is based on Sven Kuenzel's Brand Identity Measurement Scale to measure brand identity. The internal consistency reliability coefficient of this scale is Cronbach's $\alpha=0.93$. At last, this study divides brand loyalty into attitude loyalty and behavioral loyalty based on Kelley (2003). The internal consistency reliability coefficient of this scale is Cronbach's $\alpha=0.81$.

4.2 Empirical analysis

4.2.1 Correlation analysis

From Table 1, we can see that there is a positive correlation between brand personality and brand communication with brand loyalty. Also, there is a positive correlation between brand identity with brand loyalty. Therefore, Hypothesis 1, Hypothesis 2 and Hypothesis 3 are initially verified.

Table 1   Correlation coefficient matrix

Variable	Mean	S.D.	1	2	3	4	5	6	7
1 Sincerity	21.76	28.17	1						
2 Excitement	2.62	0.91	0.067	1					
3 Fineness	34.51	39.43	0.045	0.097	1				
4 Competence	18.33	19.26	0.337	0.259	0.076	1			
5 Brand Communication	50.86	10.49	0.130	0.068	0.039	0.082	1		
6 Brand Identity	49.98	18.77	0.320***	0.410***	0.495***	0.332***	0.355***	1	
7 Brand Loyalty	30.18	11.06	0.369***	0.348***	0.391***	0.407***	0.313***	0.484***	1

Note: *** means $p<0.01$, ** means $p<0.05$, * means $p<0.1$, the same as below.

4.2.2 Regression analysis

For the hypothesis test, this study uses statistical analysis software SPSS20.0 to conduct multiple regression analysis to verify the causal relationship between variables.

Model 1 of Table 2 examines the effect of control variables on brand identity. Model 2 shows that after controlling the age and income of consumers, there is a significant correlation between brand personality and brand communication with brand identity. There is a significant correlation between brand identity and brand loyalty. Therefore, Hypothesis 1 and Hypothesis 2 and Hypothesis 3 have been repeatedly verified.

Table 2   The Mediating Role of Brand Identity

Variable	Brand Loyalty		
	Model 1	Model 2	Model 3
Control variable			
Age	0.029	-0.021	-0.032
Income	0.047	0.049	0.082
Sincerity		0.334***	0.227***
Competence		0.362***	0.206***
Variable	**Brand Loyalty**		
	Model 1	Model 2	Model 3
Excitement		0.317***	0.269***
Brand Communication		0.449***	0.377***
Brand Identity			0.218***
R^2	0.003	0.113	0.145
Adjusted R^2	-0.019	0.083	-0.116
ΔF	0.153	11.677***	3.107***

In Table 2, we use Model 1, Model 2 and Model 3 to test the mediating role of brand identity in brand personality and brand communication and brand loyalty. Model 2 shows that after controlling the age and income of consumers, there is a significant correlation between dimensions of brand personality and brand communication and brand loyalty (p<0.01). Hypothesis 1 and Hypothesis 2 have also been repeatedly verified.Model 3 is a full model. After the variable of brand identity is added, the correlation between brand personality and brand loyalty is reduced. It can be seen that brand identity plays a partial intermediary role between brand personality and brand communication and brand loyalty. Therefore, hypothesis 4 of this paper is verified.

In order to verify the synergy of brand personality and brand communication on brand identity,this study performs regression analysis on each variable.

Table 3   The Synergistic Effect of Brand Personality and Brand Communication

Model	Independent variable	R^2	Adjusted R^2	F value	Standardization coefficient	t	Sig.
1	brand personality	.517	.515	21.58	.613	17.133	.000
2	brand communication	.484	.482	28.90	.516	13.022	.000
3	brand identity	.685	.684	53.76	.827	26.038	.000
4	brand personality	.581	.578	16.77	.441	7.496	.000
	brand communication				.367	6.073	.000

Dependent variable: brand loyalty

From Table3,Compared with Model 1 and Model 2, We can see that the R^2 is improved and the standard estimation error is reduced in model 4when the independent variables are brand personality and brand communication. That is to say, the model 4 provides favorable fit statistics and the degree of integration becomes better. So, the synergistic effect of brand personality and brand communication is verified.

5 Conclusion

This study takes the smart phone brand as the research object, carries on analysis to the sample data and discusses the relationship between brand personality and brand communication, brand identity and brand loyalty. The main conclusions are as follows:(1) Brand personality and brand communication have a positive effect on brand identity. (2) Brand identity can promote brand loyalty. (3) Brand identity plays an intermediary role between brand personality, brand communication and brand loyalty. This study combines brand personality with brand communication as a system, analysis their direct influence on brand loyalty and how to further enrich the brand theory system through the indirect influence of brand identity on brand loyalty. At the same time, this study also made a slight contribution to the theoretical development of brand communication and provides some valuable inspiration for corporate marketing practices.

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An Empirical Study on the Influencing Factors of Relationship Commitment in Marketing Channel

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Abstract: The relationship between suppliers and dealers in their marketing channels has become the marketing research focus because it directly affects competitive advantage of an enterprise. This paper reviews the relevant literature and builds an influential model of relationship commitment in marketing channel, and combines with empirical study to test the analysis. Empirical findings show that Major antecedents of affective commitment are trust and shared values; both service quality and relationship termination costs are positively associated with income commitment; relationship termination costs positively impact on switching cost commitment.

Key words: Relationship commitment; Income commitment; Switching cost commitment; Affective commitment

1 Introduction

How to improve the quality of channel relationship is an urgent problem that needs to be solved in marketing theory and practice. By constructing and testing a theoretical model of the antecedents of relationship commitment in marketing channel, the present study is intended to extend existing research on the antecedents and consequences of relationship commitment and to provide practical guidance for current enterprises.

The study of the theory of relationship commitment is mainly the description of the behavior level and mental level.American scholar Becker (Becker, 1960) suggested that "commitments come into being when a person, by making a side bet, links extraneous interests with a consistent line of activity" from the aspect of behavior. Moorman, Zaltman, and Deshpande (Moorman,Zaltman and Deshpande, 1992) proposed that "Commitment to the relationship is defined as an enduring desire to maintain a valued relationship". We adopt the mainstream view, defined customer relationship commitment as an enduring desire to maintain a valued relationship.

In recent years, researchers have mostly regarded customer relationship commitment as multi-dimensional. Meyer and Allen(Meyer and Allen, 1991)argued that three major dimensions of relationship commitment: affective commitment, continuance commitment, normative commitment. Wang Zehua (Wang Zehua, 2002) suggested three major dimensions of customer relationship commitment: income commitment, switching cost commitment, affective commitment. This study, there are three major dimensions: income commitment, switching cost commitment, affective commitment. Now economy commitment and affective commitment used do not embody the qualitative difference between the benefit and switching cost factors. In this paper economy commitment is classified more particularly by the income commitment and switching cost commitment. Demonstration by Wang Zehua (Wang Zehua, 2002) indicates it to highlight the characters of channel member more accurately.

In this study, we will focus on the influencing factors of relationship commitment in marketing channel: trust, shared values, service quality, and relationship termination costs through the research and summary of relevant documents, combined with the previous visit to Wuhan electronic products dealers.

Trust is so important to relational exchange that it is the cornerstone of the strategic partnership. We conceptualize trust as existing when one party has confidence in an exchange partner's reliability and integrity. Moorman, Zaltman, and Deshpande (Zaltman, and Deshpande, 1992) ,Morgan & Hunt (Morgan and Hunt, 1994) found that trust by marketing research users in their research providers significantly affected user commitment to the research relationship. Wang Zehua (Wang Zehua, 2002) found thata negative relationship between trust and income commitment, and a positive relationship between trust and affective commitment.

Shared values, Morgan and Hunt (Morgan and Hunt, 1994) found that the only concept that we posit as being a direct precursor of both relationship commitment and trust, is the extent to which partners have beliefs in common about what behaviors, goals, and policies are important or unimportant, appropriate or inappropriate, and right or wrong. Dwyer, Schurr, and Oh (Dwyer,Schurr and Oh, 1987), Morgan and Hunt (Morgan,Hunt, 1994) theorized that shared values contribute to the development of commitment and trust.

Service quality is often conceptualized as "a comparison between customer expectations and performance". Parasuraman et al. (Parasuraman et al, 1988) propose that there are five key determinants of service quality: reliability, responsiveness, assurance, empathy and tangibles. Ko de Ruyter &Wetzels (Ko de Ruyter and Wetzels, 1999) found that Service quality positively impact on affective commitment and calculative commitment.

Relationship termination costs. Morgan and Hunt (Morgan and Hunt, 1994) proposed that termination costs are, therefore, all expected losses from termination and result from the perceived lack of comparable potential alternative partners, relationship dissolution expenses, and or substantial switching costs. These expected termination costs lead to an ongoing relationship being viewed as important, thus generating commitment to the relationship. Morgan and Hunt (Morgan and Hunt, 1994) test that relationship termination costs are positively associated with relationship commitment using data from automobile tire retailers.

2 Research Model and Hypotheses

In this article, we review commitment theory and research and propose an influential model of relationship commitment in marketing channel, it is presented in Figure 1. In the model of commitment to be described in this article, there are three major dimensions: income commitment, switching cost commitment, affective commitment.

Stated in formal fashion, our study tests 12 hypotheses:

H1: There is a positive relationship between shared values and income commitment.

H2: There is a positive relationship between shared values and switching cost commitment.

H3: There is a positive relationship between shared values and affective commitment.

H4: There is a positive relationship between service quality and income commitment.

H5: There is a positive relationship between service quality and switching cost commitment.

H6: There is a positive relationship between service quality and affective commitment.

H7: There is a negative relationship between trust and income commitment.

H8: There is a negative relationship between trust and switching cost commitment.

H9: There is a positive relationship between trust and affective commitment.

H10: There is a positive relationship between relationship termination costs and income commitment.

H11: There is a positive relationship between relationship termination costs and switching cost commitment.

H12: There is a positive relationship between relationship termination costs and affective commitment.
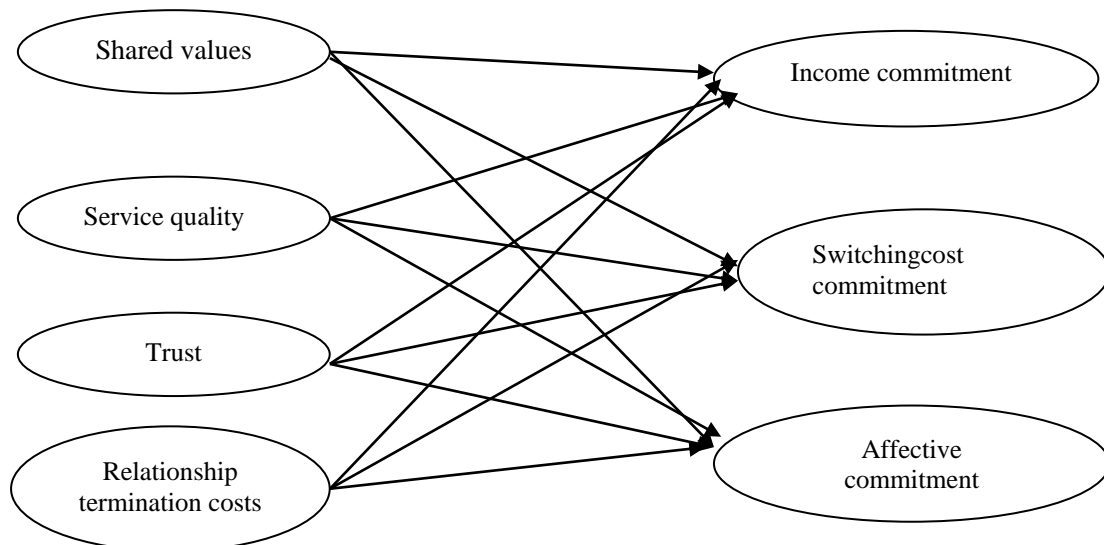
Figure 1　An Influential Model of Relationship Commitment In Marketing Channel

3 Research Design

In this paper, data were collected using questionnaires sent to dealers in the electronics industry. There are two parts in the questionnaire. The first part, respondents need to confirm suppliers who they usually visit and answer some questions about relationship commitment in marketing channel. The second part is about their information. All measures employ 7-point scales. Then we use SPSS Statistics 19.0 for data processing. In order to explore the attitude and behavior of the dealers to the suppliers, we investigate the dealers of the electronics industry in Wuhan. We visited 150 dealers of Wuhan, Hubei province from China with random sampling method. Returned questionnaires totaled 128, and there were 7 invalid questionnaires, so we got 121 questionnaires at last.

Sample characteristics. Our sampling method succeeded in providing respondents who varied greatly on firm characteristics. There are 29% channel managers and 54.5% Salesman among our respondents. They have more contacts with suppliers, and they are able to understand the influencing factors of relationship commitment in marketing channel. 97.52% dealers have had more than three years of contacts with their main suppliers. 82.65 % dealers have had more than three suppliers. It shows that there are many suppliers in the electronics industry and the market competition is fierce. It is a good research object for the study of the influencing factors of relationship commitment in marketing channel.

4 The Results of the Study and Analysis

4.1 Reliability and validity test

Each variable's Cronbach 's alpha is more than 0.7, and it shows that the scale is reliable on the reliability, as shown in Table 1. KMO value of various factors is 0.868. It is greater than 0.6, the scale has good structure validity.

Table 1   Reliability Statistics

variable	N of Items	Cronbach's Alpha
income commitment	3	0.808
switching cost commitment	3	0.852
affective commitment	3	0.832
relationship termination costs	2	0.710
trust	9	0.834
shared values	5	0.885
service quality	10	0.864
Total reliability	35	0.944

4.2 Correlation analysis

The correlation coefficient between relationship termination costs and income commitment is 0.486, the correlation coefficient between trust and income commitment is 0.384, the correlation coefficient between shared values and income commitment is 0.414, the correlation coefficient between service quality and income commitment is 0.434. They have a significantly positive influence on income commitment. It is presented in Table 2.

Table 2   Correlation Matrix of Relationship Termination costs, Trust, Shared Values, Service Quality and Income Commitment

	variable	income commitment	relationship termination costs	trust	shared values	service quality
income commitment	Pearson Correlation	1	.486**	.384**	.414**	.434**
	Sig. （2-tailed）		.000	.000	.000	.000
	N	121	121	121	121	121

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient between relationship termination costs and switching cost commitment is 0.663, the correlation coefficient between trust and switching cost commitment is 0.569, the correlation coefficient between shared values and switching cost commitment is 0.549, the correlation coefficient between service quality and switching cost commitment is 0.399. They have a significantly positive influence on switching cost commitment. It is presented in Table 3.

Table 3　Correlation Matrix of Relationship Termination costs, Trust, Shared Values, Service Quality and Switching Cost Commitment

variable		switching cost commitment	relationship termination costs	trust	shared values	service quality
switching cost commitment	Pearson Correlation	1	.663**	.569**	.549**	.399**
	Sig. （2-tailed）		.000	.000	.000	.000
	N	121	121	121	121	121

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient between relationship termination costs and affective commitment is 0.512, the correlation coefficient between trust and affective commitment is 0.592, the correlation coefficient between shared values and affective commitment is 0.582, the correlation coefficient between service quality and affective commitment is 0.479. They have a significantly positive influence on affective commitment. It is presented in Table 4.

Table 4　Correlation Matrix of Relationship Termination costs, Trust, Shared Values, Service Quality and Affective Commitment

variable		affective commitment	relationship termination costs	trust	shared values	service quality
affective commitment	Pearson Correlation	1	.512**	.592**	.582**	.479**
	Sig. （2-tailed）		.000	.000	.000	.000
	N	121	121	121	121	121

**. Correlation is significant at the 0.01 level (2-tailed).

4.3　Regression analysis

In this study, we use multiple linear regression analysis to analyze the prediction effect of relationship termination costs, trust, shared values, service quality to relationship commitment.

The regression coefficient of service quality to income commitment is 0.517, and the regression coefficient of relationship termination costs to income commitment is 0.343. The regression coefficient significance level is less than 0.05, so it will be noted from Table 5 that service quality and relationship termination costs displayed a significant, positive linkage with income commitment .Therefore H4 and H10 are supported. The regression coefficient significance level of trust and shared values are more than 0.05, so they are ruled out, H1 and H7 are refused.

Table 5　The Regression Coefficients of Shared Values , Service Quality, Trust, Relationship Termination costs to Income Commitment

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1　(constant)	.915	.745		1.228	.222
shared values	.094	.123	.086	.765	.446
service quality	.517	.174	.298	2.979	.004
trust	-.110	.156	-.085	-.709	.479
relationship termination costs	.343	.095	.374	3.610	.000

a. Dependent Variable: income commitment

The regression coefficient of relationship termination costs to switching cost commitment is 0.474. The regression coefficient significance level is less than 0.05, so it will be noted from Table 6 that relationship termination costs displayed a significant, positive linkage with switching cost commitment.Therefore H11 is supported. The regression coefficient significance level of trust, service quality and shared values are more than 0.05, so they are ruled out, H2, H5 and H8 are refused.

Table 6　The Regression Coefficients of Shared Values , Service Quality, Trust, Relationship Termination costs to Switching Cost Commitment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(constant)	-.175	.719		-.244	.808
	shared values	.165	.118	.134	1.391	.167
	service quality	.098	.167	.050	.584	.560
	trust	.241	.150	.166	1.605	.111
	relationship termination costs	.474	.092	.461	5.178	.000

a. Dependent Variable: switching cost commitment

The regression coefficient of shared values to affective commitment is 0.262, and the regression coefficient of trust to affective commitment is 0.303. The regression coefficient significance level is less than 0.05, so it will be noted from Table 7 that shared values and trust displayed a significant, positive linkage with affective commitment.Therefore H3 and H9 are supported. The regression coefficient significance level of service quality and relationship termination costs are more than 0.05, so they are ruled out, H6 and H12 are refused.

Table 7　The Regression Coefficients of Shared Values , Service Quality, Trust, Relationship Termination costs to Affective Commitment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
1	(constant)	.680	.641		1.061	.291
	shared values	.262	.106	.252	2.481	.015
	service quality	.219	.149	.133	1.468	.145
	trust	.303	.134	.247	2.264	.025
	relationship termination costs	.137	.082	.158	1.683	.095

a. Dependent Variable: affective commitment

5 Conclusion

Empirical findings show that Major antecedents of affective commitment are trust and shared values; Both service quality and relationship termination costs are positively associated with income commitment; relationship termination costs positively impact on switching cost commitment.

In summary, several lessons emerge from the findings of this research that might be usefully applied to marketing channels.

The need for relationship marketing stems from the changing dynamics of the global marketplace and the changing requirements for competitive success. To be an effective competitor in today's global marketplace requires one to be an effective cooperator in some network of organizations.

We posit that relationship commitment develop when suppliers attend to relationships by (1) maintaining high standards of corporate values and allying oneself with exchange partners having similar values; (2) improving the quality of their services by providing smoother and more profitable products that are superior to the offerings of alternative partners; (3) communicating valuable information, including expectations, market intelligence, and evaluations of the partner's performance to improve mutual trust and satisfaction.

The study also has certain limitations. First, this study has the limitation of the industries. Research should be made for different industries to study. Another limitation is that this study only considered the impact of four antecedent variables. Other antecedents, such as relationship benefits, communication in the relationship might prove insightful. Our theory and the model need further explication, replication, extension, application, and critical evaluation. We offer them to the marketing discipline and marketing practice for all these purposes.

Acknowledgement

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Study on the Effect of the Lifestyle on Vegetable Consumption Behavior of Urban Residents

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Abstract: This paper mainly studies the effect of bad lifestyles on the consumption willingness and consumption behavior of vegetables of Chinese urban residents. It studies factors which impact vegetable consumption behavior of urban residents in China by utilizing consumer behaviors theories and empirical research method. Currently, there is little research on the effect of lifestyles on consumption behavior and foreign scholars only studied the impact of smoking, drinking, physical exercise and other habits on vegetable consumption. Therefore, the paper utilizes the new approach to study the effect of the lifestyle on vegetable consumption behavior of urban residents. After implementing data analysis, the article draws the conclusion that the lifestyle exerts great effect on urban residents' vegetable consumption behavior. People who smoke, drink alcohol and engage in less physical exercise will have low vegetable consumption than people who have more healthier lifestyle.
Key words: Vegetable consumption willingness; Vegetable consumption behavior; Living habits; Regression analysis; Common method variance

1 Introduction

Lifestyle refers to the way of life for individuals to better satisfy their own needs, it gradually formed in different kinds of activities. People may have different lifestyles; some are good, some are bad. In the study, the author defines lifestyles referring to smoking, drinking and physical exercise.

According to the relevant news reports and investigation reports, currently, the number of smokers in China ranks first globally. In 2017, there were 281 million of smokers in China which accounted for about 1/3 of the smoking population in the world. While the ratio of drinking between male and female were as high as 84.1% and 29.3%. 65% of drinkers have unhealthy drinking habits and the most serious problem they are facing is excessive drinking. On the other hand, according to the related report, people who participate in physical exercise on the regular basis accounts for only 28.2% of the total Chinese population.

These bad lifestyles will increase the incidence and mortality of chronic diseases, such as cardiovascular. While taking more vegetables can effectively reduce the incidence of chronic diseases such as cardiovascular, stroke, hypertension, diabetes and certain types of cancer (Bazzano, 2002; Appel, 2003）[3-4]. Therefore, people who do not like doing physical exercise and who are smokers or drinkers should take more vegetables in order to keep health. Are people with unhealthy lifestyles willing to take more vegetables? How lifestyles affect urban residents' consumption behavior of vegetables? These series of questions are neglected by scholars. In order to obtain answers of questions, the paper focuses on the impact of lifestyles on urban residents' consumption behavior of vegetables.

2 Theoretical Review and Research Hypothesis

Nowadays, only a few researchers pay attention to the effect of lifestyles on consumption behavior. Meanwhile, most of these researchers are foreign scholars who only study the impact of smoking, drinking and physical exercise on vegetable consumption. Obviously, the influence mechanism of vegetable consumption behavior did not discuss before.

Agudo (Agudo, 2002) pointed out that people who smoke usually consume less vegetables and more meat by investigating the eating habits of community residents in the south-east area of New England. Am J ClinNutr (Am J ClinNutr, 2008) asserted that people who don't smoke often consume more vegetables than the others by conducting surveys on health education and lifestyle. Appel JJ (Appel JJ, 2010) analyzed the Canadian community health survey data from 2000 to 2001 and found that Canadians who often engaged in physical exercise and never smoking and drinking, usually consume more fruits and vegetables than the others.

According to analyses listed above, it seems that people who smoke, drink and take less physical exercise are going to consume fewer vegetables.Based on the existing researches, some scholars have

pointed out that lifestyle will affect people's consumption behavior of vegetables. However, these researches only studied some individual factors such as smoking, drinking and physical exercise, without taking lifestyles as a variable.

According to the above analysis, this paper makes the following assumptions:

Hypothesis 1: Lifestyle plays a significant role on the vegetable consumption behavior of urban residents.

Hypothesis 2: Lifestyle plays a significant role on the willingness of vegetable consumption of urban residents.

Hypothesis 3: The willingness of consuming vegetables plays a significant role on consumer behavior of urban residents.

Hypothesis 4: Vegetable consumption willingness plays an intermediary role between lifestyles and vegetable consumption behavior of urban residents.

The article presents a mechanism for the impact of lifestyles on the willingness of Chinese urban residents to explain how the living habits affect the consumption behavior of Chinese urban residents and the specific path (as shown in Figure 1).
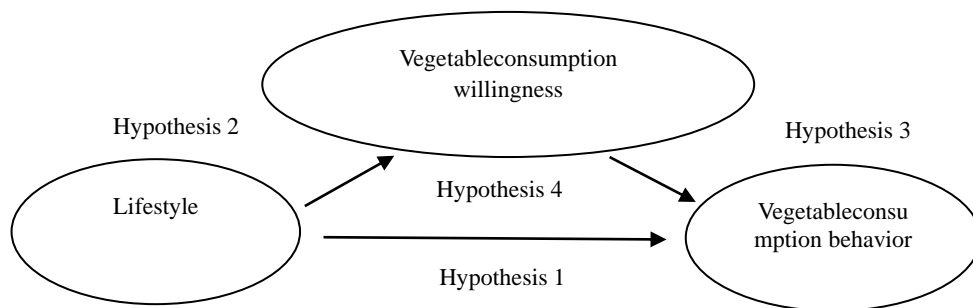
Figure 1   Research Model

The theoretical model is a comprehensive model and includes four subsystems, in order to better explain the four subsystems model, firstly symbols are defined as follows:

LS- Lifestyle

VC- Vegetable Consumption

VCW- Vegetable Consumption Willingness

Based on this, the four subsystems model was constructed.

Model 1：$VC = \alpha_1 + \beta_1 LS$

Model 2：$VCW = \alpha_2 + \beta_2 LS$

Model 3：$VC = \alpha_3 + \beta_3 VC$

Model 4：$VC = \alpha_4 + \beta_4 LS + \gamma_1 VCW$

3 Data Analysis

The variables involved in the study mainly include lifestyles, vegetable consumption willingness and vegetable consumption behavior.

3.1 Reliability test

Table 1 is the Cronbach's alpha values for the survey. According to the data listed in Table 1, lifestyle variables were measured by three indicators, Cronbach's α was 0.964. The vegetable consumption willingness variables were measured by three indicators, Cronbach's α was 0.908. The consumption behavior variables were measured by two indicators, Cronbach's α value was 0.832, and the overall reliability of the questionnaire was 0.863, which indicates that the questionnaire used in this study has good reliability.

Table 1   Relliability Test Value

Construct	Observations	Cronbach's α
vegetable consumption willingness（CI）	CI1	0.908
	CI2	
	CI3	

Continural Table 1

Construct	Observations	Cronbach's α
vegetable consumption behavior(CB)	CB1	0.832
	CB2	
Lifestyle(LS)	LS1	
	LS2	0.964
	LS3	

3.2 Validity test

The main component factor analysis method is mainly used in the validity test. The criterionfor determining the validity by using the factor analysis method is that the factor load of each variable should exceed 0.5, preferably more than 0.7, and the average variance extraction value of each variable is better than 0.5.

Table 2-5 are the KMO and Bartlett spherical test values, factor load values and mean variance extraction values for each variable. In this study, factor analysis was performed according to the criteria of factor eigenvalues greater than 1 in principal component analysis. Among them, the total variance of a factor in the study of the lifestyle of the question is 93.439%, and the three items are sufficient to be 0.725. Bartlett's spherical test approximate card square values is 1808.506 (df is 3，p is 0.000). The total variance of a factor in the study of the vegetable consumption willingness of the question is 84.446%, and the three items are sufficient to be 0.743. Bartlett's spherical test approximate card square values is 949.158（df is 3，pis 0.000), suitable for factor analysis.

The total variance of a factor in the study of the vegetable consumption behavior of the question is 85.614%, and the two items are sufficient to be 0.605. Although the best standard is below 0.7, Bartlett's spherical test approximate card square values is 328.133（df is 1，pis 0.000), suitable for factor analysis, significantly good, so it is also suitable for factor analysis. Table 5 is the consumption willingness of the three test items, consumer behavior of the two questions, life habits of the three items together to do the factor analysis of the dimensions of the factor loading and the Average variance extracted (AVE). It can be seen from Table 5 that the factor load of all measurement dimensions is more than 0.7, that is, the measured items can well measure the basic situation of the variables. On the other hand, the average variance extraction of the three variables respectively was 0.823, 0.824 and 0.921, respectively, and the effective standard (AVE> 0.5) was reached. Through the above analysis, it can be shown that the measurement of the questionnaire used in this study is better.

Table 6 shows the co-variance between variables and variables in the survey sample and the average variance extraction number AVE of the corresponding variables. From the values listed in the table, we can see that the co-variance of the variable with any other variable is less than the average variance extraction(AVE). Therefore, the questionnaires used in this study have a better discriminant validity.

Table 2   Aggreate Validity Test Value

Construct	Observations	Factor load	Average variance extraction（AVE）
Vegetable consumption willingness（CI）	CI1	0.917	
	CI2	0.928	0.823
	CI3	0.875	
Vegetable consumption behavior（CB）	CB1	0.942	0.824
	CB2	0.872	
Lifestyle（LS）	LS1	0.959	
	LS2	0.941	0.921
	LS3	0.978	

Table 3   Distinguish The Validity Test Value

	CI	CB	LS
Vegetable consumption willingness（CI）	0.823		
Vegetable consumption behavior（CB）	0.297	0.824	
Lifestyle（LS）	0.195	0.190	0.921

Note: The bold numbers in the table are AVE values for each construct

3.3 Hypothetical test

Before using SPSS 21.0 to analyze the data, the study conducted Anova analysis to examine the significance of the overall regression model. The significance of regression models in thestudy reached a level of 0.000 which is indicating that the respective variables had a significant effect on the dependent variable. And the VIF values of each variable are below 10, indicating that there is no multicollinearity between variables.

Table 4 is the specific regression results regarding control of variables, living habits, vegetable consumption and vegetable consumption behavior. Model 1 is a regression model of the control variables on consumption behavior. Model 2 is the main effect regression model of adding independent variables to study the main effect relationship between Chinese urban residents' lifestyle and vegetable consumption behavior. The results show that there is a positive correlation between lifestyle and consumption behavior of Chinese urban residents (β= 0.186, p <0.001). Lifestyles have significantly affected the consumption behavior of Chinese urban residents. The empirical results show that hypothesis 1 has been validated.

Model 3 is a regression model of control variables for Chinese urban residents' willingness to consume vegetables. Model 4 is the relationship between living habits and the willingness of Chinese urban residents to consume vegetables. The results show that there is a positive correlation between lifestyle and Chinese urban residents' consumption appetite (β = 0.193, p <0.001). That is, lifestyle affect the willingness of Chinese urban residents to consume vegetables, People with healthy lifestyles are going to have stronger willingness to consume vegetables. The empirical results show that hypothesis 2 has been validated. Model 5 is the relationship between the willingness and the behavior of Chinese urban residents to consume vegetables. The results show that there is a positive correlation between Chinese urban residents' consumption appetite and consumer behavior (β = 0.193, p <0.001). That is, the consumer willingness affects the consumer behavior of Chinese urban residents to consume vegetables. Chinese urban residents who have stronger willingness to consume vegetables are more likely to consume vegetables. The empirical results show that hypothesis 3 has been validated.

In this paper, hypothesis 4 suggests that vegetable consumption will play a mediating role between lifestyle and Chinese urban residents' vegetable consumption behavior. To validate the mediating role of the variables in the theoretical model, most scholars utilize the validation method proposed by Baron and Kenny in 1986. This paper also applies the method to verify the mediating role of consumer willingness.

Baron and Kenny argued that there was some requirement should be met to validate the mediating role of variables. Firstly, changes in the variable can be significantly explained by the independent variables. Secondly, changes in mediating variables can be significantly interpreted by independent variables. Thirdly, changes in the variables can be significantly explained by the intermediary variables. Fourthly, when the mediating variable and the independent variable are added to the regression model, the explanatory effect of the independent variable on the dependent variable disappears or decreases. If the effect disappeared, it means the variables are complete intermediaries. If the effect reduced, it means the variables are partial intermediaries. It can be seen from Table 13 that the first three conditions have been met. In order to meet the fourth condition, the paper did regression analysis with urban residents' lifestyle, vegetable consumption willingness and vegetable consumption behavior. According to the analysis of Table 13, the effect of the variable lifestyle on the consumption behavior of Chinese urban residents has been weakened after adding the willingness to consume vegetables into the regression model. Therefore, the conclusion can be drawn that the consumption willingness of vegetables plays as a partial intermediary between lifestyle and consumption behavior of Chinese urban residents. In the other words, lifestyles will not only influence vegetable consumption willingness of Chinese urban residents, but also affect Chinese urban residents' vegetable consumption behavior. The empirical results show that hypothesis 4 has been validated.

Table 4　Regression Results

Variable		Consuming behavior		Consumer willingness		Consumer willingness	
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Control variable	Constant term	0.004	-0.008	0.277	0.281	-0.077	-0.068
	Region	-0.043	-0.071	-0.104	-0.098	-0.046	-0.045
	Occupation	0.055	0.063	-0.109	-0.025	0.074	0.070

Continual Table 4

Variable		Consuming behavior		Consumer willingness		Consumer willingness	
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Independent variable	Lifestyle		0.186***		0.193***		0.134**
Mediation variable	Consumer willingness					0.294***	0.268***
	F	2.479	7.261***	2.584	7.783***	16.341***	14.715***

Notes：**、*** represents P<0.05、P<0.001

4 Conclusion

This paper mainly studies the effect of bad lifestyles on the consumption willingness and consumption behavior of vegetables of Chinese urban residents. The findings are unique and provide some guiding significance in the area. There are also some limitations in the study. Firstly, the paper utilized smoking, drinking and physical exercise to measure the living habits, it only took a testing item to measure those 3 habits respectively. Although the measurement is creative and it passed the reliability and validity test. The results still need further validation. Secondly, the study analyzes regions and occupations as control variables in the regression model. It did not analyze consumers' attitude, subjective norms and perceived behavior control which are classic theories of planned behavior.

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Research on the Regulation Elements of Technical Service Quality, Functional Service Quality and Satisfaction from the Perspective of Relationship Norms and Service Types

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Abstract: The effects of customer employee relationship norms (interactive elements) and service types (elements of service) on the relationship between service quality and satisfaction are discussed in this paper. The study shows that symbiotic relationship norms will strengthen the relationship between functional service quality and satisfaction, but weaken the relationship between technical service quality and satisfaction; exchange relationship norms will strengthen the relationship between technical service quality and satisfaction, but weaken the association between functional service quality and satisfaction; trust service will strengthen the relationship between functional service quality and satisfaction, but weaken the relationship between technical service quality and satisfaction; search service will strengthen the relationship between technical service quality and satisfaction, but it will weaken the relationship between functional service quality and satisfaction.
Key words: Technical service quality; Functional service quality; Satisfaction; Relationship norms; Service type

1 Introduction

The service delivery process consists of four kinds of participation elements, namely, employees, customers, service itself and interaction process.

Research on the quality of service. The quality of service is the gap between customer service expectations and actual feelings (Gronroos, 1984). In many literatures, the quality of service is divided into two dimensions, namely, functional service quality and technical service quality (Gronroos, 1983; Sharma and Patterson, 1999). The quality of technical service, the quality of functional service, and the image of the enterprise will affect the quality of service perceived by consumers (Brogowicz, 2009). The quality of functional services refers to the nature of the interaction between the service providers and the customer and the process of the transmission of the core services; the quality of the technical service refers to the output and quality of the service (Sharma and Patterson, 1999).

Research on relationship norms. The relationship specification refers to the potential relationship rules formed by the consumer in the process of communication, interaction and communication with the enterprise (brand). This rule affects the consumer's expectation to the behavior of the enterprise, and the response and attitude of the consumer to the enterprise (Doney and Cannon; Stern, 1997). The relationship specification includes two types (Clark and Mills, 1993; Aggarwal, 2004), that is, the exchange relationship specification and the communal relationship norm. In addition, when consumers start different specifications, they present different psychological and behavioral patterns (Aggarwal and Law, 2005; Aggarwal and Zhang, 2006) in dealing with the relationship with the enterprise.

Research on service types. Previous literature and scholars, based on the complexity of product, the accessibility of consumer product information, and the difficulty of evaluating the product attribute information by consumers, divide the service into three types, namely, search, experience and credence serveices (search, experience, and credence serveices, Nelson, 1970; Darbi and Karni, 1973; Iacobucci, 1992; Brush and Artz, 1999; Zeithmal and Bitner, 2000). In the past, many scholars have analyzed and studied it as a predominant factor (Girard and Dion, 2009; Hsieh and Hiang, 2004)

Research on customer satisfaction. Customer satisfaction refers to the consumer expectations based on historical experience and information, and the evaluation and judgment of the expectation consistency after the consumer expectations are compared with the actual perceived experience (Oliver and Linda, 1981). Some scholars believe that satisfaction is a service evaluation and perception that is formed by consumers comparing consumer costs (time, physical and monetary input) and income (psychological, social and physical income) (Churchill and Surprenant, 1982). In summary, satisfaction is the overall evaluation and judgment of consumers after the use of products or services (Fornell, 1992).

In the existing domestic and foreign literature, the research on the attributes of employees or

customers is more abundant, but there is less attention to service elements and interactive elements; there is more literature to explore the quality of service to the main effect of satisfaction. A small amount of literature begins with the dimension of service quality, and the influence of technical service quality and functional service quality on satisfaction is explored, but the research on regulatory elements and boundary conditions is scarce.

The purpose of this study is to explore the impact and regulation of customer employee relationship norms (interactive elements) and service types (elements of service) on the relationship between service quality and satisfaction on the basis of existing research.

Based on the perspective of customer employee relationship and interaction, the relationships between relationship norms and technical service quality, functional service quality and satisfaction are explored. Based on the perspective of service nature, the adjustment function and effect of service types on the relationship between technical service quality, functional service quality and satisfaction are analyzed.

2 Data and Methodology
2.1 Method one-regulatory effects of relationship norms
Experimental objectives are following: Firstly, to explore the main effect of technical service quality and functional service quality on satisfaction; Secondly, to explore the moderating effect of relationship norms between on technical service quality and satisfaction; Thirdly, to analyze the moderating effect of relationship norms between on functional service quality and satisfaction.
2.1.1 Experimental subjects
The subject is a college student. A total of 130 questionnaires were issued, and 112 valid questionnaires were removed from those that were invalid, incomplete or unqualified.
2.1.2 Experimental program
Situational guidance; Measure the "technical service quality" and "functional service quality" perceived by consumers in the service process; The subjects were manipulated by relationship norms; Collect the respondents' satisfaction with the company's brand; Conduct the inspection of the operation and collect the demographic characteristics of the sample.
2.1.3 Hypothesis test
On the basis of variance analysis, the hypothesis H1 is verified, the variable is "satisfaction", the independent variable is "technical service quality (high and low group)", "functional service quality (high and low group)" and relationship norms (symbiotic norm and exchange norm), and the independent variables are classified variables.

Weverify hypothesis H1a and hypothesis H1b by constructing technical service quality (high and low) * relationship norms (symbiotic, exchange) matrix and functional service quality (high and low) * relationship norms (symbiotic, exchange) matrix.

(1) The main effect analysis of technical service quality and functional service quality. The analysis of the single variable main effect shows that the quality of technical service is positively affecting the level of consumer satisfaction ($F_{(1112)} = 32.420$, $p < 0.01$), and the quality of functional services is improving the satisfaction of consumers ($F_{(1112)} = 40.231$, $p < 0.01$).

(2) Interaction of quality of technical services * relationship norms. The interaction results show that there is interaction between technical service quality (high and low) and relationship norms ($F_{(1112)} = 38.794$, $p < 0.001$).

When the symbiotic relationship is initiated, the groups with higher quality of technical services and lower groups shows no significant difference on the level of satisfaction ($F_{(1112)} = 2.911$, $P = 0.12$). When the exchange relationship is started, the groups with higher quality of technical services and lower groups are significantly different at the level of satisfaction ($F_{(1112)} = 88.442$, $p < 0.001$).

(3) Interaction of functional quality of service* relationship norms. We divide the functional service quality into high group and low group through the median. Interaction analysis shows that there is a significant interaction between functional service quality (high and low) and relationship norms ($F_{(1112)} = 42.224$, $p < 0.001$). There is no significant difference in the level of satisfaction between the high and low functional service groups ($F_{(1112)} = 1.116$, $P = 0.34$).

When the standard of consumer symbiotic relationship is started, consumption is more important for emotional, interaction and communication elements, which leads to high and low groups of functional service quality, and there are significant differences in the level of satisfaction ($F_{(1112)} = 67.231$, $p < 0.001$).

To sum up, first, the symbiotic relationship norm will strengthen the relationship between functional service quality and satisfaction, but it will weaken the relationship between the quality of technical service and satisfaction (H1a).

Second, the norm of exchange relationship will strengthen the relationship between the quality of technology service and satisfaction, but it will weaken the relationship between service quality and satisfaction. Therefore, it is assumed that H1a and hypothesis H1b are verified.

2.2 Method two--the adjustment effect of service types

The purpose of experiment two includes three aspects.

First, verifying the effect of functional service quality and technical service quality on satisfaction again.

Second, exploring and analyzing the moderating effect of search service on service quality between different dimensions and satisfaction.

Thirdly, analyzing the moderating effect of trust service on service quality and satisfaction

2.2.1 Experimental subjects

The subjects of this study are MBA students from a university.A total of 140 questionnaires were distributed in the study, and 121 valid questionnaires were finally obtained after the wrong answers, invalid answers and poor-quality answers were eliminated.

2.2.2 Experimental procedures

Interpretation of service types;Filling out one of the most impressive search and trust services in the last three months in groups;Measuring the "technical service quality" and "functional service quality" experienced by the subjects in the whole service process;Collecting participants' satisfaction with the company (or employees);The test of manipulation; Collecting the demographic characteristics of samples.

2.2.3 Hypothesis test

Using variance analysis to verify and assume H2,the dependent variable is "satisfaction",and the independent variable istechnical service quality(high and low group)、functional service quality(high and low group)and service type(search service and trust service),the independent variable are all categorical variable.By establish technical service quality(high、low)*service type(search、trust)matrix、functional service quality(high、low)*type of service(search、trust)matrix to verify and assume H2a,   H2b should be assumed too.

Firstly,the main effect analysis of technique service quality and functional service quality.The analysis of variance indicates that technique service quality（$F(1,121)=35.211$，$p<0.01$）and functional service quality can all promote the satisfaction of consumers positively.

Secondly,the reciprocal action of technique service quality*service type.The reciprocal actionIndicates, technique service quality(high、low)and service type(search、trust)have a significant interaction effect（$F(1,121)=44.774$，$p<0.001$.Which leads to the background of trust service, the technique service of high quality group and low group, on the level of satisfaction doesn't have significant difference（$F(1,121)=1.232$，$P=0.18$）.But as background of search service, this two groups have significant difference（$F(1,121)=58.172$，$p<0.001$）.

Thirdly, the reciprocal action of technique service*service type. The reciprocal action indicates, functional service quality(high、low)and service type(search, experience)have a significant interaction effect（$F(1,121)=38.771$，$p<0.001$）.By the background of search service, the satisfaction level between high group and low group doesn't have significant difference（$F(1,121)=0.998$，$P=0.53$.But on the background of trust service, the functional service between high and low group, have a significant difference in satisfaction level（$1,121)=63.224$，$p<0.001$）.

In conclusion, first, trust service will intensify the relationship between functional service quality andsatisfactory,but it can weak the relationship between technique service quality and satisfactory (H2a).

Second, search service can intensify the relationship between technique service quality and satisfactory,but it can weak the relationship between functional service quality and satisfactory. Therefore, it is assumed that H1a and hypothesis H1b are verified.

3 Results

Based on the data of experiments and questionnaires, the hypotheses test and exploration are conducted by means of variance analysis and structural equation modeling (path analysis). The first one

is to explore the moderating variables of the quality of functional service and the quality of technical service affecting the satisfaction. We start from two perspectives: relational norms and service types. Study two aims to analyze the mediating and intrinsic transmission mechanisms of the quality of functional service and the quality of technical service. From the perspective of trust, we analyze the boundary adjustment variables that affect the satisfaction of different dimensions of trust. Specifically, the research contents of the paper are as follows:

3.1 Service quality is not a single dimension; the data shows that the quality of service processes and the quality of service results will positively significantly increase consumer satisfaction levels.

3.2 The regulatory effect of relationship norms. Relationship norm regulates technical service Quality, functional service quality and satisfaction. The customer and employees showed intimacy and altruistic orientation and were sensitive to functional service quality. When the exchange Relational Norms was initiated, the customer and employees were presented with economic relations, transaction relationships, and merchant relations. Pay more attention to the exchange of interest and reciprocity norms. In this context, consumers are more sensitive to the quality of technical services, which leads to the exchange relationship specification will strengthen the relationship between technical service quality and satisfaction.

3.3 Regulatory effects of service types. Different types of services mean that consumers have significant differences in product knowledge, experience, and access to information, which leads to differences in consumer sensitivity.In the context of search service type, consumers have the ability to evaluate products and services, and are more sensitive to the quality of technical services. Under the background of trust services, consumers rely more on service processes, employee communication, and interaction to judge the quality of services, and on functional services. The quality is more sensitive.

3.4 The mediating mechanism of service quality affecting satisfaction based on trust theory. The study finds that the path and mechanism of the quality of functional service and the quality of technical service influencing the satisfaction are asymmetric. Specifically, technology service quality promotes customer satisfaction through competence trust. The quality of functional service focuses on the communication, interaction and communication between employees and customers in the service process, mainly by improving the consumer's good faith and honest trust, thus affecting the level of consumers.

3.5 Trust dimensions, relational norms and satisfaction studies. It is found that when the symbiotic relationship is started, consumers pay more attention to the interaction elements in the service process. Consumers regard employees as intimate partners, more altruistic and morefriendly, and are more sensitive to employee interaction, communication and conversation. In this context, the norms of symbiotic relationship will strengthen the relationship between goodwill trust, integrity, trust and satisfaction.

3.6 Trust dimension, service type and satisfaction degree. The study finds that when consumers recall search service, consumers have the ability to evaluate and judge services, and they value the achievement of service and results. In this context, search service will enhance the relationship between competence trust and satisfaction. However, when the consumers recall the trust type service, the consumer lacks relevant experience and knowledge of the product due to the more complex services, the consumers are more dependent on the process elements of the service to form the judgment of the quality of service, so it is more sensitive to the good intentions and professional norms of the employees. Therefore, trust service will enhance the relationship between goodwill trust, integrity, trust and satisfaction.

4 Conclusion

Based on the results, some suggestions can be given as follows. First, managers should ensure service results and performance, while need to pay attention to the interaction, communication and communication status between customers and employees, so as to improve satisfaction and loyalty of customer.Second, according to different customer types, employee relations management practitioners can focus on strengthening different service elements. Exchange relationship specifications. The enterprise shall guarantee the results, performance and expectation of the service of the service; symbiotic relationship norms, employees should interact and communicate with customers proactively.Third, according to different type of service, the key point of enterprises needs to adjust the service. For trust services, enterprises should improve the level of satisfaction of customer through service processes. For search service, enterprises should ensure the quality of service performance and

results, to win satisfaction and loyalty of customers.

The research has some insufficiency. First, adjust the diversity of variables. The research mainly investigate the adjustment variables from the perspectives of interaction elements and service itself, There are other potential variables that can be analyzed and studied in depth, such as communication quality, customer involvement, and customer self-explaining tendencies.Second, the study only explores binary interactions. The future may consider exploring three-way interactions and exploring more valuable discoveries and results. For example, the interaction between the quality of services dimension* relational norms* and nature of service.

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The Evaluation Model of Public Bicycle Franchise Based on Income Approach in China

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Abstract: Public bicycle franchise is a special intangible asset. Its evaluation must be undertaken with the transfer of public bicycle franchise and the introduction of social capital. In this thesis, the evaluation model of public bicycle franchise based on income approach was built. And some profound research was made to its basic model and two stage models. Moreover, the methods to determine three important parameters including the discount rate, the amount of revenue, and the franchising period were analyzed. It can provide a reference for the deal and assessment of future similar public bicycle franchise.
Key words: Public bicycle; Franchise; Income approach; Evaluation model

1 Introduction

The rapid development of urbanization has caused traffic congestion and environmental pollution. The development of urban public transport is an effective way to alleviate urban traffic. As a powerful extension of urban public transport, public bicycles have been developed in recent years. Different modes of public bicycle operation have been formed in various cities in China, such as the Beijing mode of pure private sector, the Wuhan mode of government subsidized contract, the Suzhou mode, and the Hangzhou mode of government purchasing services (Wang Huanming, Li Peng, 2015). From the view of the operation of each city, the pure private Beijing mode is a failure. In 2012, the government began to dominate the operation of the public bicycle system, and provided relevant support to the enterprises, and implemented a partial market mode. At present, it is in the process of development (Yang Yuanjun, 2014). The Wuhan modesubsidized by the government has also failed mainly because private enterprises used government resources for the development of public bicycles to undertake other businesses. In 2014, Wuhan public bicycles were formally accepted by the Wuhan Ring Investment Group, approved by the Municipal Party Committee and the Municipal Government. The Group invested and formed the state-owned enterprise of WuhanDriving Service Co., Ltd., which is solely responsible for the resumption of public bicycle projects in Wuhan. The contract Suzhou mode and the government purchase service Hangzhou mode have run more successfully. But from the Hangzhou mode, it still needs a large amount of local government financial subsidies every year, so it has also increased the government financial pressure. In the Third Plenary Session of the 18th CPC Central Committee, it was proposed that the cooperation between government and social capital should be actively promoted, and the PPP model was introduced to alleviate the government financial pressure. This also pointed out the direction for the development of public bicycles in China. The franchise of public bicycles to social capital granted by the government can achieve a win-win situation between government and social capital. At present, some cities in China, such as Fuyang and Zhanjiang, are also actively introducing PPP model to invite public bicycle franchises. As a special intangible asset, public bicycle franchise is necessary to evaluate its value. At the same time, it should be combined with the actual situation of the development of public bicycles in our country, and use the correct evaluation method to evaluate the value of the franchise rights of public bicycles.

2 Related Analysis on Franchise Rights of Public Bicycles

2.1 The concept of franchise rights of public bicycles

The word "franchising" comes from the English language. It means that franchise is the franchisor's own trademark, trade name, product, product patent, technical secret, formula, management model and other intangible assets which are granted to the franchisee in the form of franchise contracts, in accordance with the franchisor's unified business model to engage in business activities, and to charge the cost of the business form.The essence of franchise is the right of concession, which can be divided into two categories according to the difference of the Licensor: commercial franchise and government

franchise (Yu Bingwen, Wang Meiting, 2013). The franchising in this paper mainly refers to the government franchise in public utilities. The introduction of the franchise system can effectively reduce the financial burden of the government so that the government can put more capital and energy into the construction of urban infrastructure and effectively improve the operation and management level of public utilities (Xu Zongwei, 2001). It can also innovate the financing channels of public utilities and alleviate the supply imbalance of municipal public utilities (Chen Hongbo, 2003). Besides, it can effectively reduce the operation cost of municipal public utilities and promote the growth of investment (Yang Shiwen, 2003), which can guarantee the independent operation of the project and improve the operating efficiency (Li Ming, JinYucheng, 2007).

This article is aimed to the study of the franchise rights of public bicyclesystem granted by government agencies; that is, in the business of bicycle sharing system, the government authorizes investors to establish franchised operating companies and own the management privileges of the construction and operation of public bicyclesystem for a certain period of time. It mainly includes the chartered right to charge bicycles, the franchise of franchised advertising and the franchise of service facilities. During the concession period, the company can collect investment from bicycles and comprehensive development and operation to recover investment and obtain profits. After the expiration of the franchise, the government will clarify the rights and obligations between the government and the concessionary investor through contractual agreements or other means.

2.2 The value essence of franchise rights of public bicycles

The franchise of public bicycles is an intangible asset. At present, there is no unified definition of intangibleassets. The definition of an intangible asset by the International Evaluation Criterionis that it is a non monetary asset which can prove its own value through economic property. It does not have the physical form, but it can bring rights and economic benefits to the owner. . The definition of intangible assets in China's Evaluation Criteria is that intangible assets are: to be controlled by a specific subject; not to have the physical form; to play a long-term role in production and operation and to bring economic benefits. Therefore, the value of public bicycle franchise is mainly reflected in its economic benefits (Jiang Nan, 2015)

As an asset without material entities, the income of intangible assets is usually expressed through the income of the related assets, which is shown as the income of products, services or enterprises which it has adhered to, that is, the excess returns to the specific subject. Therefore, the benefits gained from the franchise of public bicycles are more manifested in the excess profits they can bring to the franchisees of public bicycles. This excess return is the essence of the value of public bicycle franchise.

3 The Evaluation Model of Public Bicycle Franchise Based on Income Approach

3.1 The setting of the evaluation model

The evaluation model of public bicycle franchise can be shown in the formula as follows:

$$P = \sum_{t=o}^{T} \frac{NCF_t}{(1+r)^t} \tag{1}$$

Among them:

P-- evaluation value of franchise for public bicycles

r -- discount rate

T -- the franchise period

NCF_t-- net cash flow in T

The model can be used to predict the annual earnings of the future franchise period for T years accurately, and the cycle of bicycle franchise in China is long, and the forecast changes of net income in the future may be larger. Therefore, the accuracy of the forecast results is difficult to guarantee. In order to get more accurate results, it can be evaluated in a piecewise way.

3.2The evaluation model of initial annual discount plus later annual discount in earnings

Assuming that the earnings of the first 5-10 years can be predicted and the annual return of public bicycles will remain approximately the same, the model [9] can be used in the early annual discount and the later annual income discount evaluation model. The formula can be expressed as:

$$P = \frac{NCF_1}{1+r} + \frac{NCF_2}{(1+r)^2} + ... + \frac{NCF_m}{(1+r)^m} + \frac{NCF}{r}\left[1 - \frac{1}{(1+r)^{T-m}}\right]\frac{1}{(1+r)^m} \tag{2}$$

Among them:

NCF_1--future income in T

NCF_2--the income of late annuity

m-- the accurate forecast of the 5-10 years period

3.3 The evaluation model of the early annual discount and the later equal increase income.

Assuming that the earnings of the first 5 to 10 years can be predicted, the annual earnings of public bicycles increase in proportion. In this case, we can use the way of the early discount and the later equal increase rate. The formula can be expressed as follows:

$$P = \frac{NCF_1}{1+r} + \frac{NCF_2}{(1+r)^2} + ... + \frac{NCF_m}{(1+r)^m} + \frac{NCF_{m+1}}{r-s}\left[1 - \left(\frac{1+s}{1+r}\right)^{T-m}\right]\frac{1}{(1+r)^m} \tag{3}$$

Among them:

s-- the ratio of the late earnings to the increasing ratio ($r{\neq}s$)

In the actual assessment process, the corresponding model should be determined according to the actual situation of each city, and the value of the franchise of public bicycles should be evaluated.

4 The Parameter Extraction of the Evaluation Model

4.1 Discount rate

The discount rate is a key factor in determining the value of the franchise rights of public bicycles. The methods used to determine the discount rate are the constituent element method and the capital asset pricing model. The constituent element method means that the discount rate is equal to the sum of the risk free rate, the risk reward rate and the rate of inflation, in which the rate of non risk return generally refers to the yield of the treasury bond, and the rate of inflation is to evaluate the purchasing power of the currency in real time. The risk reward rate is the compensation for the investment risk of the investors, and the rate of risk reward is due to the rate of risk reward. Since there is a quite high sense of subjectivity in determining the risk reward rate, it is difficult to reflect the true discount rate. Therefore, the discount rate of public bicycle franchise value should be evaluated by capital asset pricing model (Yuan Zhongwen, Nu Jun, 2014).

$$R = R_f + (R_m - R_f) \times \beta \tag{4}$$

Among them:

R_f -- risk free reward rate

R_m-- the historical average of the expected rate of return on the market

β-- risk adjusted coefficient

The risk-free rate is generally referred to as the yield of short-term treasury bonds. Therefore, it is possible to refer to the 5- year coupon interest rate of treasury bonds on the basis of benchmark days in the assessment. The historical average of the expected rate of return of the market is generally associated with the stock price index. At the time of evaluation, the average return of the annual closing price of the Shanghai index and the Shenzhen index since the founding of the index can be respectively calculated, and take the geometric average rate of return of both the Shanghai stock index and the Shenzhen index as the historical average of the expected return rate of the market. The risk adjusted coefficient can refer to the beta value of a comparable listed company in the same industry, and the regression line method can be used. That is to say, the regression coefficient of the stock return and stock market return is the beta coefficient. Because the calculation of beta coefficient is more complex, it can be learned through Wind data query.

4.2 The amount of income

The amount of revenue is expressed by the annual net profit after the public bicycle franchise in the future. The net cash flow per year is equivalent to the annual cash inflow from the public bicycle franchise, reducing the operating cost of the last year. The franchise of public bicycles includes franchise fees for bicycles, the franchise rights of franchise advertisements and the franchise rights of comprehensive service facilities. As each city carries out the transfer of the franchise of public bicycles, the scope of the transfer is not the same. Some only transfer the bicycle rental franchise, so the annual cash income only includes the annual rental fee for bicycles. At the same time, some transfer the bicycle rental franchise, the franchise of advertisement and the franchise of comprehensive service facilities, so the annual cash income mainly includes the annual rental fee for bicycles and the advertising revenueobtained. Only the transfer of bicycle chartered right is discussed here. The annual rental fee of a

bicycle is the product of the charge standard and the annual rent amount. The fee standard is determined according to the local economic development and policy. The annual rent amount can be calculated by the weighted average of the most optimistic income expected value, the most likely return expected value, and the most pessimistic income expected value.The annual operating costs include daily maintenance costs, overhaul costs and management costs during the operating period. The daily maintenance costs mainly refer to the various funds consumed for the daily maintenance of public bicycles, and their maintenance costs have a linear relationship with the factors such as the amount of bicycle rents and precipitation. The cost of overhaul is mainly used for periodic and preventive comprehensive repairs, making the bicycle maintain the original function state. The influence of these factors is more complex and can be predicted according to the experience method. The management costs mainly include the wages and benefits of managers and the costs of relevant management institutions, which can be predicted according to the annual management costs of other urban public bicycles. There is a certain proportion between the annual operating cost and the annual cash income in the earnings forecast, so we can determine a certain proportion according to the experience data of other cities, and make a reasonable forecast for the net income per year.

4.3 The time limit of return

The time limit of return, the time limit obtained from the franchise of public bicycles, refers to the time period of the entry into force of the franchise to the end of the franchise, and it can be referred to as the franchise period for short. The determination of concession period is more complicated. The government hopes to recover the franchise right earlier. The franchising company hopes that the franchising period will be longer and more revenue will be obtained. Generally speaking, the franchise period should not be shorter than the investment recovery period of public bicycles, nor should it be longer than the economic life of public bicycles. There are two kinds of algorithms for franchise period: the investment recovery period plus the reasonable profit period method, and the suitable investment yield method (Zen Hang, 2012). The investment recovery period plus reasonable profit period means that the franchise period of the project is equal to the sum of both the investment recovery period and the reasonable profit period, in which the investment recovery period refers to the static investment recovery period, and the reasonable profit period is determined by the government and the social capital. The method of suitable investment rate of return refers toselect a suitable rate of return on investment as the discount rate to discount the net cash flow of public bicycles franchised in different years. The appropriate rate of return on investment should be higher than the benchmark discount rate of the project. The higher part is the profit of the public bicycle business. The formula can be expressed as follows:

$$\sum_{t=0}^{T} NCF_t (1+i)^{-t} = 0 \qquad (5)$$

Among them, i means a suitable rate of return on investment.

5 Conclusion

Asquasi-public goods to alleviate urban traffic pressure and mitigate environmental pollution, public bicycles can not rely solely on the power of the market. Under the situation of promoting the PPP model, the government should cooperate with the social capital to promote the construction of urban public bicycles. Since the franchise of public bicycles may serve as a bridge to link between the government and social capital, the income law is the best method to evaluate its value under the current situation of the development of public bicycles in China.

In the process of evaluating public bicycle franchise by the income approach, it is quite subjective to determine the discount rate and the amount of income. We should analyze the various risks of the discount rate, and predict the annual cash income and the operation cost in the amount of income. Moreover, we should carefully determine the three basic parameters of discount rate, the amount of income and the period of franchise in order to get a reasonable and accurate evaluation. In general, with the continuous improvement of the trade market and the transaction database of the franchise rights of public bicycles in China, it is also feasible to use the market law to evaluate its value in the future.

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The Solution for Traditional Publishing Media under the Background of the Rise of New Media

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Abstract: The new media experience a fast development with the rapid expansion of Internet and Digital Technology. There is a great impact on the traditional publishing media. Is this a life and death struggle? However, the new media era is a new product with a strong vitality; while traditional publishing media also have their own advantages. Therefore, it's an inevitable development that the new media absorb the advantages of traditional publishing media. This paper analyzes the development path of new media and the advantages and disadvantages of traditional media compared with new media in recent years, it is proposed that, with the application of new media technology and development in the production of content, there will definitely a new development opportunity for the traditional publishing media.
Key words: New media; Challenge; Opportunity; Traditional publishing

1 Introduction

In recent years, with the advantages compared with traditional media, the rise of new media bring a great impact on people's real life. The new media occupy the media market and penetrate into all aspects of people's life in a very short time. This creates dilemma for the traditional publishing media and great pressure for many traditional media practitioners. Some people think that traditional publishing media come to the end and would be replaced by new media. However, some people think that traditional publishing media also have their own market and would not be replaced. Different researchers have different opinions on the transformation of traditional media. From the three aspects of rapid changes of technology upgrading, cultural change and public demand that has given rise to the change of media environment, Wang Hongyu (Wang Hongyu, 2015), Zhou Xiangyan (Zhou Xiangyan, 2009) and Liu Mengda(Liu Mengda, 2016) have proposed that, traditional media should break through constantly in order to survive. Wang Liming (Wang Liming, 2016) and Chen Dong (Chen Dong, 2016) have proposed from three aspects that the transformation of traditional media is very urgent and necessary. First, the media should develop towards diversification since the audience gradually changes to diversification. Second, based on the extremely fierce competition in the market, traditional media and new media can't develop at the same pace, each side should show its unique advantages. Third, with the rapid development of the Internet and information dissemination and updating, traditional media have been greatly impacted with continuously decreased influence. Therefore, it is necessary to adapt to the development of the times and keep pace with users. However, Bai Qifeng (Bai Qifeng, 2013) made a more accurate description of the current situation of traditional media. From the media environment to the necessity and urgency of reform, all the explanations have told us the breakup of the monopoly and challenges meet by traditional media. First, the challenge of information content because of the restrictions on the amount of information. Second, the challenge of communication mode. As one-way media, no feedback channels are available between the audience and newspaper. There is a lack of extensive communication between media and users. Fourth, the challenge of information expression. The information dissemination of text and audio is flattening by the traditional media, while more comprehensive and three-dimensional dissemination of information can be made by the new media. From the development at home and abroad, it is believed that the real development path is the integration of traditional publishing media with the advantages of new media.

2 The Rise of New Media
2.1 The concept of new media

In essence, new media is a constantly changing concept. With the development of technology and times as well as the continuous enrichment of knowledge, integration and transformation will be made with the new media through the absorption of new contents. As a kind of media form and communication carrier, new media is essentially a way of information transmission that can eliminate the limitation of time and space with strong interactivity.

New forms of media include e-books, mobile newspapers, web publications, mobile websites, television, digital TV, webcasts, blogs and podcasts. To be more specific, based on the information science and take the mass communication theory as the basis, new media is a highly integrated comprehensive interdisciplinary with the integration of culture and art, the application of information transmission technology to the areas such as literature and art, entertainment, business and management.

2.2 The development trend of new media

With its strong vitality and the extraordinal acceptability of the public, the appearance of new media bring challenges to the traditional publishing media. The market of the traditional publishing media are occupied by the overwhelming new media. Being developing at a surprising speed and as a new way of modern communication, new media approach to the increased users in just few years which it takes newspapers, books, magazines, radio and television for decades and hundred years to achieve it.

2.3 The influence of new media on traditional publishing media

The new media is a platform for free thinkers. Because of its nature such as sharing and deep communication, it becomes more and more popular. Among these audiences, especially the young generation, they are addicted to the mobile phone, microblog and internet forum. Media users redistribute their limited time, shifting their attentions and interests to the new media. In this way, the development of traditional publishing media has been influenced to a certain extent by the appearance of new media.

At present, the world has entered the era of mobile Internet, which is an irreversible industrial revolution. In the traditional printing and publishing period, we had developed a set of editorial and publishing strategies, which can be carried out for 10 years. Nowadays however, when we come into a new thing, maybe it was out of date already. The one-year plan could be an adventure since it is most likely out of date after it has published just several months later. iPad is only three years old, but the changes that it bring to the world is obvious.

Through the communication with traditional publishing media practitioner, it can be summarized into two opinions towards new media, one is that the traditional business can be continued instead of change and reform; the other is that it holds pessimistic attitude and they think magazine come to the end. In fact, one should be both optimistic as well as crisis awareness. Since it can't be avoided, so it is better to welcome it. For many marketable publications, including *Readers Magazine*, they face both challenges and opportunities. Traditional publishing media should adapt to this situation. The most important is that, the traditional publishing media practitioners need to correct their thoughts at any time with continuous study, and get ready to change with adjustment.

3 Advantages and Disadvantages between New Media and Traditional Publishing Media

New media has the characteristic of timeliness, which is unmatched by traditional publishing media. In recent years especially, with the appearance of new media such as Weibo, the events that happened just now all over the world will be uploaded to the Internet in a few seconds and spread to the whole world. This couldn't be imagined by the traditional media before. Take the education on socialist concept of honor and disgrace proposed by the President Hu Jintao for example, one publishing plan of a book about this topic has made, but the author has found that, there are so many similar things with various forms on the Internet which are more diversified than traditional books with visual impact.

In order to make the products that meet the market requirements, traditional media still lags behind compared with the new media. It should focus on the content and give priority to the content in order to provide better products. That is to say how the traditional publishing media can make full use of its advantages and improve its disadvantages. According to the author, the advantages and disadvantages of traditional media compared with new media are shown in the Table One as follows:

Table 1   Advantages and Disadvantages of Traditional Publishing Media Compared with New Media

Advantages	Disadvantages
1. Originality and selection of information.	1. Slow content updating.
2. Depth and credibility of the content.	2. Simple content presentation method.
3. Professional editorial staff with good ability.	3. Weak interactivity.
4. Stable audience.	

4 Challenges and Opportunities Faced by Traditional Publishing Media
4.1 Challenges faced by traditional publishing media
The development of new media is not rapid and powerful in the social environment currently, but there are various signs that challenges and difficulties are faced by the traditional publishing media. Some people even think that traditional publishing media will eventually be replaced by the new media, some people even predict that one has to go to the museum if want to see the paper medium in the future. Would book and magazine still exist? It is the issue concerned by the traditional publishing media. However, the traditional publishing media has a profound historical heritage. Many people are in particular pursuit of the feeling of paper and ink fragrance. The authority and influence within traditional media cannot be replaced by the new media at the present stage. Moreover, the replacement of traditional media by new media is usually a gradual process instead of a comprehensive process.

From another perspective, faced by the impact and influence of the new media, traditional publishing media should keep pace with the times and make full of its advantages to maintain its strong competitiveness through unique development method in order to establishing a coexistence and win-win situation with the new media. Faced by the appearance of new media, traditional publishing media have been able to treat the developmental characteristics of new media and itself in a correct way after panic at the initial stage. It can learn the advantages from the new media. Traditional publishing media should swallow their pride and abandon the mode of dissemination with superior feeling, thus it can become popular among the audience. Change the audience from being passive to active as to the information dissemination, make the mode of dissemination with humanity and interactively.

4.2 Opportunities faced by traditional publishing media
It can be said that, besides the challenges to traditional publishing from the mobile Internet, it also brings corresponding opportunity. First, a large number collection of data enables publisher to have a clear understanding of their users and readers. Thus, better service can be provided for their users based on the foundation.

In the traditional period, one periodical with 4 billion circulation is a huge success because of the limitation of distribution channel and publishing stock. However, it is not surprising that there are so many applications with millions of active users in the period of mobile Internet. The cost of acquisition and physical distance is eliminated by the Internet and better content can be found and experienced than before. For the content producers, if the content is good with well operation, its Internet users can certainly reach to 10 times as that of paper media circulation. Advertising and value-added services can be continually provided to these users. This is the development trend of the media in the future.

Take the periodical *Readers* for example, the overloaded information could be an opportunity. Because it is seldom for the ordinary people to have ability or energy to get the right information from the mass information. What they need is a recommendation like a sieve or filter. The editor with human nature is better and more accurate than the calculation of computer to provide the information to the users. In the period with insufficient information, *Readers* had achieved success by providing effective information to the users. In the period of the long tail, abstract journal is more like an effective filter which it can constantly provide reading service to the users. It can choose information, save time and energy for the users. This is the opportunity for the *Readers*.The premise is that these two kinds of publishing methods are different, which involves the awareness of product and service as well as new editorial thought.

5 Strategies for the Traditional Publishing Media during Transformation
5.1 Strengthen internet thinking
According to the opinions proposed by Mr. Zhou Hongshen, the founder of Qihoo 360 Technology Co. Ltd, Internet thinking contains four key factors: user first, experience first, free business model and disruptive innovation. The essence of Internet thinking can be summarized as: user-centered, perfect user's experience, think what the user thinks, and start from the emotional appeals of the user in order to provide individualization service for the user.

The integration of traditional publishing media and new media is to find the social value of traditional publishing media under the framework of the Internet, transform traditional publishing media through Internet thinking instead of treat the Internet as the extension and supplement of traditional publishing media. The Internet Plus mode is to enable traditional media to build a powerful

communication ability on the platform with the help of advanced communication technology and method from the new media based on the exploitation of its own content and brand communication ability.

5.2 Adhere to the content

The unique advantages of traditional publishing media can't be possessed by the new media. More specifically, the content and editing standards of traditional publishing media can't be reached by the new media. Traditional publishing media can achieve success in content through authoritative analysis and penetrating comments. The traditional print media should attach importance to its own capability, make its content more competitive, meet the needs of reader as the starting point, provide the reader with the information they need, treating the reader as god, thus the interaction communication can be realized.

Traditional publishing media can enhance and make full use their advantages, and provide the core content to their audience through rapid and convenient way. The audience can get valuable information. These are the advantages of traditional publishing media that are not possessed by the new media. This can be regarded as the traditional publishing media to be popular with the audience. Where is the living space and future of traditional publishing media? It is proposed that besides the strengthen of the advantage in content, it should also develop the speciality in its authority.

5.3 Active transformation by the traditional publishing media talent through the use of advantages

Now most of the traditional print media has its own website, traditional publishing media must learn new technology with integrated development. It should be actively integrated into the new media such as network, e-paper, mobile news, especially small fresh e-books, and further participate in the cultural management in all aspects such as network media, mobile media (mobile phone newspaper), cultural publication, electronic schoolbag, etc.

The profound literary accomplishment as well as editing and publishing experience of the traditional publishing media editor are the advantages in the transformation. Their accurate reading comprehension ability and fast editing ability enable them to adapt to the characteristics of high speed and efficiency of the new media. The talents of traditional publishing media can make use of their own advantages in editing and publishing fields, integrate the Internet thinking, learn new technologies, and improve their abilities accordingly. It is entirely possible for them to adapt to the requirements of new positions rapidly and gain new career development opportunities.

6 Conclusion

It is very dangerous to ignore the development of new technology and new media. It is also unwise to lose confidence in development because of the challenges from the new media. It is wise to attach importance to the new media, absorb new technologies, and choose the right development road.

In the fierce market competition, the traditional publishing media must take the initiative, seize the opportunity and make full use of the advantages of brand and resource, enhance the competitiveness in the fields of new technologies and communication in order to realize the development goal that the integration, promotion, coexistence and win-win can be found between the old and new media. In order to meet the development of society and needs of people, the development of the media has been increasingly integrated. Traditional media will inevitably find the most suitable way in each transformation.

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Market Bottlenecks and Future Development Analysis of the APP for Children's Co-education both at Home and at School

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Abstract: This paper uses a comparative summary and FieldWork, presented a query on the market development of the APP for children's co-education both at home and at school. It is believed that the existing products cannot fundamentally solve the problems which parents concerned. The product homogeneity is highly competitive and the ultimate victims are users. After analyzing several well-developed APPs for children's co-education both at home and at school, it is found that their fundamental problem lies in focusing on the wrong parts. They focus on the parents rather than the children. Finally, it is concluded that we must focus on children, increase children's participation, and constantly strengthening their professional education.The product is really conducive to the healthy growth of children, which is possible to build a unified infant market platform for the qualitative leap to China's immature toddler market.

Key Words: Co-education both at home and at school; Application; Children's market; Education industry

1 Introduction

The school-family connection of American pre-school education is mainly based on parent organization, and the parent organization and school in the United States are equal. Of course, there are APP, such as Remind and Buzzmob, which provide school-family contact functions, but their functions are all very simple. It can facilitate the convenient transmission of information, and the purpose is to reduce the cost of paper. School-family connections in Britain are mainly letters .Sometimes are e-mail or paper letters. Chinese parents are mostly busy with their careers, and they have less time to accompany their children. The feature-rich home produced app arises at the historic moment, but the development time is not long, and there are many problems. At present, there are some articles in China pointing out the problems existing in the app.Serious homogenization is one of the most criticized.

The reference is mainly to explore the application of homelands co-breeding APP under the background of "internet+" and the positive interaction between line and line.

The second literature: From the Internet to the "Internet +", the progress of information technology has greatly changed people's lives. Under the influence of the great era, the combination of "Internet +" and early childhood education has promoted the upsurge of home interaction APP. Starting from the practical problem of home interaction, this paper discusses the application of home interaction APP in the field of preschool education, and puts forward some suggestions and ideas.

The sixth literature: This paper presents a thematic review of app-enabled learning in the context of recent developments in mobile technology and m-learning. Three key themes are presented that reflect the issues that teachers, school leaders and systems have grappled with in recent years.

The seventh literature: The children's market is very challenging but has great potential. In the very dynamic and ever-changing face of the children's market, identifying and being able to optimize the factors that can preserve product dominance is the key to product longevity. This paper attempts to identify factors which are identified as the antecedents of brand loyalty in the children's market. We propose a model which tries to encapsulate the antecedents of a brand relationship and its influence toward brand loyalty. We did a semi structure interview in Indonesia, Portugal, and Brazil to validate our model. We also did a survey within these three countries to test our hypotheses. The findings of the preliminary study, semi-structured interviews, and past research suggest that brand personality, brand trust, and brand salience are important antecedents to create a brand relationship in the children's market.

The ninth literature: Driven by the "Internet +", a large number of APP software based on home ownership has emerged. In view of the characteristics of APP in the current home, this paper focuses on analyzing its advantages and disadvantages in its application, and puts forward some rectification strategies.

The tenth literature: The key of home co-education lies in the communication between parents and kindergartens. Traditional communication methods can not meet the needs of development. In today's "Internet +" era, new Internet information technology has begun to be applied in home communication. Through combing all kinds of online and offline communication modes, this paper draws a conclusion that the benign interaction between online and offline is the inevitable trend of the development of home co-education communication mode.

2 The Market Situation of the APP for Children's Co-education both at home and at school

The preschool education industry has developed rapidly in the past two years,and the capitalists smell the benefits,and a large amount of capital has begun to flow into the kindergarten market.
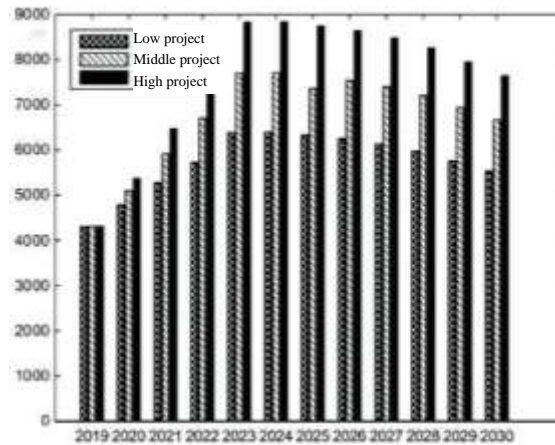
Figure 1   Number of Children in Kindergarten (unit: a children)
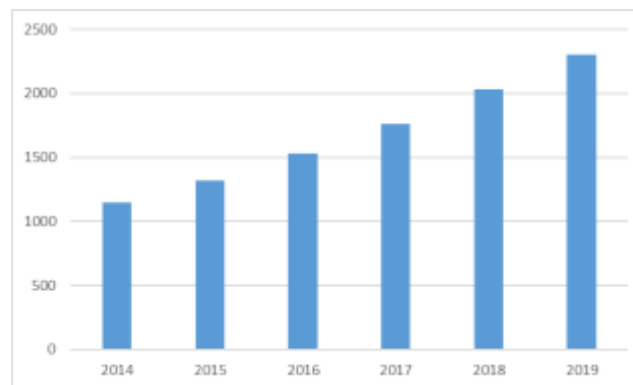
Figure 2   Prediction of the Market Scale of Preschool Education in China (unit:a hundred million RMB)

This huge market has not been well excavated, and has not yet formed a brand and monopoly. So now is a good opportunity for development. Whoever can seize it first is the winner.

This part will start from three aspects of the market of the APPs for education, the APPs for co-education both at home and at school, the APPs for children's co-education both at home and at school to help us understand the current market situation of this kind of products.

2.1 The market of the APPs for education

China's first comprehensive and systematic education APP evaluation report was released in the 7th China education gala of sina. By November 2014, the total number of education APPs in China has exceeded 70,000, accounting for about 10% of the APP market share in China, ranking second only to game APPs in apple APP store.

In China, where material conditions are gradually getting richer, cultural education has been put on the agenda. Parents of the younger generation pay more and more attention to children's education, and education expenditures have been increasing year by year. In addition, the "Internet + education" policy enables people engaged in the Internet and education industries to see opportunities and join the

research and development of education APPs.

Due to the low market access threshold of education APP in China, the product similarity is serious and the quality is difficult to be guaranteed. Sina education conducted a comprehensive evaluation of the top 200 education APPs in domestic APP stores. Education APPs with a full score of 100 and above 80 are excellent products worthy of recommendation. But the results showed that less than 10 percent of APPs scored 80 or more.

2.2 The market situation of the APPs for co-education both at home and at school

The education of a child is mainly at home and school. Parents are eager to obtain information about their child from the teacher, and the teacher also hopes that the parents can understand their child and help the teacher better educate the child. Therefore, the communication between the parent and the teacher become a must.

With the advent of the Internet and mobile terminals, communication between parents and teachers has gradually shifted from offline to online. Our mobile phones receive a huge amount of information every day, and people are already upset with the huge amount of information. However, they are still greeted by a lot of invalid information in the communication group of home and school. The home-school communication groups on QQ and WeChat not only waste time for parents to read invalid information, but also sometimes miss important information released by teachers, causing great influence.

So the APPs for co-education both at home and at school came into being. There are mainly the following categories: national type, regional type, K12 universal type, targeted type. There are many varieties and fierce competition.

2.3 The market situation of the APPs for children's co-education both at home and at school

According to the online education career yearbook provided by the cnki.net, by 2016, the number of children in our country reached 47.25 million and the number of kindergartens reached 239,812. This is still a blue ocean child market. Everyone wants to occupy a place.

According to the assessment data, preschool education users currently spend about 94 yuan on average, and the average amount they may spend in the future is as high as 178 yuan, ranking the top among educational APPs. At present, the market has done a better job with the smart tree children's growth industry cloud platform, shell chat, palm home, in the next chapter we will introduce these products in detail.

According to the product trail and online user's evaluation, there is no obvious difference between these APP products except the design of the page, and the homogeneity problem is quite serious. "In fact, many of the functions of those APPs have not been fully developed and have already been introduced to the market. In the process of promotion, some users might give up those APPs. Therefore, some functions cannot be completed, and the final functions are almost identical to QQ and WeChat."

Due to the imperfection of design and the lack of information about the demands of users, many users registered when those APPs were firstly introduced, but soon their enthusiasm began to decline, and the usage rate could not be maintained. And because of the fierce competition among those products, the market for each product is very fragmented, and it is difficult for customers in these infant markets to have a common platform.

2.4 Foreign markets

Living Tree was established in 2012. The main product is the Tiered Social Network, a home-school interaction APP, through which teachers, schools, and district administrator can send texts, pictures, and other types of messages within the product. It is mainly prepared for parents and children to acquire the notification of schools and classes. It was announced on November 30, 2016, that the product was acquired by Dean Drako, the founder and former CEO of network security firm Barracuda Networks with several million dollars. The home-school co-education in foreign countries is different from that in China. They focus on social network. Therefore, Living Tree, an APP focused on providing social network platform, meets the needs of teachers and students, and the number of users is increasing.

3 Popular Products Analysis

Common function: Notification/ Children Dynamics Sharing/ Private Chat Between Teachers and Parents/ Children Recipes/ Parents Circle Communication/ Bedtime Story

3.1 Smart tree preschool cloud platform (page base color: green)

Users: 32 provinces, 120,000 kindergartens, 30 million users

The Smart Tree Preschool Cloud Platform was developed by Beijing Huanyu Wanwei Technology

Co., Ltd., with kindergarten principals, teachers, and parents as the main service targets, and focused on building an integrated service platform for home education.

In February 2018, the Smart Tree was financed by 700 million RMB.

Features:

Cloud office system (storage of children's and parents' files, storage of weekly plans and attendance and leave for each class, reduction of teacher workload, and implementation of integrated kindergarten information management.)

Weekly event recommendation (Wisdom Tree organizes various national events weekly, as well as rich prizes)

Quality childcare knowledge (baby see, baby listen, childcare tips and other quality parenting content to help your baby grow better)

3.2 Shell chat (page base color: yellow)

Users: 31 provinces, 50,000 kindergartens, 10 million users

Shell chat returned to the nature of education, and continued to build a one-stop home education products and personalized parenting program. It was committed to liaising parents and kindergarten to promote home synchronization, and to truly realize the children's personalized training.

Shell chat is the only brand of Viagra shares (the first share of A-share preschool education), Tsinghua Enlightenment and NetEase.

Features:

Professionalism (combined with authoritative organizations to create and combine data on the use and behavior of millions of children, to record and analyze growth status, and to generate exclusive childcare programs. Hundreds of pre-school education experts have settled in Shell Chat, and more than 30 well-known educational institutions and publications have been established to meet the childcare needs of users with multiple contents.)

Director's exclusive functions (information monitoring and teacher work statistics) The "Little Yellow Chicken Guardian Program" (a public welfare project to prevent the loss of children in kindergartens was initiated by Shell Chat, NetEase, Gaode, and the Children's Safety Foundation. The use of mobile Internet technology prevents children from being lost.)

3.3 Palm home (page base color: blue)

Users: 50,000 kindergartens, 10 million users

For the kindergarten industry, we have created a cloud-based platform for home-school communication, park management, and presentation sharing based on mobile Internet technology.

Features:

Video surveillance (application of remote video technology provides core patented technical support for campus security and transparency management.)

Sign-in management (advanced sign-in equipment is connected to the palm-home network, and parents authorize pick-up and drop-off of children by handing them home.

Kindergarten, through fingerprints, photographs and parents, checks passenger information in a timely manner to ensure the safety of children.

4 The Environment Pest Analysis

4.1 Policy environment

In the "13th Five-Year Plan" for the development of national education in 2016, it is proposed to make full use of big data, cloud computing and other information technologies to promote the development of "Internet Plus Education". This is the first time that "Internet Plus Education" has been written into national education. "In the planning, the conference pointed out that during the "13th Five-Year Plan" period, we must continue to place education in a strategic position of giving priority to development and advance education modernization.

4.2 Economic climate

China's GDP reached over 82.7 trillion yuan in 2017, which is the first time to exceeded 80 trillion yuan, and the Engel coefficient fell from 30.1% in 2016 to 29.3% in 2017. With the progressive improvements in people's livelihood, cultural requirements have also gradually increased. In addition, there are increasingly investment in education because the younger generation of parents tend to create and provide better quality education for their children. Huge demand embraces a huge market. The education industry, billed as a growing industry, is more and more prosperous year by year. For instance, "Internet Plus Education" pushed education in the spotlight once again in 2016, which became highly

favor among numerous entrepreneurs. "The data shows that the number of start-up companies in the educational technology circle is growing at an average annual growth rate of around 50% in recent years, of which the number of online education projects currently surpasses 3,000."

4.3 Social environment

In December 2017, China Institute of Educational Finance Research-Household Survey(CIEFR-HS) at Peking University officially released the initial survey data for domestic household education spending in China. The survey data in the next semester of 2016 and the last semester of 2017 estimated that the total expense of family education on the pre-primary and basic education in China was approximately 1.9 billion yuan, accounting for 2.48% of the 2016 GDP. That means that individuals gradually realize the significance of early childhood education because the early education of a child shapes his whole life. Therefore, parents are willing to invest more money and energy to provide their children with the best education during this period, and kindergarten and early childhood programs are preferred by parents.

4.4 Technical factors

Cloud computing, internet of things, big data technology and related industries rise rapidly and diversified newly services flourish within the context of "Internet Plus". Due to little technology for home-school co-producing products, this product needs more detailed page design, more understanding of the infant market and preschool education as well as professional knowledge of pre-school education, which is expected to bring young children better growth environment, so that they can embrace the trust of parents and build brand loyalty.

5 Problems and Difficulties

5.1 Homogenization and competition

There are 76 APPs focused on home-school interaction are neatly arranged online. However, there is no real difference among them, whose the main function includes the private chat between parents and teachers, school notice, dynamic sharing, parenting knowledge. Other common additional functions consist of bedtime stories, nursery rhymes learning, punch check-ins, and course studies, which are not only insubstantially different from similar products, but also similar to APPs that focus on additional functions as what is mentioned above. Indeed, one-stop services are more convenient, but parents and children will not tend to use them if they are not professional and attractive compared with APPs doing these products exclusively. That is to say numerous functions are not necessarily more appealing.

Home-school interaction is so attractive for APPs entrepreneurs and some businessmen, and those merchants looking for another ways to start with existing social platforms that are already popular. For example, following the launch of "Ali Teachers and Students" by Alibaba last year, Tencent has recently added this function to the QQ group, and many people turn their attention to Tencent's other social software- WeChat. In fact, there are companies that are helping schools to develop related services based on WeChat official accounts and establish their own online home-school communication channels. For example, Nanjing Maunguan Technology Co., Ltd. ("Mongguan Stock"), which has recently raised about 10 million RMB on the New Third Board, currently mainly popularizes its "Micro Campus Alliance" home-school platform based on WeChat.

In this way, homogenization brings serious disorderly competition, which damages the interests of users. Some APP users are still being used while they are disabled. The APP still retains a large number of pictures of children, registered phone numbers and other important information. However, there is no person in charge is responsible for the loss of such information.

5.2 Lack of profession

Although the current home-school co-education APP boasts education, there is no way to prove its real effect in education. Indeed, it can be felt that parents' monitoring of children has been strengthened, but people begin to wonder if it will be harmful to the free growth of children. The free development of the parents; the communication between the parents and the teacher just brings more convenience the teacher and the parents, but it needs to think whether it is conducive to children's education. So, that the focus of this product is a child or a parent deserves to pondering.

Social APP is currently a benchmark product in the era of mobile internet, such as WeChat, which is well-known to all of us, and a strangers' social APP that is listed in the United States. Meanwhile, APPs of home-school communication are also standard educational products of K12 education on the Internet. Owing to the functional overlap of these two kinds of APPs as well as the higher cost for parents to acknowledge those new studying products, WeChat has greatly weaken the competitiveness of

those APPs which are only capable of social communication. Thus for those APPs of home-school communication, to strengthen their unique educational function is the only way out.

Social interaction is universal from the perspective of tool attributes. However, as social interaction becomes different, the demand for products will vary accordingly. Because of the special nature of education, parents, students, and teachers participate in the tripartite party, and the communication between the two groups is quite different. Therefore, a product that better understands education is naturally more popular.

5.3 High usage rate for users is hard to maintain

Since users are mainly parents who are a very busy group, their time spent on an APP is very limited. If this product is not necessary, they will directly give up. Few parents are free to chat with their teachers every day; dynamics do not have to be brushed every day; what can be notified is to communicate with the teacher directly when they pick up the children, instead of chatting online. From this point of view, this just-needed requirement doesn't seem to be so necessary. Therefore, although parents registered an account under the management of the kindergarten, the actual usage rate cannot be guaranteed. Thus the construction of this platform is meaningless. Without active user, who can see and promote advertising? With only a beautiful outlook, how this platform will work is worth thinking about.

6 Future Trends and Development

6.1 Market diversification of preschool education industry

The kindergarten industry has not yet formed a monopoly and the market is very decentralized. At present, the number of kindergartens in our country is close to 240,000, but only 6,000 of the top 20 preschool education corporations in China add up, accounting for not to 6% of the market share. Therefore, if it is to seek kindergarten cooperation, in addition to a few big heads, the rest require a door to door run. Especially in some small cities, people's acceptance of new things is limited. It is difficult to take the initiative to try. Only the APP actively seeks cooperation. The workload is very large. Therefore, the establishment of a unified infant platform still has a long way to go.

6.2 Strengthen proficiency

Many existing products are just for users' convenience. But they only see the superficial needs, yet forget the most essential needs of parents: the expectation for their children's better growth instead of the pursue of convenience. The development of the preschool education industry in China is relatively late, and the preschool education is still immature. If there is an APP with a strong educational specialty, it will quickly be recognized by the teacher parents and the relevant experts. After all, there is no product in the market that can make it.

6.3 Increase children participation

It's better to figure out children's preference rather than their parents', and attract parents with their children's preference. Nowadays, the services provided by the products are mainly parents-focused, such as exchanges experience parenting, children's dynamic sharing, in which children's participation is very low. This kind of product is completely irrelevant to children, though it should be. If an APP can tap the child's interests, and let parents and children participate in the activities of the APP together, it will not only play a role in educating children, but also increase the time for parents and children to get along with each other. In this way, the user's activity will naturally come up.

7 Conclusion

The development of child-care platforms still needs time, and co-apprenticeship for child care is a good point to start, but its development still needs a long way to go. With the decentralization of kindergartens and the unification of preschool education platforms, it is difficult for children's brands to build. Children's home-school co-APPs should be child-centered, accurately capture the pain points of parents, enhance the professionalism of product education, win the trust of parents and teachers, and ultimately be able to build a unified child care platform, which can bring a qualitative leap to the child care market.

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Research on Implementation of CSR Based on Coca-Cola Case Study

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Abstract: This essay began with the definition, development and classification of corporate social responsibility strategy, then Coca-Cola company was taken as a research object to evaluate the effectiveness of its CSR strategy through its response to different criticisms. Through such analysis on three key issues, it could be concluded that Coca-Cola water stewardship as an effective strategy helped the company to solve serious water criticism. However, in terms of the criticism of sugar use and packaging, the corresponding CSR strategies taken by the company failed to solve the problem effectively due to the lack of attention and incorrect focus.
Key words: CSR; Effectiveness; Three key issues; Strategy

1 Introduction

Over the years, because of the coming of the era of globalization, business competition is becoming more and more fierce, and the core competitiveness of enterprises has gradually transformed from the indicator of "hardware" such as machinery, equipment, and plant into a "software metrics" such as brand, company values, social responsibility, etc (Ambastha and Momaya, 2004). Therefore, many multinational companies are gradually realising the importance of corporate social responsibility (CSR).This essay will firstly analyse the meaning of CSR in a critical way. Then taking Coca-Cola as an example, the significance and effectiveness of CSR strategy will be evaluated through analysing the company's responses to three key issues which have been particularly criticised, and finally corresponding recommendations for improvement will be given.

Coca-Cola as a leading company in the industry has devoted itself into CSR to ensure the sustainable development of itself and the whole society as well, and the company uses the term of 'sustainability' in the the report for describing the CSR plan in the official website. The goal of the company is to establish a positive example for how to carry out more sustainable businesses worldwide through the joint efforts of Coca-Cola Company and nearly 250 bottled partners in more than 200 countries (Sustainability Report, 2016). However, in Coca-Cola's Sustainability Report (2016), there is no clear definition of CSR or introduction about 'What does CSR mean to the company?', also the company has not stated that how long they have worked on reporting sustainability.

2 Concepts and Research Status of CSR

Corporate Social Responsibility (CSR) represents a change in the direction of business operation from the interests for shareholders to the interests for the whole society. However, after decades of the research for CSR, there is still no universally accepted definition for it. CSR has been defined differently by different writers or entrepreneurs based on their personal perspective. Generally, CSR is regarded as a duty that enterprises should integrate social, environmental and economic issues into their operations, decisions, strategies, and culture, so as to create better practices within the company, and make the society become better (Blowfield and Murray, 2014). CSR is also known as some other terms, such as corporate accountability, corporate ethics, business sustainability, and so on. With CSR becoming increasingly related to business strategic practices, there is a trend to call it "responsible competitiveness" or "corporate sustainability".

Although there is no consensus as to how to define or implement CSR, main CSR theories and related approaches could be categorised to four groups - Instrumental Theories, Political Theories, Integrative Theories and Ethical Theories (Garriga and Melé, 2004). Firstly, Instrumental Theories regard the corporation as an instrument or a tool used to maximise profits, which has been seem as a sole responsibility for the corporate (Friedman, 1970). Some Instrumentalists claim that CSR is bad for business because it would increase costs and take profits away from shareholders, while the other branch of instrumentalist regards CSR as a way to find more profits. The second group is called Political Theories which emphasise the connection or relationship between the corporate and the society (Garriga and Melé, 2004). Corporate would think they should use business power to take responsibilities in the political environment, for example some companies would like to do something which is considered as

governments' duties, such as providing health services. In addition, Integrative theories insist that corporate should pursue long-term profits and success by integrating social demands into the business, which could help companies develop steadily (Garriga and Melé, 2004). In these theories, stakeholder management as one of the most important ways could help companies fulfill social demands. Ethical theories as the last group make the profits irrelevant to CSR, and ethical obligation is seen as the top consideration in the process of business operating.the main aim of these theories is to make the whole society become better with the company's development (Garriga and Melé, 2004). In this way, the relationship between business and society could be Strengthened.

Carroll as the representative of Integrative Theories put forward 'The Pyramid of CSR' as a useful and widely used tool to evaluate the performance of CSR. Carroll (1991) argues that four positions constitute the total CSR, they are economic, legal, ethical, and philanthropic. For the majority of enterprises, the latest situation is that all four aspects in CSR need their attention, and they should take effective measures corresponding to such four different parts to ensure validity of CSR.

In the real life, more and more companies put CSR in the crucial position of business operation because of its overall advantages. The most mentionable point is that the corporation could increase the reputation from implementing CSR strategy, which serves a dual purpose (Brammer et al, 2007)- Firstly, customers would want to buy more products or services because of the clear and positive image of the company. Secondly, other enterprises would be more willing to invest or cooperate with the corporation. Then in this way, companies could attract more customers, improve relations with other companies, and promote profits in long term.

However, the existence of CSR has been controversial for decades. For example, Friedman is a representative for opposite arguments of CSR, he believes that the sole responsibility of the company should be increasing profits for itself and shareholders, rather than being charged with "social responsibility" for the public or whole society, while the private capacity of shareholders could be seem as social responsibility (Friedman, 1970). Also there are some other arguments against CSR. Firstly, focusing most on CSR would affect the success of companies businesses in the marketplace, because CSR would waste lots of time and money. In addition, another idea is that it is the responsibility of the government to deal with social issues, not business (Aguinis and Glavas, 2012).

3 Introduction of Coca-Cola

Coca-Cola as a leading company in the industry has devoted itself into CSR to ensure the sustainable development of itself and the whole society as well, and the company uses the term of 'sustainability' in the the report for describing the CSR plan in the official website. The goal of the company is to establish a positive example for how to carry out more sustainable businesses worldwide through the joint efforts of Coca-Cola Company and nearly 250 bottled partners in more than 200 countries (Sustainability Report, 2016). However, in Coca-Cola's Sustainability Report (2016), there is no clear definition of CSR or introduction about 'What does CSR mean to the company?', also the company has not stated that how long they have worked on reporting sustainability.

The latest sustainability report of Coca-Cola will be taken in to see the company's efforts for sustainability. In the Sustainability Report 2016 of Coca-Cola, it presents seven different aspects in its sustainable plan, includes agricultural, climate, giving back, human rights, packaging, water and women. They could be categorised into three types, environment, human rights and donation.

In terms of environmental perspective, the company showed that they did much for the goal about more sustainable source for priority ingredients by 2020. Their goal on climate protection is to reduce Coca-Cola's carbon emissions by 25% by 2020, and the plan was half done in 2016 (Sustainability Report, 2016, p9). In addition, the company has been committed to avoiding waste in the life cycle of packaging. The Sustainability Report 2016 shows that 60% of Coca-Cola's bottled and canned beverages launched in the market were repackaged or recycled (p12). Then, the company has focused water stewardship efforts on the areas where they can have the greatest impact to protect water sources.

As for the part of human rights, Coca-Cola said that respect for human rights is a core component of their business and the basis for their ability to run a successful global enterprise (Sustainability Report, 2016, p11). The company uses the human rights policy and supplier guidelines as the basis for managing global business. On the other hand, 5by20 is a program designed by Coca-Colain 2010, which aims to enable more women with the economic empowerment.

When it comes to donation, the Coca-Cola claims that they have always had a strong tradition of giving back to the society. The Coca-Cola Foundation, launched in 1984, is a global philanthropic arm.

The Coca-C[1]ola Foundation awarded more than $900 million since 1984, and in 2016, the company donated 1.2 percent of the company's operating income, $106 million, into local communities (Sustainability Report, 2016, p10).

4 Main Implementations of CSR by Coca-cola

As a corporation with a history of more than 100 years and worldwide business, for a long time, Coca-cola has been striving to take root in community and achieve harmonious development among corporation, community and ecological environment. To be more specific, Coca-cola is making efforts to protect water resources, save energy, tackle climate changes, protect environment and health, promote prosperity and development of the community where it is located, innovate operation, take care of its employees, lead cooperation and mutual benefits of supply chain. The concept of corporate social responsibility has integrated into the daily operation and management of Coca-cola and influenced society and other stakeholders.

4.1 Water use

Coca-Cola has been criticised on their water use for long time, particularly their practices in India. In 1999, Coca-Cola had set up a bottling plant in Kala Dera, Rajasthan, which was consistent with the government's plan. The plan aimed to transform a backward rural area which completely dependent agriculture into a modern industrial center. As the company stated, setting up the plant also as an effort showed company's CSR vision and mission of benefiting the society.

However, after investing heavily in Kala Dera plant, the company faced resistance from the community, including some activists in 2004. Farmers began to launch a "water protest" on Coca-Cola, because after the Coca Cola Co was commissioned, they were faced with a serious drop in the water level (Chaklader and Gautam, 2013). According to the research done by Ananthakrishnan Aiyer (2007), such phenomenon made irrigating lands and sustaining crops become more and more difficult, which put local families at risk of losing livelihoods at that time. As a result, the verbal clashes and protests became increasingly serious in Kala Dera, even surrounding villages began to crusade against Coca-Cola for their unethical behaviour of overusing water source. Finally, Coca-Cola had to close down that plant in 2004 after the village council refused to renew the operating licence for the company in Kala Dera (Chilkoti, 2014).

After that, the company changed its CSR strategy in India, from solely supporting economy to protecting environment.From the research done by Chaklader and Gautam (2013) it can be seen that Coca-Cola India patiently heard feedback and opinions from all stakeholders and tried to communicate and cooperate with them rather than denying or shrinking responsibility. Coca-Cola India took several targeted actions for implementing the new strategy of sustainability to deal with challenges of water scarcity in Kala Dera. For example, it started a project to promote drip irrigation in Rajasthan. Coca-Cola helped the government of Rajasthan increase the subsidy offered to farmers for drip irrigation from 50 percent to almost 90 percent (Hills and Welford, 2005). Furthermore other a series of initiatives as a part of Coca-Cola India's water stewardship promote working with local communities.Also Coca-Cola has expanded the support of healthy watersheds and sustainable community programs to balance the water used in the process of producing beverages. Finally, the company has successfully decreased its water usage ratio by more than 25 percent from 2004 to 2009 (Coca-Cola, 2018).

According to CSR Pyramid (Carroll, 1991), such new strategy in India fulfilled the ethical responsibilities, doing right things to protect water and meeting the villagers' expectation for livelihood. All these initiatives helped Coca-Cola turn the negative situation where they had to close down the plant in Kala Dera (Chaklader and Gautam, 2013). According to the interview research conducted by Hills and Welford (2005), it shows that Coca-Cola India has enjoyed local favour as it successfully coped with the water issues in Kala Dera by its new CSR strategy, and those actions had boosted up the confidence level of the villagers towards the ethics of company and changed the perception about the company. Therefore, although the efforts on such issue spend the company about five years, at the end the company transformed the negative resistance into positive popularity through its CSR activities. Besides, as Coca-Cola announced, they have learned a great deal from such challenges happened in India, which has positively influenced the way they approach responsible water stewardship today, in

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[1] Sustainability Report. (2016). [Online], Available at: http://www.coca-colacompany.com/content/dam/journey /us/en/private/fileassets /pdf/2017/2016-sustainability-update/2016-Sustainability-Report-The-Coca-Cola-Company: df [Accessed 9 Mar. 2018].

India and even globally (Coca-Cola, 2016). For example, after that Coca-Cola established a global water stewardship strategy to initially protect water source around the world and avoid similar infamous issue.[1]

4.2 Sugar-added

About ten years ago, there were many questions about the side effects of sugar in Coca Cola. According to a report of Sunday Times, Coca-Cola contains a sugar substitute known as aspartame, which affects the brains of drinkers (Gard, 2015). In recent years, soda consumption is down amid anti-obesity campaigns and an overall trend toward health and wellness (Bernstein et al, 2012), and especially Coca-Cola as a biggest soda company has been criticized. Although the company earlier countered that aspartame was a safe and appropriate additive with low calorie content and its safety has been recognized by the U.S. food and drug administration, it is still being rejected by many healthy people. So enterprises have to adopt a series of corporate social responsibility strategies to reduce the side effects of sugar.

In order to cope with the health crisis caused by sugar, Coca-Cola claims that they are committed to providing people with a variety of product choices which uses clear product nutrition labeling and actively advocates healthy lifestyle (Sustainability Report, 2016). According to the investigation of Gertner and Rifkin (2018), the company has made a lot of effort for promote the nutrition of the product, including adopt a positive calorie label on the package, develop low-calorie and zero-calorie products, change the recipe of the product to reduce sugar addition, and more transparently open sponsorship money, as well as do not advertise children under the age of 12. For example, recently, Coca-Cola introduced Coca-Cola Zero Sugar, a new product taste and look more like the original Coca-Cola, but without sugar (Hepburn, 2016).

However, the latest research done by Cox (2009) shows that Company is still criticized for its sugary traditional products. It is worth mentioning that in Coca-Cola's Sustainability Report 2016, the company did not put the reducing sugar as one of the seven main aspects, so it could be seen that the company still does not regard reducing sugar content as the main target of sustainability. Thus, Coca-Cola's CSR strategy has not done much to reduce sugar, which makes the company remains mired in disputes over the health risks of sugary drinks. At the same time, CSPI has launched a lawsuit alleging that Coca-Cola misled consumers about the health risks by funding research that downplays the dangers of sugary beverages and spending billions of dollars on deceptive advertising that have enormous appeal to consumers (Spinet.org, 2017). Therefore, the CSR strategy has been widely questioned, whether Coca-Cola thinks it is better to reinvent itself as a new healthy brand than to spend money on new recipes of sugar-free coke.

4.3 Packaging

The third key issue for the beverage industry as a whole has been around packaging. Serious problems about climate change and landfill waste make product packaging become one of the factors for consumer choice. Though the influence of product formula has been the focus of consumer attention for a long time, it is increasingly argued that the waste produced by daily consumption will also have adverse effects on the environment, so recently the environmental consequences of packaging and the amount of household waste become a focus (Bone and Corey, 2000). Especially for food and beverage industry, Plastic packaging waste is the main reason of environmental impact. A shocking 5.35 trillion pieces of plastic fragments were floating in oceans, which would greatly affect marine animals, also fish would bring plastic waste into the food chain causing poisoning of more species, even including human beings (Tencati et al, 2016). Therefore, now a new element has come to the front of the packaging - environmental packaging.

In such background, for fulfilling customers' expectation and making contribution to the environment Coca-Cola has been working to find ways to avoid their packaging turning into waste and to optimise packaging efficiency. Also in response to this issue, Coca-Cola set long-term vision in the sustainability report to contribute meaningfully to the "circular economy", in which materials are used

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[1] BBC News. (2018). Coca-Cola unveils global recycling aims. [Online], Available at: http://www.bbc.co.uk/news/business -42746911 [Accessed 5 Mar. 2018].

Chilkoti, A. (2014). Water shortage shuts Coca-Cola plant in India. [Online], Available at: https://www.ft.com/content/16d888d4-f790-11e3-b2cf-00144feabdc0.[Accessed 26 Feb. 2018].

Statistic.(2018). Market share leading carbonated beverage companies worldwide. [Online],Available at: https://www.statista.com/statistics/387318/market-share-of-leading-carbonated-beverage-companies-worldwide/ [Accessed 27 Feb. 2018].

and reused to provide ongoing value (Underwood, 2003). In 2016, the company claimed in its Sustainability Report that they would focus on recycling as a core to ensure its environmental packaging. Coca-Cola has aimed to achieve the goal of recycling a bottle for every new Coke bottle, sold also the company set investing in recycling facilities around the world as one of its targets. (Sustainability Report, 2016).

However, although the company actively responded to claims on environmental packaging, some criticisms against Coca-Cola in the aspect of packaging has still appeared. For example, according to analysis by Greenpeace, last year Coca-Cola increased the production of plastic bottles by more than a billion, and fewer than half of them were collected for recycling and only 7% of those collected finally were turned into new bottles (BBC News, 2018). Instead, the research done by Greenpeace (2018) shows that most plastic bottles produced end up in landfill or in the ocean, which could lead to the negative consequences mentioned above. As a result, Coca-Cola was slammed for focusing on recycling, instead of making moves to decrease its use of single-serve plastic bottles (BBC News, 2018). Therefore, Coca-Cola still has a long way to go to show it is taking the plastics epidemic seriously.

5 The Assessment of The Role of CSR in Coca-cola

5.1 Properly execute social responsibility and improve economic benefits

When executing social responsibility, an enterprise will pay for the cost. As a result, it will be harmful to economic benefits in the short run. Nevertheless, after perfectly fulfilling environmental protection, human rights protection, social welfare, etc., it will find out that it will obtain larger benefits because in the process of executing social responsibility, this enterprise also reveals its sense of responsibility to society. In other words, products produced by an enterprise with a sense of responsibility will be accepted by more consumers, which can not only increase its competitive advantage in market share, but also bring benefits to this enterprise. It is one of the important reasons why Coca-cola can steadily occupy overseas market.

5.2 Strive to share interests with stakeholders

To implement social responsibility, Coca-cola needs to share interests with stakeholders at first. It shall surrender part of the profits to other stakeholders, share interests with other parties in cooperation and promote communication and corporate operating efficiency.

5.3 Pay attention to the implementation of environmental-protection responsibility

When implementing social responsibility, a food enterprise should put a special emphasis on environmental protection. Coca-cola has done a lot of work and made remarkable achievements on environmental protection. Food safety and development of food enterprises can't do without the protection from ecological environment. Therefore, food industry of China should consciously be responsible for improving food quality, realizing high-quality development and actively implementing environmental protection. In addition, it should establish a production and operation system synchronous to environmental protection, constantly increase investment in environmental protection funds, take the initiative in developing and producing green food so as to make contributions to environmental protection.

5.4 Abide by requirements raised by local governments for corporate social responsibility

The international standards of social responsibility are constantly improving and the awareness that enterprises must adhere to standards is also enhancing. As governments of various countries are accelerating the steps of social responsibility standardization, transnational corporations must also internalize external standards into their own standards. At the same time when comprehensively implementing social responsibility, Coca-cola has won trust from markets and governments of various countries by adapting to local conditions. For example, Coca-cola has adjusted modes of social responsibility implementing in accordance with laws and regulations of social responsibility formulated by governments of various countries. As a result, governments will adopt more liberal policies, give support, reduce limitation, provide tax preference, etc. to some extent for Coca-cola. Favorable operating environment helps [1]to advance corporate production and operation, reduce obstacles, promote sustainable development and improve value. On the contrary, if Coca-cola conducts illegal acts such as fraud, production from inferior raw materials, etc., even though Coca-cola's profits may be boosted due

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[1] Chilkoti, A. (2014). Water shortage shuts Coca-Cola plant in India. [Online], Available at: https://www.ft.com /content /16d888d4-f790-11e3-b2cf-00144feabdc0.[Accessed 26 Feb. 2018].

Coca-Cola.(2018). Our Business | Coca-Cola. [Online], Available at: http://www.coca-cola.co.uk/about-us/our-business [Accessed 9 Mar. 2018].

to decrease in operating cost in the short run, it will face massive fines and other punishments imposed by national governments. In short, even though Coca-cola may bear some costs in order to be responsible for governments, in the meanwhile, it also provides a stable and good external environment, promotes sustainable development and increases value for itself in the long run.

6 Conclusion

In response to the problem of Coca-Cola's CSR strategy, there are two main recommendations which could help the company improve the effectiveness of the strategy to solve criticisms. Firstly, Coca-Cola should put 'reducing sugar' as a main part of sustainability, because the health awareness of people would not decrease, focusing more on reducing sugar would retrieve consumers who are looking for other health drinks. On the other hand, Coca-Cola should try to decrease the use of single-serve plastic bottles rather than just focus on recylcling. In this way, relevant environmental pollution will be effectively mitigated, which would help the company defeat the criticism about they are not taking the plastics epidemic seriously.

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Economic Explanation of Customer Perceived Value[*]

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Abstract: The actual utility of the product represents the customer perceived value, and the ideal point represents the customer satisfaction value. Thus, the utility theory can reasonably explain the relationship between the customer's perceived value and the customer expected value and customer satisfaction. When the consumer is regarded as a whole, the purchase decision only depends on the two factors of price/quantity and the zero-sum game relationship with the producer. Applying the theory of consumer surplus, we can conclude that the greater perceived value of the customer, the greater the residual value of the consumer; no-difference curve theory can explain customer perceived value from the customer and the manufacturer perspective, but only provides a static combination of two influencing factors.
Key words: Customer perceived value; Utility; Consumer surplus; Indifference curve

1 Introduction

Value refers to the utility of the item, i.e. the value of the item, and the exchange value of the item that is exchanged with the consumer (Adam Smith, 1972). Value is the abstract human labor condensed in commodities, which can be measured by the socially necessary labor time in commodities (Marx & Engels, 1976). From a competitive perspective, value is the price which is a buyer is willing to pay for a product (Michael Porter, 2005) and is a consumer's assessment of the ability of the product to meet various needs (Philip Kotler, 2013). Many scholars at home and abroad believe that value is the perceived value, and perceived value is the subjective cognition and judgment of the perceived subject's value to the perceived object.

Customer perceived value is a trade-off between customer perceived performance and purchase cost (Michael Porter, 2005), derived from the benefits of the product and the cost of getting the product (Monroe & Krishnan, 2005; Wood &Scheer, 2006), equivalent to market-aware quality after corporate product price adjustment (Gale, 2003), is a customer-perceived evaluation of product or service attributes and their consumption experience (Woodruff, 2005), which is what customers perceive. The overall evaluation of the utility of a product or service after the profit it receives is based on the cost of obtaining the product or service (Zeithaml, 2008), which is functional, social, emotional, cognitive, and contextual. The combination (Sheth, 2001), according to different connotations and dimensions, can be divided into product value, service value, personnel value and image value (Philip Kotler, 2013), product value, use value, possession value and total value (Bruns, 2013), preceived acquisition value, transaction value, use value and redemption value (Parasuraman & Grewal, 2016), emotional value, social value, quality value Price value (Sweeney&Sautar, 2011), the value of utilitarianism, hedonism value (Chandon, 2000), or by the value of the real, the desire value (Woodruff & Flint, 2012). Foreign scholarsprovided a comprehensive model explaining the relationships among experience quality, hotel image, perceived value, and customer loyalty in the setting of boutique hotel（Ananda Sabil Husseinet al,2018），conceptualized perceived value,brand image and Islamic attributes to studies the relationship that exists in the industry(Nashrul Hakimi,et al.2018)，and acquired the influence of green perceived value and green perceived risk perceptions on the green products purchase intention(Titis Shinta Dhewi,et al..2018)

Foreign scholars' research on customer perceived value has formed a trade-off evaluation theory represented by Zeithaml and Woodruff and a multi-factor theory represented by Sheth. On the basis of absorbing and weighing the evaluation theory and multi-factor theory, domestic scholars have given formula definition: customer perceived value = F (functional value, emotional value, and social value) = F (customer perceived profit, customer perceived profit and loss) (Fan Xiucheng, 2013), or customer

perceived value = customer perceived utility ÷ customer perceived cost (i.e. the ratio of value experience and usage gains and losses) (Dong Dahai, 2015).

There are many definitions of customer perceived value at home and abroad, but in essence, the following consensus has been reached: customer perceived value is a kind of value provided by the enterprise to the customer; the value is perceived by the customer rather than the real value; the perceived value is ultimately determined by the customer rather than the enterprise, but the enterprisehas a significant impact on it; the perceived value is the trade-off between the perceived profit and the perceived cost. Through literature search, it is found that there are only 6 doctoral thesis on perceptual value and value perception research in the 18 years from 2001 to 2018, and less than 20 master's thesis. This fully shows that domestic research on customer perceived value has just begun, and is still in the stage of introduction, absorption, digestion and exploration.

Although customer perceived value is originated in psychology and applied to marketing, its theoretical explanation can be found in economics.

2 Utility Theory Explanation

As the name implies, the utility is effectiveness and function, and is a kind of psychological feeling and subjective experience of human beings. For the customer, the utility is the benefit or satisfaction obtained when consuming a product or service. The utility of the product is not only the physical property of the product itself that satisfies people's needs and desires (such as bread can fill the hunger, clothes can keep out the cold)), also depends on the consumer's own subjective feelings (i.e. customer perceived profit). Conceptually, customer perceived value includes not only perceived profit but utility, but also perceived profit and loss. If the "loss (ie cost)" and "expenditure (i.e. pay)" are included in the meaning of "utility", then the meaning of customer perceived value and utility is equal and equivalent. The utility theory can be used to explain how limited rational customers spend limited disposable income on a variety of goods or services that meet their needs.

When using utility theory to explain how customers choose products, the size of the consumer's utility is used as a criterion. The utility theory has three basic assumptions: (1) The various options available are interrelated. There is an alternative or complementary relationship between them; (2) consumers' preferences for optional goods are consistent and indifferent. That is, if the consumer has a preference for commodity A rather than B, then he cannot have the same preference for commodity B than A or for commodities A and B; (3) the consumer's preference for alternative commodities is transitive. That is, if the consumer's preference for commodity A is better than B and the preference for commodity B is better than C, then his preference for commodity A must be better than C. The ordinal utility theory assumes that the utility of different commodities can be compared and ranked, so that consumers can sort the preference of alternative commodities. The cardinal utility theory also assumes that the utility of a commodity can be calculated by a unit, summed up, and then the degree of satisfaction obtained by consuming a commodity can also be measured by the base utility unit. Although some economists believe that the theory of cardinal utility is not valid, because the nature of different commodities is different, there is no comparability, and its utility cannot be measured by the same unit, but the thought of ranking on ordinal utility of consumers according to the degree of preference of different commodities is acceptable. In fact, the three basic hypotheses and ordinal utility theories about utility are the theoretical basis of customer perceived value. The rational consumer purchasing decision is based on the perceived value of the customer; the empirical study on customer perceived value and quantitative analysis is based on the theory of cardinal utility theory, is the quantitative calculation and quantitative ranking of customer perceived value.

An important result of the study on utility theory is that the measurement of utility can be independent of the proportional or interval table tool in the theory of cardinal utility, making it feasible to conduct comparative research between customers: various options can be used with the help of multidimensional utility meters. The commodity is a point on the multidimensional scale and is assigned a value separately while maintaining the original preference ranking. The point on the scale that represents the customer's favorite item is called the "ideal point". The product represented by the ideal point may be one of the alternative items, or it may not be any of the alternative items, but is a kind of fictitious imaginary "ideal" commodity.

The concept of ideal point provides an analytical basis for using the utility meter to describe the consumer's consumption preferences, and is also a tool for explaining customer perceived value. The ideal point of a customer on the utility meter indicates the expected value of the customer's desire to

purchase the goods or services, is also the customer's desired value. The actual utility perceived by the customer after purchasing the goods or services is the perceived value of the customer. If the expected value of the goods or services purchased by the customer can be expected, that is, the customer expects the value to reach the desired utility level (i.e, the desired point reaches the ideal point); if the actual utility of the goods or services is lower than the utility level, i.e. customer perceived value is lower than the customer's expected value, the customer will be dissatisfied; if the expected value (ideal point) of the goods or services purchased by the customer is much lower than the expected ideal utility level (the ideal point), the utility of actual purchase or consumption of the goods/service is between the ideal point and the desired point, that is, the customer perceived value is greater than the customer's expected value, and the customer will be satisfied.
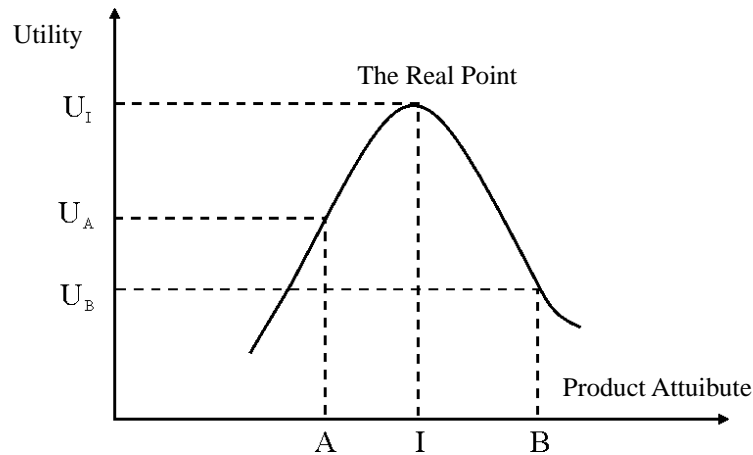
Figure 1   Utility Theory Explanation of Customer Perceived Value

The ideal point concept in utility theory can well explain the above relationship between customer perceived value, customer expectation value and customer satisfaction, but it also has the following limitations: (1) The consumption preference and customer perceived value reflected by the utility meter are based only on the product attributes itself, but do not take into account the customer's own background, personality and other customer's behavior; (2) use the ideal point to reflect the customer's expected value and the customer's perceived value, and use the gap between the two to represent the customer. The degree of preference for products is too simple and abstract, there needs further improvement and improvement.

3 Consumer Surplus Theory Explanation

Economic theory tells us that as consumed goods is more, the total utility received is accordingly increased, but the utility of each unit of commodity consumption is less than the utility of the previous unit of commodity consumption. that is, the marginal utility is diminishing. Then, rational consumers should arrange consumption expenditures in such a way that they obtain the maximum total utility from the purchased goods. At this time, the ratio of the marginal utility of each commodity to the price of its commodity is equal. In theory, every consumer is willing to pay the same price for the same commodity. However, the consumer will ultimately determine the price he is willing to pay based on his own perception of the value of the utility of the product, such that there is a difference between the price he is willing to pay and the price actually paid, which is the consumer surplus. Consumer surplus refers to the difference between the price that a consumer is willing to pay to purchase a good or service and the actual price paid. This indicator measures the extent to which consumers' needs are met after they purchase goods on the market. It exists because the actual price paid is determined by marginal utility rather than by total utility: the price that consumers pay for each unit of goods and the price of the last unit of purchased merchandise is equal, that is, the price is balanced. According to the law of diminishing marginal utility, the utility of previous units of goods is greater than the utility of the last unit of goods. Therefore, consumers have a certain amount of consumer surplus for each unit of goods previously purchased.

The price that the consumer is willing to pay is based on the value and utility perceived by the customer. Then, the consumer surplus is the difference between the perceived value of the consumer and

the actual price paid. Therefore, customer perceived value is also marginally decreasing. There is no doubt that the perceived value of the customer buying the first item is definitely not the same as the perceived value of the last item purchased. This will be described below with reference to Figure 2.
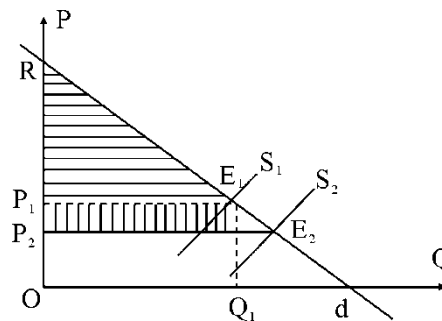
Figure 2   Customer perception value Consumer Surplus Theory Explanation

As can be seen from the figure, the greater the customer perceived value, the more the consumer surplus (because the actual payment price is certain). However, using consumer surplus theory to explain customer perceived value, we must explain the following three points: (1) It is very difficult to measure the consumer surplus of a single consumer, but collect each consumer as a whole, and then measure the overall consumption. The remainder is feasible. This point is useful for quantitative analysis of customer perceived value, but given the individual differentiation characteristics of customer perceived value and the different attributes of each product, quantitative analysis and empirical research in the general sense are not applicable; (2) consumer surplus theory does not cover all the factors in the process of consumer purchase and consumption, only including the two factors of commodity price and purchase quantity. In fact, the quality of goods, advertising, packaging, sales services and consumer's own interests, habits, preferences, background and other factors have a large impact on customer perceived value; (3) the increase in consumer surplus is the cost of producers' surplus reduction, that is, the negative correlation between the consumer surplus and the producer surplus is a trade-off, and the consumer and the producer are in a zero-sum game relationship. As can be seen from Figure 2, assuming that the supply curve moves from S1 to S2, the market equilibrium price will fall from P1 to P2, and the consumer surplus will increase from RP1E1 to RP2E2, and the increased shadow area of the consumer surplus is equal to the shadow area of the producer surplus. The zero-sum game relationship presented does not apply to customer perceived value and corporate perceived value, because the customer-to-business relationship is not one necessarily zero-sum game relationship, and there is no negative correlation between customer perceived value and corporate perceived value, may be a positive correlation. Because companies create and improve customer perceived value does not necessarily reduce their interests, it is likely to increase profits.

4 Indifference Curve Theory Explanation

The indifference curve refers only to the trajectory description of the various combinations of the two commodities that enable the consumer to achieve the same level of satisfaction. Each point on the indifference curve represents the total utility provided by the combination of different purchase quantities of two commodities, so it is also called the equivalent line, which is mainly used to analyze the consumer's choice of two commodities.

The indifference curve has three basic assumptions: (1) The consumer preference is complete, that is, the consumer can discharge the preferences of the different combinations of the two commodities in a certain order; (2)The consumer preferences are deductible, i.e. If consumer preference A is better than B and preference B is better than C, then he must prefer A to C (this is the same as hypothesis 3 of utility theory); (3)All goods are good, that is, consumers think all goods have no negative utility and are worth having, and the more the better.

In theory, it can be assumed that a person has an infinite number of indifference curves for two kinds of commodities, that is, an infinite number of invariant curves can be drawn on the same graph, and each indifference curve represents a certain total utility level and different product combinations. The indifference curve has the following characteristics: (1) The farther the indifference curve is from

the origin of the coordinate, the higher the total utility level is represented; (2) Any two indifference curves are impossible to intersect, or parallel, and the distance each other can be a variable; (3) The slope of the indifference curve is negative, that is, the marginal replacement rate of the two commodities is negative; (4) The marginal substitution rate decreases, that is, each indifference curve is convex Bending to the origin and inward.

As mentioned earlier, customer perceived value is the trade-off between customer perceived profit and customer perceived spending (profit and loss). Using the indifference curve theory to explain customer perceived value, the customer perceived profit score can be divided into two parts: the product perceived profit (Vp) and other perceived profit (Vs), and the customer perceived expenditure is divided into currency perceived expenditure (Cp) and non-currency perceived expenditure (Ct).In this way, an indifference curve can be used to reflect the combination of all product perceived profit (Vp) and other perceived gains (Vs) that bring the same level of satisfaction to the consumer (Figure 3), and another indifference curve to reflect the combination of all monetary perceived expenditures (Cp) and non-monetary perceived expenditures (Ct) in the equal consumer pay. (Figure 4).
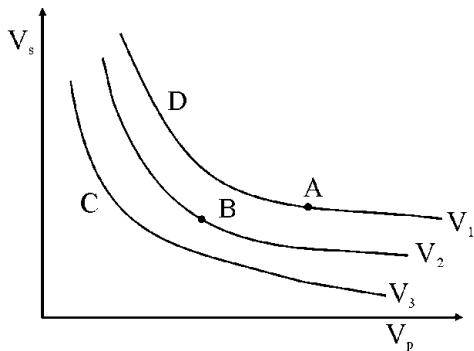
Figure 3   Perceived benefit indifference curve   Figure 4   Perceptual Expenditure Indifference curve
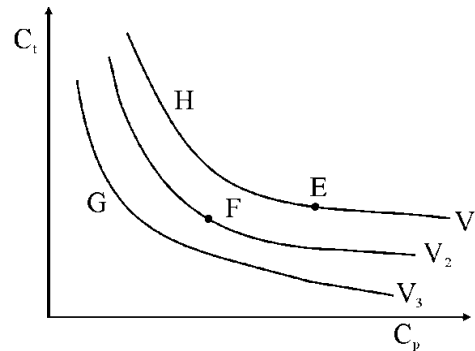
Figure 3 depicts three indifference curves for the perceived value of a customer's merchandise. It can be seen from the figure that the perceptual value on the same curve is the same; any perceptual value combination on curve V1 is higher than any perceptual value combination on curve V2; any perceptual value combination on curve V2 is also higher than any of the perceived value combinations on curve V3.

Figure4shows three indifference curves for monetury perceived expenditures and non-monetary perceived expenditures when a customer purchases an item. The three curves show that the customer perceived expenditure at point E is greater than the customer perceived expenditure at point F, the customer perceived expenditure at point G is less than the customer perceived expenditure at point F; and for point H and point E, the customer perceived expenditure is the same indifference curve.

Referring to Figure 3,Figure 4, and Figure 5 can be drawn to reflect the relationship between customer perceived profit and customer perceived expenditure. In Figure 5, the curve V is the customer perceived profit curve, the curves C1 and C2 are the customer perceived expenditure curves, and the intersection point E represents the customer perceived profit. Equal to customer perceived spending, is the perceived equilibrium point
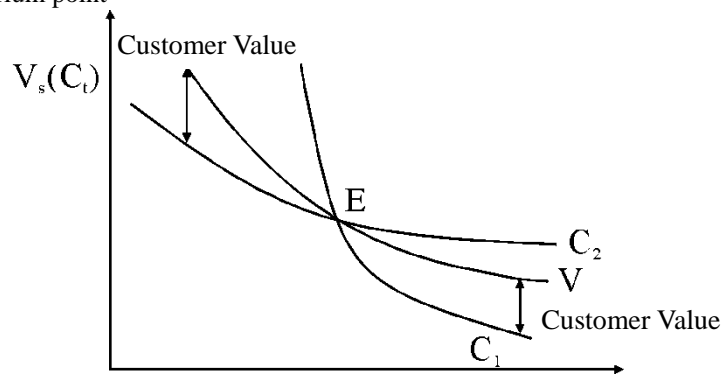
Figure 5   Relationship between Customer Perceived Profit and Customer Perceived Expenditure

As can be seen from Figure 5, when the customer perceived expenditure curve is C1, on the right side of point E, the customer's product perceived profit is relatively high, and other perceived profits are relatively low, at which time the customer perceived profit is greater than the customer perceived expenditure. Therefore, the perceived value of the customer is relatively high. At this time, the customer is more likely to generate the purchase behavior. On the left side of the E point, the customer's product perceived profit is relatively low, and other perceived profits are relatively high. At this time, the customer perceived profit is less than the customer perceived expenditure. Therefore, the perceived value of the customer is negative, and it is unlikely that the customer will make a purchase. When the customer perceived expenditure curve is C2, the opposite is true. On the left side of point E, the customer's product perceived profit is relatively high, other perceived profits are relatively low, and customer perceived profit is greater than customer perceived spending. Therefore, the perceived value of the customer is relatively high. At this time, the customer is more likely to generate the purchase behavior. On the right side of the E point, the customer's product perceived profit is relatively low, the other perceived profit is relatively high, and the customer perceived profit is lower than the customer perceived expenditure. Therefore, the perceived value of the customer is negative, and the possibility that the customer generates the purchase behavior is small at this time.

It is worth mentioning that, assuming that the customer perceived benefit curve and the customer perceived expenditure curve completely coincide, the customer perceived value is always zero. This is a very special situation which is almost impossible in reality.

The above is the description and interpretation of customer perceived value using the indifference curve theory from the customer's perspective. Next, the ability line based on the enterprise perspective is introduced into the indifference curve. Vendor capability refers to the ability of a manufacturer to create value and provide value for customers. A capability line such as a manufacturer refers to different combinations of factors that provide the maximum customer perceived value in the case of a manufacturer's ability. Then, under the condition that the ability of the enterprise to create value for customers and provide value, how can the customer's perceived value elements be combined to make the customer's perceived value the most? As shown in Fig. 6, the capability line AB of the manufacturer is tangent to the indifference curve V2, and the combination of the two perceptual value elements represented by the tangent point E provides the customer with the maximum perceived value under the established conditions of the manufacturer's ability, and the customers provided by other combinations. The perceived value level must be lower than the perceived value of the customer represented by point E. AB intersects with the indifference curve V3 at point C. According to the law of no difference curve, the higher the total utility level from the origin, the higher the customer's perceived value level is lower than the E point, and the utility is greater than the indifference curve of V2. V1 is located outside the V2, away from the origin, and it is impossible to intersect with the capability line AB such as the manufacturer. Therefore, among all the combinations of value elements, the customer point value represented by point E is the largest, which is the equilibrium point.

The indifference curve can be used to analyze and explain the customer's preference for different perceived profit factors and different perceived expenditure factors. Using the capability line such as the manufacturer, it is also possible to propose a value combination proposal for providing the maximum customer perceived value. However, due to the dynamic and individualized value of customer perceived value, the assumptions of the indifference curve are not necessarily true in reality, and the influencing factors of customer perceived value are far more than two, while the indifference curve only provides a combination of two factors. These all lead to a significant reduction in the explanatory power of the indifference curve. Most importantly, the application of indifference curve analysis and interpretation of customer perceived value must first analyze the factors that influence customer perceived value. Therefore, the use of indifference curve theory to explain customer perceived value has certain limitations.
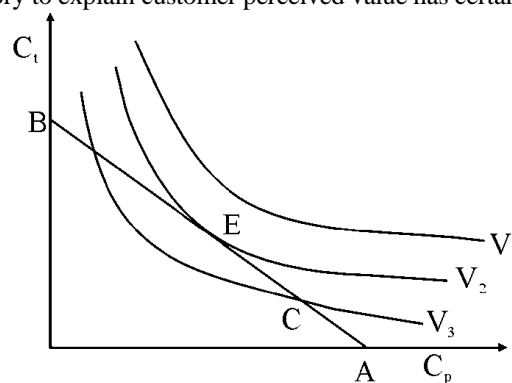
Figure 6   Interpretation of the Indifference Curve of Customer Perceived Value

4 Conclusion

Through the above analysis, the following conclusions can be drawn:

(1) Replace "customer perceived value" with "product actual utility" and "customer satisfaction value" with "ideal point". In this way, utility theory can reasonably explain the relationship between customer perceived value, customer expectation value and customer satisfaction. ;

(2) Under the assumption that the consumer is regarded as a whole, the purchase decision only considers the price/quantity factor, the customer and the producer is a zero-sum game relationship, the application of the consumer surplus theory can be known: the greater the perceived value of the customer, the greater value of the residual consumption;

(3) The indifference curve can analyze and explain the customer's preference for different perceived profit factors and different perceived expenditure factors, and can also propose to the enterprise the value combination proposal to provide the maximum customer perceived value, but only provide two influencing factors satatic combination.

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A Comparative Study on the Competitiveness among Japanese, American, German and Chinese Automobile Brands in Chinese Market

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Abstract: Brand competition has become an effective means of competition among enterprises in the environment of modern market competition. Based on defining the connotation of brand competitiveness and the key indicators of automobile brand competitiveness, this paper takes Japanese, American, German and Chinese automobile brands as the research object, analyzes the development status of China's automobile market and the market performance of American, German and Chinese automobile brands. From the perspectives of brand marketing ability, brand value and consumer perception of brand, this paper makes a comparative analysis on the competitiveness of four countries' automobile brands in Chinese market, which aims to offer a reference for automobile brands in different countries to identify their advantages and disadvantages, and finally strengthen their competitiveness.
Key words: Chinese market; Japanese; American; German and chinese; Automobile brands; Competitiveness

1 Introduction

Brand competition has become an effective means of competition among enterprises in the environment of modern market competition. From the development experience of major automobile manufacturing countries in the world, to obtain brand-centered competence is the only way for a big automobile country to become powerful. It is also the key to meet demands of the global automotive market and enhance the international competitiveness of enterprises. With the development of economic globalization and the acceleration of China's opening to the world, lots of automobile brands from all over the world have been flooding into China. After more than a decade of rapid growth, however, China's automobile market is going through a period of slow growth. The competition among automobile brands of various countries is very fierce. In Chinese automobile market, what about the market performance of each automobile brand? What are the advantages and disadvantages of different automobile brands in the fierce competition, and how to improve their competitiveness? Those are very important issues of concern for automakers all over the world.

2 Automobile Brand Competitiveness Definition and Its Elements

2.1 The connotation and elements of brand competitiveness

As for the concept of brand competitiveness, scholars at home and abroad have achieved fruitful research from different perspectives. Some scholars thought that brand competitiveness was the ability of enterprises to build strong brands and support the sustainable development of brands in a certain market environment. The main factors that constitute the brand competitiveness were brand awareness, loyalty, consumer perception, brand association, brand relations, etc. (Aaker, 2004; Keller,1998). The brand value came from its value to customers, that is, the so-called brand equity based on customers, the brand represented the seller's consistent commitment of product features, benefits and services delivered to the buyer (Philip Kotler, 2002). Best brand was the guarantee of quality, and the essence of the brand was the intangible contract between enterprises and consumers, the competitiveness of a brand depended on its market share of comparative advantage and certain premium capacity. The brand competitiveness was reflected by the aspects of quality, image, personality and service. (Zhang Shixian, 1996). The brand competitiveness was the ability to occupy the market, gain dynamic competitive advantage and obtain long-term profits by its particularity or advantages which could not be easily imitated by competitors (Wang Yonggui et, al., 2002). Some scholars studied the brand competitiveness from the view of customer-based brand value, they thought that brands generating competitive brand equity will gain market share, relative to the competition (Hume Winzar, Chris Baumann, Wujin Chu, 2018); Brand competitiveness is a brand's possession of competitive advantage. Competition is a market condition, whereas competitiveness is about the ability to create competitive advantage (Baumann et al., 2017).

To sum up, although different scholars have not reached an agreement on the definition and elements of brand competitiveness, they generally believe that: (1) Brand competitiveness is a kind of comparative ability, which is the ability of a brand to participate in market competition and to gain market share, dynamic competitive advantages and long-term profits; (2) Brand competitiveness is a kind of comprehensive ability, which is the result of multiple factors and can be measured by some explicit indicators; (3) Brand competitiveness is an ability of sustainable development. Its essence lies in the commitment of the brand to customers and the value brought by consumers. It maintains a long-term and stable interaction relationship with customers. Based on above, this paper put forward that brand competitiveness is a unique ability formed by an enterprise through the effective allocation and use of resources, which is different from or going beyond other competitors. It is a comparative ability of brand marketing, brand value and overall image which comes from consumers' cognition, feeling, attitude and experience of brand products and service.

2.2 The key indicators of automobile brand competitiveness

Automobile brand competitiveness is the ability of comparative advantage, it can be reflected by the brand market ability, brand value and consumers' comprehensive evaluation of automobile brand product attributes and brand value image. So the competitive advantage of automobile brand can be measured and compared from three aspects: brand market ability, brand value and consumer perception. Among them, brand market ability is the external and explicit market performance of brand competitiveness, it directly reflects the ability of the brand to expand market, occupy market and gain profits. It can be evaluated by market share, sales volume and profit. Brand value is the specific embodiment of brand competitiveness, reflecting various resources investment and the development potential of the brand so as to maintain and improve the market position and gain competitive advantage. Brand value is also the main indicator of marketing performance, and it is the result of the comprehensive effect of various marketing techniques and marketing methods (Yu Mingyang, Yang Fangping, 2009). Consumer perception mainly reflects the value perception of the brand and the interaction between business and consumer, it can be evaluated by the value of consumer perception of some important properties of automobile products, such as safety, quality, value (cost-effective), performance, design, style, technology innovation and environmental protection, etc., and brand image, such as brand awareness, brand familiarity, brand reputation, brand satisfaction and brand loyalty.

3 The Market Performance of Japanese, American, Germany and Chinese Automobile Brands

3.1 The growth of automobile sales in Chinese market

In the year of 2017, the annual production and sales volume of China's automobile market reached 29,015,400 and 288,789 vehicles respectively. It had ranked the first in global automobile sales for nine executive years. In terms of sales volume for passenger cars, annual sales in China increased from 4.97 million in 2008 to 23.1 million in 2017, with an average growth rate of 36.5% (as Figure 1). In general, China's automobile market has developed rapidly in the past decade, and the market competition is very fierce. The passenger car market begins to differentiate, and the consumption of luxury cars has been increasing rapidly.
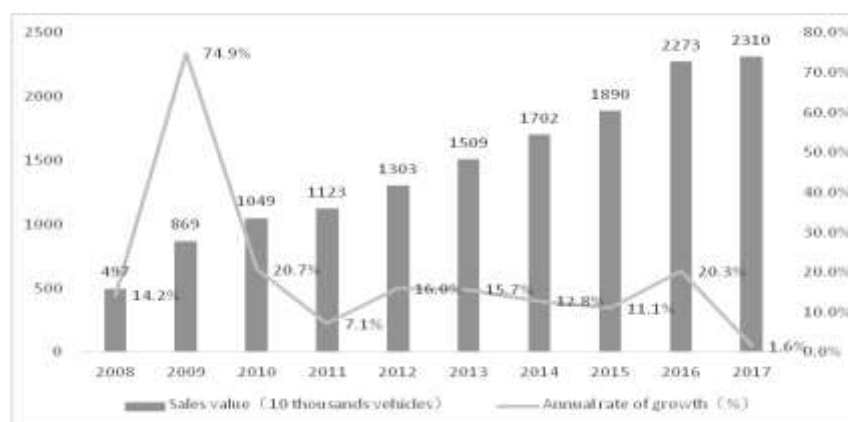
Figure 1   The Sales Volume of Passenger Cars in China's Auto Market from 2008 to 2017
Note: the number of cross passenger vehicles is not included here.

3.2 The proportion of Chinese and foreign automobile brands sold in Chinese market

With the opening of China's automobile market, foreign automobile brands have poured into Chinese market. The sales volume of Chinese automobile brands are significantly lower than those of foreign brands during the period of 2013-2017, and it was less than half as many as foreign brands during the period of 2013-2015. But in general, the rise of sales volume of Chinese automobile brands is increasing year by year. From the year of 2013 to 2017, the proportion of Chinese and foreign automobile brand sales is shown as Table 1.

Table 1　The Proportion of Chinese and Foreign Automobile Brand Sales from 2013 to 2017

Year Proportion of automobile brand sales	2013	2014	2015	2016	2017
Chinese automobile brand	25.1%	24.6%	29%	33.8%	36.4%
Foreign automobile brand	74.9%	75.4%	71%	66.2%	63.6%

Note: the number of cross passenger vehicles is not included.

3.3 A comparison of the "sales leads" of Japanese, American, Germany and Chinese automobile brands in Chinese market

"Sales leads" is the number of items that can reflect consumers' intention to buy a car, which is counted by the telephone system of "Automobile Home" and other channels. Sales clue is a measure index closely related to the last step when users order and purchase, which has significant value for forecasting the market development trend. During the period of 2014 to 2017, compared with German, Japanese and American, Chinese automobile brands have an absolute advantage in the proportion of sales leads, which is generally on the rise. The sales leads of German automobile brands occupy the second place, Japanese and American automobile brands are in the third and fourth place. The automobile brand sales leads in Chinese market are as shown in figure 2. The data show that Chinese automobile brands have a higher degree of enthusiasm for car purchase, and the growth trend is year by year. Compared with the purchase enthusiasm of American, Japanese and German, Chinese automobile brands have stronger market advantages than others.
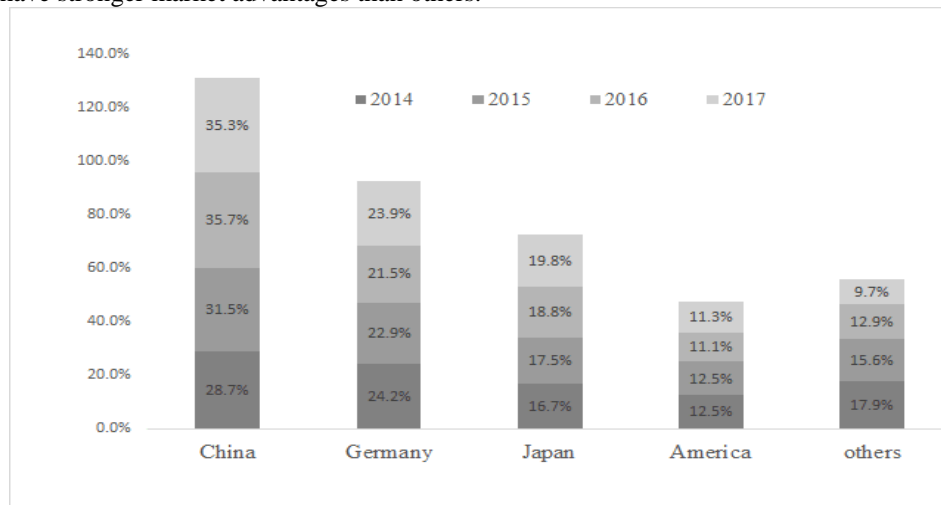
Figure 2　The Proportion of Four Countries' Automobile Brand Sales Leads from 2014 to 2017

4 A comparative Analysis on the Competitiveness of Automobile Brands in China's Market

4.1 A comparison of the market ability of automobile brands among four countries

(1)A comparison of the sales volume of automobile brands in different country

Brand sales volume is an important indicator to reflect the profitability and market performance of enterprise brands. According to the performance of the passenger car market, the growth rate of China's passenger car brand sales was reached as high as 50.2% during the period of 2013-2017, the volume is rising from 7.222 million vehicles in 2013 to 10,8467 million vehicles in 2017. The sales volume of China's passenger car brand kept on the first, and then followed by Germany, Japanese and American automobile brands. The passenger car sales in four countries continued to rise year by year, which is

shown in figure 3. It can be seen from the figure in the Chinese market, compared with Germany, American and Japanese automobile brands, the overall sales of Chinese automobile brands had maintained a steady growth, and the sales volume had an absolute advantage. However, that doesn't mean it's more profitable. Because the price of China's automobile brand is lower than the price of Germany, Japan and American, and the purchase power of most Chinese consumers are relatively limited, lots of Chinese are more inclined to choose Chinese automobile brands.
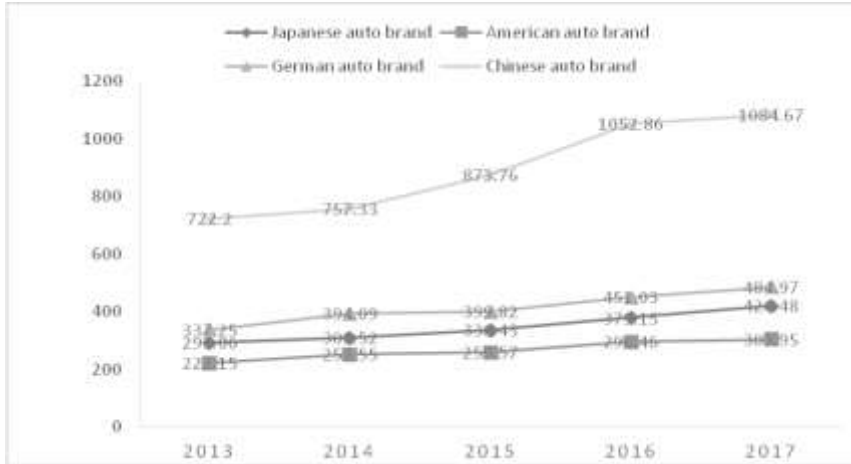
Figure 3   The Sales Volume of Passenger Car for Four Countries from 2013 to 2017 (units: 10 thousand vehicles)

（2）A comparison of market share of automobile brands of four countries

To a large extent, brand market share reflects the competitive position and brand competitiveness of enterprises, which is an important index that enterprises pay close attention to. During the year of 2013 to 2017, the market share of Chinese, German, Japanese and American brands remained unchanged, they ranked first, second, third and fourth respectively. Chinese automobile brands had the largest market share and kept the fastest growth in the world. The market share of passenger cars in China and other countries in the last five years was shown as figure 4.
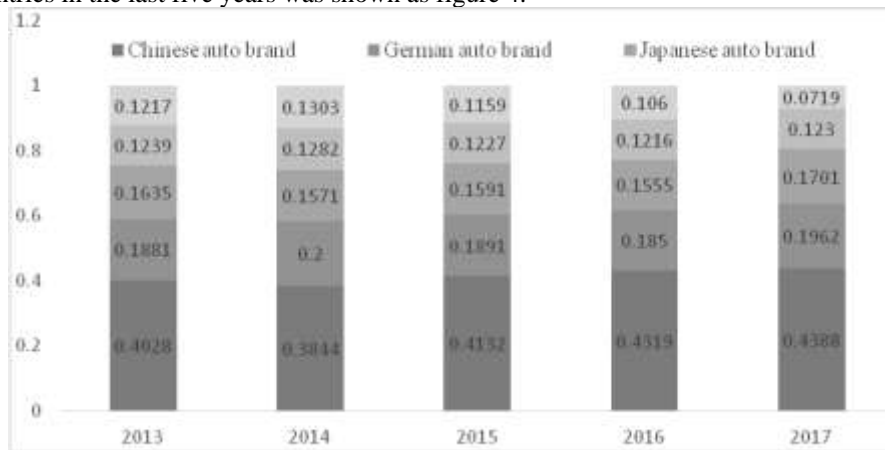
Figure 4   The Market Share of Passenger Car for Four Countries in Chinese Market from 2013 to 2017

4.2 Comparisons of the value of different automobile brands among four countries

According to the automotive brand ranking data in 2016 released by Consumer Reports, which is the leading automotive market research agency in America, there were 10, 9 and 6 auto brands of Japanese, American and Germany respectively ranked in the top 30 most valuable brands in automotive brand ranking list. Audi, a German car brand, came first, followed by Subaru, a Japanese car brand, and Lexus. However, Chinese car brands did not appear on the list. In addition, according to the global automotive brand value ranking for 2017-2018 released by Rand Finance in the UK, the top ten automobile brands are occupied by German, Japanese and American companies .In 2018, the number of TOP10 automobile companies of German, Japanese, American and Chinese is 5,3,2, and 0 respectively;

and the number of TOP50 is 7, 11,10 and 5 respectively; and the number of TOP100 is 7,14,17 and 22 respectively. It can be seen that Chinese automobile brands have some market advantages in China, however, the overall brand value is low. However, we are pleased to find that the number of Chinese companies entering the top 100 increased from 18 to 22 in 2018, which shows that the brand competitiveness of Chinese automobile enterprises is strengthening gradually.

4.3 A comparison of Chinese consumers' perception of four countries' automobile brands

(1)Data collection. Taking Chinese consumers as the respondents, this paper conducts an expert interview on brand image of different automobile brands from the perspective of consumers' perception. The important attributes of consumers' perception of automobile brand products and important indicators to measure automobile brand image were determined, and questionnaire design, questionnaire pre-survey and formal investigation had been done. The questionnaire was distributed to consumers in the form of E-mail and website, the official website of questionnaire star was used for the investigation. After one month survey, we collected a total of 396 valid questionnaires.

(2)Sample characteristics. In this survey, 210 males and 186 females accounted for 53.03% and 46.97% of the total sample respectively. The sex ratio of the survey is reasonably distributed. From the view of age distribution, the sample size for age under 22 years is 45, accounting for 11.36% of the total sample; the sample size for age of 23-35 is 248, accounting for 62.63% of the total sample; the sample size for age of 36-50 is 87, accounting for 21.97% of the total sample, and the sample size for age over 50 is 16, accounting for 4.04% of the total sample. From the view of education, there are 20 people in high school and below, accounting for 5.05%; there are 55 people in university or college, accounting for 13.89%; there are 237 people are undergraduate degree, accounting for 59.85%; and 84 people have graduate degree, which account for 21.21%. In a word, the sample proportion distribution is reasonable.

(3)Statistics and analysis.

①A comparison of value perception of automobile brands of four countries. For automobile products, safety, quality, value, performance, design style, technological innovation and environmental protection are not only important brand's attributes, but also important indicators of consumer perception. According to the evaluation of various brand attributes (we assumed the total score is 5) and statistical analysis of questionnaire, Chinese consumers' evaluation of various attributes of Japanese, American, German and Chinese automobile brands are shown in table 2.

Table 2   Chinese Consumers' Evaluation of Various Attributes of Automobile Brands

	Safety	Quality	Price	Performance	Design style	Technological innovation	Environmental protection	Mean value
Japanese	3.39	3.62	3.59	3.74	3.62	3.71	3.66	3.61
American	3.89	3.78	3.4	3.75	3.66	3.75	3.51	3.68
German	4.27	4.16	3.48	4.1	3.88	4.03	3.74	3.95
Chinese	3.5	3.31	3.9	3.37	3.36	3.21	3.29	3.42

In general, in terms of safety, quality, performance, design style, technological innovation and environmental protection, German automobile brands ranked the first, Chinese automobile brands lead the first in value (cost-effective), but lag behind in other attributes. Japanese and American automobile brands have their own advantages in various attributes, but they all lag behind German automobile brands. For Japanese brands, the main disadvantage is safety, while in other aspects, they are similar to American. Chinese consumers have a high value perception of German automobile brands, and then followed by American and Japanese brands, while the perception of Chinese brands is relatively at a disadvantage situation.

②A comparison of automobile brands image among four countries. Brand image can be generally measured by indicators like brand awareness, familiarity, reputation, satisfaction and loyalty. According to the survey, it is shown that the Japanese brand awareness is 9.9%, American auto brand awareness is 6.6%, German auto brand awareness is 77.89%, Chinese auto brand awareness is 5.61%. It can be seen that German automobile brands have the leading place in the Chinese market, and then followed by Japanese, American and Chinese.

In terms of brand familiarity and reputation, 5 automobile brands were selected from each country. And there are 20 brands of four countries totally, which were randomly placed in the questionnaire item. The respondents were required to choose the automobile brands that they are familiar with and prefer to, and the number of their choices is no more than four. According to the statistics, the cumulative numbers

of Japanese, American, German and Chinese brands that consumers were familiar with in all samples are 297, 251, 739 and 188 respectively. The average familiarity of automobile brands in each country takes up 15%, 12.7%, 37.3% and 9.5%; the cumulative numbers of Japanese, American, German and Chinese brands that consumers prefer to in all samples are 224,210,722 and 92 respectively. The average reputation of automobile brands in each country are 11.3%，10.6%，36.5% and 4.7%. Obviously, the German automobile brand won the best brand familiarity and best reputation remarks, however, the Chinese automobile brands had the lowest ones. Japanese and American brands ranked second and third respectively.

In terms of brand satisfaction and loyalty, this paper uses NPS (Net Promoter Score) to reflect consumers' loyalty to automobile brands and purchase intention. According to the calculation formula of NPS=(number of recommenders/total sample size) * 100%-(number of derogators/total sample size) * 100%, the NPS of automobile brands for four countries can be calculated. Among them, those with evaluation scores of 9 and 10 belong to the recommender, those with 7 to 8 belong to the passive, and those with 0 to 6 belong to the derogatory. According to the calculation, the NPS of Japanese, American and Chinese automobile brands are all negative, while the NPS of German automobile brand is 17.68%. The result shows that in Chinese automobile market, consumers have the highest loyalty and purchase intention to German automobile brands, but they have low brand loyalty to Japanese, American and Chinese cars. To some extent, it reflects the advantages of German automobile brands, and it will maintain a good developing trend and sustainable profitability at present and in the future. On the other hand, it also shows that Chinese consumers are picky, and it will be still difficult for Japanese, American and German car brands to maintain consumers' high satisfaction and loyalty.

5 Conclusion

In recent years, China's automobile market grows very fast, and the international automotive brands have entered the Chinese market. Although this gives Chinese consumers more choices, it also undoubtedly intensifies market competition. Based on the research above, we can find out：Firstly, from the perspective of brand marketing ability, Chinese automobile brands have more competitive advantages, and their sales volume and market share are much higher than those of Japanese, American and German automobile brands. The survey indicates that with the growing strength of Chinese automobile brands, Chinese consumers are more in favor of domestic automobile brands these years. Secondly, from the perspective of brand value, China's automobile brand value lags far behind those of Japanese and Germany brands; the foundation of enterprise brand competitiveness, resources investment and brand development potential ability need to be strengthened and improved. Finally, from the perspective of consumers' perception of automobile brand value, although Chinese automobile brands have advantages in value, they lag behind German, Japanese and American brands in safety, quality, performance, design style, technological innovation and environmental protection. In terms of automobile brand image, the overall evaluation of Chinese automobile brands is not high, which still lags behind American, Japanese and German brands.

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Factors Contributing to Transformation Process in Kenya's Manufacturing Sector

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Abstract: Kenya's manufacturing sector provides a clear footing in industrialization advancement. However, the sector is faced with challenges in its efforts to build a competitive manufacturing base as well as cultivating business and industrial environs. Therefore, the paper intends to ascertain factors contributing to manufacturing sector transformation process and its position in Kenya's economic growth. We analyze annual data for the period 1975-2017. The findings of this study using time series regression analysis confirms that new investments by manufacturing sector to credit issuance by financial institutions and commercial banks ratio, labor involvement to output to manufacturing output ratio, value addition output to manufacturing output ratio positively contributes to transformation of Kenya's manufacturing sector and Economic Growth. The study also reveals that lack of political good will during election period does affect manufacturing sector operations. The study recommends manufacturing sector to embrace innovation concept and technological advancements for betterment of operational efficiency and effectiveness.
Key words: Manufacturing sector; Transformation; Kenya; Economic growth

1 Introduction

Manufacturing Sector is very essential in industrial revolution and growth for any given economy. Transformation has not been easy for manufacturing firms in developing countries (Marival Segarra-Oña et al., 2016; Navas Antonio, 2014; Beckmann B. et al., 2016) due to lack of capability to innovate and adopt technological advancements. The world economy at large has been influenced by competition at both national and international level whereby each firm tends to fight for a better position (Jacob Chege et al., 2016; Reischauer G., 2018).

The growth and structure of manufacturing sector has not provided even level playing field for its investors due to unrealistic policies (Odhiambo Walter, 1991; Rioba Martin E. 2013; Yash Mehta, A. John Rajan, 2017). However, facts provided by Kenya National Bureau of Statistics (KNBS) have showed how the manufacturing sectorial activities contribute to Kenya's Gross Domestic Product. In 2017, there was a tremendous deceleration on industrial contribution to GDP; hence service-oriented sectors seemed to contribute more to Kenya's overall economic growth. For the manufacturing sector to be revived and become main contributor of economy, strategies towards long-term sustainability are vital.

According to Kenya National Bureau of Statistics report Kenya has witnessed varied performance in the manufacturing sector which is largely associated to lack of total commitment and proper resources allocation towards industrial development (Rioba Martin E., 2014; Aaron Atteridge, Nina Weitz, 2017). Navas Antonio argued that market competition for manufactured products do dictate transformations in manufacturing firms that depend on innovation (Schumpeter, 1934; Helena Forsman, 2011; Heredia Pérez et al., 2018). Mendi P., Mudida R. highlighted how past informalities affect innovation in Kenya's firms which still proves a major challenge for firms transforming from informal to formal classification. Mendi P., Mudida R. research failed to put more weight on fund availability as an enabler of innovation implementation in firms while (Rioba Martin E., 2013; Jacob Chege, 2016) found out how unfriendly Kenya's reform policies towards manufacturing sector transformation were.

It is therefore evident that past studies have given emphasis on innovation concept and policy implementation in manufacturing firms excluding attention towards manufacturing sector new investments, manufacturing productivity, value addition, mode of financing and labour productivity regardless of political situation. With inclusion of innovation and technological advancements, the study aims at ascertaining the factors leading to major transformations in Kenya's manufacturing sector since independence before and after multi-party democratic system of governance.

2 Manufacturing Sector Developments

Agricultural activities are considered to be main contributors of GDP for Least Developing

Countries (LDCs). In Kenya, agricultural sector is the number one contributor of country's GDP (KNBS, 2018) but is currently faced with challenges, such as, global warming leading to adverse climate change, natural calamities and bio-diversity loss.

To exit low-income status, manufacturing sector development is considered to be a likely alternative (Olamide Oguntonye, Steve Evans, 2017).

Innovation concept cannot be ignored, if sectorial development in LDCs is to be achieved (J. J. Wakeford et al., 2017; Ueasangkomsate P., Jankkot A., 2017; Beckmann B. et al., 2016; Mendi P., Mudida R., 2017). Through innovated systems, competition at firm, sector, national, and international levels is boosted. It is through innovation that manufacturing firms are able to do away with traditional methods or processes of production by embracing science, technology and creativity (Helena Forsman, 2011; Heredia Pérez et al., 2018).

Proper resource allocation is also of significance in manufacturing development through optimal input allocation (Zhang Xun et al., 2017; W-C. Lee, S-S. Wang, 2017) hence, increased output, reduced waste reduction and increased efficiency in production (Konstantinos Salonitis, Christos Tsinopoulos, 2016). Infrastructural development especially capital investments, technological advancements, state-of-the-art equipment, skilled labour and R&D need to be given priority through allocation of necessary funding towards their successful implementation (Ueasangkomsate P., Jankkot A., 2017; Yash Mehta, A. John Rajan, 2017).

Political goodwill is another aspect that cannot be ignored. Corruption in LDCs is one major challenge towards realization of industrialization through manufacturing development (Mijiyawa A. G., 2017). LDCs' governments and democratic processes should provide favourable manufacturing environment by supporting right policies and discouraging slow and tedious bureaucracies (Navas Antonio, 2014).

Last but not least, financial structures are crucial in manufacturing development. Financial institutions and commercial banks play key role in ensuring credit is allocated to most industrious manufacturing firms. Also, it is ideal to financially support Small and Medium Enterprises (SMEs) in the manufacturing sectors (Hoxha Indrit, 2013) that are characterized by weak R&D and incapacity to innovate (Helena Forsman, 2011). Findings have proved how degree of competition in banking sector does have an impact on external financing towards manufacturing sector whereby, industrialized countries are largely dominated by monopolistic banking competition. (Munacinga Simatele, 2015).

Therefore, agenda by Kenya government to revitalize of the manufacturing sector is ambitious priority towards industrial development, job creation for youth as well as boosting of local and overseas market accessibility for its products (KNBS, 2018). It is evident from the literature review above that with proper resource allocation, labour productivity, implementation of innovation towards value addition, availability of external financing and presence of political good do play part in various transformations in manufacturing sector.

3 Econometric Modeling

The research model is based on Ordinary Least Square Principle (OLSP) in efforts to determine effects of manufacturing transformation on economic growth using Eviews10. Secondary data for dependent, independent and control variables was from KNBS for the years between 1975 and 2017. The model specification is based on the function below;

$$EG=F(IF, LQ, VQ, P) \tag{1}$$

The estimation time series linear equation; econometric model is then written as follows;

$$EG=\beta_0+\beta_1 IF+\beta_2 LQ+\beta_3 VQ+\beta_4 P+\varepsilon \tag{2}$$

Where, Measure for economic growth (EG) is the dependent variable represented by real GDP growth rate while independent variables are; new investments by manufacturing sector to credit issuance by financial institutions and commercial banks ratio (IF), labour involvement to output to manufacturing output ratio (LQ), value addition output to manufacturing output ratio (VQ) and political good will (P) is a dummy variable used to capture election and campaign period during the study period. ε is the error term. β_0, β_1, β_2, β_3 and β_4 are OLS estimators.

In dealing with data deviations due to changes in respect to time, logarithms are introduced to equation 2.

$$LogEG=\beta_0+\beta_1 logIF+\beta_2 logLQ+\beta_3 logVQ+\beta_4 P+\varepsilon \tag{3}$$

The OLS estimators are expected to give desired properties; Best Linear Unbiased Estimators (BLUE), consistent, normal distribution of residuals among other time series properties for the variables.

4 Statistical Results

The empirical analysis commenced by conducting unit root tests through Augmented Dickey-Fuller (ADF) test that confirmed that all variables except EG and P were stationary after first differencing. By comparing Test Statistic Value (TSV) and Test Critical Value (TCV) for each variable as shown in Table 1 at 5% significance level, inferences for Unit Root Test are also indicated.

Table 1   Stationary Test through ADF

Variables	Test for Unit Root	Include in Test Equation	ADF(TSV)	ADF(TCV)	Inference
LogEG	Level	Intercept	-4.7869	-2.9331	Stationary
LogEG	ΔLevel	Intercept	-8.7767	-2.9350	Stationary
LogIF	Level	Intercept	-2.1524	-2.3201	Non-Stationary
LogIF	ΔLevel	Intercept	-9.1895	-0.5498	Stationary
LogLQ	Level	Intercept	-0.105	-1.4387	Non-Stationary
LogLQ	ΔLevel	Intercept	-6.3834	-3.5407	Stationary
LogVQ	Level	Intercept	-0.9448	-0.9492	Non-Stationary
LogVQ	ΔLevel	Intercept	-6.8178	-0.2871	Stationary
P	Level	Intercept	-5.9819	2.9389	Stationary
P	ΔLevel	Intercept	-9.9352	2.9411	Stationary

Source: Computed by Author Using Eviews10 Software

Table 2   Johansen Co-Integration Tests

Hypothesized No. of CE(s)	Eigenvalue	Trace Test		Maximum Eigenvalue	
		Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
None	0.777924	113.0488*	69.81889*	61.69424*	33.87687*
At Most 1	0.439511	51.35436*	47.85613*	23.73681	27.58434
At Most 2	0.336632	27.61775	29.79707	16.82742	21.13162
At Most 3	0.226709	10.79034	15.49471	10.54111	14.26461
At Most 4	0.006060	0.249223	3.841466	0.249223	3.841466

Source: Computed by Author Using Eviews10 Software
* Denotes rejection of the hypothesis at the 0.05 level

Further, the study also rejects the null hypothesis of no co-integration at 5% significance level. Table 2 shows Johansen Co-integration tests for both Trace and Maximum Eigenvalue. From Table 2 Trace test indicates two co-integrating equations while maximum Eigenvalue indicates one co-integrating equation at the 5% level of significance. However, the study fails to reject the null hypothesis for at Most 2, 3, 4 for Trace value and at Most 1, 2,3 and 4 for Maximum Eigenvalue since respective statistics values are less than critical values at 5% significance level. The results therefore confirms existence of long run relationship among EG, IF, LQ, VQ and P with co-integrating relationship as shown in Table 3.

Table 3 Result of the Long Run Economic Growth Model (Standard Error in Parenthesis)

LogEG	LogIF	LogLQ	LogVQ	P
1.00000	-0.12958	0.131533	0.214848	-11.9001
	(0.63912)	(0.44997)	(1.1663)	(1.1267)

Source: Eviews10 Output

Through regression analysis, Table 4 provides values for estimation equation in the short run with EG as the Dependent Variable. The results indicate that all independent variables except Political goodwill have positive impact on countries economic growth. Unit increase in value addition output to manufacturing output ratio increases economic growth by 0.61. Unit increase in labour productivity increases EG by 0.29 while unit allocation of financial credit to new manufacturing investments contributing 0.1 increase in EG. Meanwhile, lack of political goodwill especially during election and campaign period have negative impact on EG.

Table 4   Short Run Estimate Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.016107	0.056471	0.285212	0.0077
LogIF	0.097172	0.399759	0.359289	0.0011
LogLQ	0.285607	0.298577	7.889552	0.0001
LogVQ	0.612050	0.213054	6.034190	0.0000
P	-0.002351	0.132970	4.602904	0.0002
R-squared	0.675512	Mean dependent var		0.008781
Adjusted R-squared	0.660422	S.D. dependent var		1.933834
S.E. of regression	2.403313	Durbin-Watson stat		2.188528
F-statistic	58.02126			
Prob(F-statistic)	0.000000			

Source: Eviews10 Output

The R-Squared results in Table 4 also indicates that the variables in question contributes 67.55% to economic growth while 32.45 takes care of other variables not factored in this study.

5 Conclusion

In conclusion, based on research findings above, Kenya's manufacturing sector plays a big role in growth of the country's economy though it's has not reached its peak. It's obvious, with ongoing industrial uprising in Kenya and other developing countries whose economies largely depend on agriculture, more transformations are yet to be witnessed. With innovation and technological advancements, manufacturing outputs will be through efficient and effective operations and quality aspect will not be compromised.

Political environment seems to have impact on manufacturing firms' operations. Therefore, political goodwill need to be embraced especially during electioneering period. From the study, it's is evident that during general election periods, manufacturing outputs, new annual investments as well as credit issuance by financial institutions are sluggish hence a negative impact on manufacturing activities contributing to GDP and Kenya's overall economic growth.

Kenya's manufacturing sector is the leading in East and Central Africa, as a result, other countries in Sub-Saharan Africa have developed a greater interest towards Kenya. With the recent signing of African Free Trade Area Agreement and manufacturing revitalization pillar under "Big Four" agenda, the government and the private sector under Kenya Association of Manufactures alliance need to collaboratively work as team by formulating policies, channeling more resources in support of R&D, investment in state-of-the-art equipment and technological advancements in efforts to ensure the manufacturing sector continues to transform in an accelerating manner.

Further, the research recommends that the management of local manufacturing firms embrace the innovation culture in their internal structures in efforts to promote local sector competition as well as meeting global competition standards. In terms of labour productivity, the manufacturing sector need to be in the forefront in ensuring its maximum outputs are met at minimum costs without interfering with its socio-economic role.

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An Empirical Study on the Financial Affordability of Public: Private Partnership Projects in Underdeveloped Areas of China: Taking the Xinjiang Uygur Autonomous Region of China as an Example

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Abstract: At present, China's research on the demonstration of financial affordability is limited to calculate a specific project. This paper takes the Xinjiang Uygur Autonomous Regionof China as an example to make an empirical study on the financial affordability of Public-Private Partnership projects in underdeveloped areas in China. Firstly, the main factors affecting the financial affordability of the Xinjiang Uyghur Autonomous Region of China were identified by using the grey correlation analysis method. It was concluded that the regional fixed asset investment was closely related to the local government's financial affordability.Secondly, through the comparing analysis of the fixed asset investment and PPP project financial investment of Xinjiang, some suggestions are raised for the economically underdeveloped areas in China.
Key words: PPP project; Financial affordability; Grey correlation analysis; Financial advice

1 Introduction

The Public-Private partnership mode has high hopes in solving the contradiction between the limited government finance and people's unlimited demand for public services. Under the tide of Public-Private Partnership, more and more infrastructure and public projects have been transformed into PPP modes in recent years. It is conservatively estimated that during the Thirteenth Five-Year Plan period, the annual investment in PPP projects will reach 1 trillion yuan. PPP mode management involves all aspects of financial work, including direct liabilities such as government payments, financial subsidies and related supporting arrangements,guarantees and other contingent liabilities, financial commitment such as implicit responsibility.ADB (ADB, 2014) pointed out that many practical experiences have shown that low-quality PPP projects will increase government financial burden. Due to the long period of PPP projects, the government has a relatively large risk of uncontrollable debts in long-term expenditure responsibilities. In addition, the serious abuse of the PPP mode in recent years has made local financial collapses very common.Gao Jianchu and Ma Jinying pointed out that financial affordability is the financial burden taken by the government to the whole economic and social development.Thedemonstration of financial affordability is a key step in the adoption of the PPP mode, and an important guarantee for the government to fulfill its contractual obligations. Wang Xi and Xia Qiang believe that it is conducive to standardize the management of fiscal expenditures for PPP projects, to promote project implementation in an orderly manner, and to effectively prevent and control fiscal risks. Zhang Naxin(Zhang Naxin, 2017)believes that the affordability demonstration is an important guarantee for the government to fulfill its contractual obligations, which is conducive to prevent and control fiscal risks, and to achievethe sustainable development of PPP.Since the Ministry of Finance of China promulgated the "Guidance Guidelines on the Financial Sustainability of Government and Social Capital Cooperation Projects", the arguments for the financial sustainability of PPP projects of China have been analyzed only for specific projects and have less reference to the local government of China fiscal performance capabilities. This article has taken the Xinjiang Uygur Autonomous Region of China as an example. From the perspective of the factors that have affected the financial sustainability of local government PPP projects, the grey correlation analysis model has been used to select the main influencing factors. With detailed analysis, policy recommendations for the development of the Xinjiang Uygur Autonomous Region of China have been proposed.

1.1 Related concepts of public-private partnership mode

1.1.1 Public-Private Partnership mode

The Public-Private Partnership mode is defined by the Ministry of Finance to mean thatthe government has a long-term cooperative relationship with social capital through franchising, purchase services, equity cooperation, etc. in order to enhance the supply capacity of public goods and services, and improve supply efficiency.

1.1.2 PPP project development stage

The Ministry of Finance defines that the PPP projects will go through the following five stages of development: project identification, project preparation, project procurement, project implementation, and project handover.

1.2 Financial affordability related concepts

1.2.1 Fiscal affordability argument

The Ministry of Finance defines that the fiscal affordability argument is to identify and measure the fiscal expenditure responsibilities of the government and the Public-Private Partnership project, and scientifically assess the impact of project implementation on current and future fiscal expenditures for the PPP project finance, and provide the basis for financial management of PPP projects.

1.2.2 The standard of financial affordability

The Ministry of Financebelieves that all PPP projects need to set expenditure responsibilities from the budget.　The proportion of general public budget expenditures should not exceed 10% in every year in China. Cao Shan (Cao Shan, 2017) thought that the purpose of setting this figure is to control the total scale of PPP projects and ensure the ability of local governments to afford the cost.

2 Factors Affecting Local Government Financial Afford Ability under PPP Mode

2.1 Setting up a grey correlation analysis model

This paper uses the grey relational analysis method from the perspective of empirical analysis to analyze the factors affecting the financial affordability of local government under the PPP mode.The relationship between the total investment of the PPP project, the level of economic development, the urbanization rate, the degree of fiscal decentralization, the scale of local fiscal revenue and the scale of the population, and the financial affordability of local governments are discussed.

Liu Sifeng (Liu Sifeng, 2004) made the basic steps of grey relational analysis which are as follows:The first step is to determine the analysis sequence.On the basis of qualitative analysis of research questions, a dependent variable factor and multiple independent variables are identified.The dependent variable data constitute the reference sequenceX_0' and each variable data constitutes a comparison sequence $X_i'(i = 1,2, \cdots, n)$,$n + 1$ data sequences into the following matrix:

$$\left(X_0', X_1', \cdots, X_n'\right) = \begin{bmatrix} x_0'(1)x_1'(1) & \cdots & x_n'(1) \\ x_0'(2)x_1'(2) & \cdots & x_n'(2) \\ \vdots & \vdots & \vdots \\ x_0'(N)x_1'(N) & \cdots & x_n'(N) \end{bmatrix}_{N\times(n+1)} \tag{1}$$

Among them,$X_i' = (x_i'(1), x_i'(2), \cdots, x_i'(N))^T$,i = 1,2, $\cdots$ n, N is the length of the variable sequence.

In the second step, the sequence of variables is dimensionless.In general, the original variable sequence has different dimensions or orders of magnitude. In order to ensure the reliability of the analysis result, the variable sequence needs to be dimensionless.After being dimensionless, the sequence of the various factors forms the following matrix:

$$(X_0, X_1, \cdots, X_n) = \begin{bmatrix} x_0(1)x_1(1) & \cdots & x_n(1) \\ x_0(2)x_1(2) & \cdots & x_n(2) \\ \vdots & \vdots & \vdots \\ x_0(N)x_1(N) & \cdots x_n(N) \end{bmatrix}_{N\times(n+1)} \tag{2}$$

The specific method is that for the minimum index,the minimum value in the sequence is 1,all other values are divided by the minimum value. For the maximum value indicator,the maximum value in the sequence is 1,all other values are divided by the maximum value：

$$x_i(k) = \begin{cases} \frac{x_i(k)}{max\, x_i(k)} \\ \frac{x_i(k)}{min\, x_i(k)} \end{cases} \tag{3}$$

$$i = 0,1, \cdots, n; k = 1,2 \cdots, N$$

The third step, the absolute difference.Calculate (2.2) the absolute difference between the reference sequence and the rest of the comparison sequences,the following absolute difference matrix is formed:

$$\begin{bmatrix} \Delta_{01}(1)\Delta_{02}(1) & \cdots & \Delta_{0n}(1) \\ \Delta_{01}(2)\Delta_{02}(2) & \cdots & \Delta_{0n}(2) \\ \vdots & \vdots & \vdots \\ \Delta_{01}(N)\Delta_{02}(N) & \cdots & \Delta_{0n}(N) \end{bmatrix}_{N\times n} \tag{4}$$

Amongthem, $\Delta_{0i}(k) = |x_0(k) - x_i(k)|$, $i = 0,1,\cdots,n$; $k = 1,2,\cdots,N$; In absolute difference matrix, the maximum number and the minimum number are the maximum difference and the minimum difference:

$$\begin{cases} \max_{1\leq i\leq n\ 1\leq k\leq N}\{\Delta_{0i}(k)\} \triangleq \Delta(\max) \\ \min_{1\leq i\leq n\ 1\leq k\leq N}\{\Delta_{0i}(k)\} \triangleq \Delta(min) \end{cases} \tag{5}$$

The fourth step is to calculate the correlation coefficient.Transforming the data in the absolute difference matrix as follows:

$$\xi_{0i}(k) = \frac{\Delta(min)+\rho\Delta(max)}{\Delta_{0i}(k)+\rho\Delta(max)} \tag{6}$$

The following correlation coefficient matrix is obtained:

$$\begin{bmatrix} \xi_{01}(1)\xi_{02}(1) & \cdots & \xi_{0n}(1) \\ \xi_{01}(2)\xi_{02}(2) & \cdots & \xi_{0n}(2) \\ \vdots & \vdots & \vdots \\ \xi_{01}(N)\xi_{02}(N) & \cdots & \xi_{0n}(N) \end{bmatrix}_{N\times n} \tag{7}$$

The fifth step is to calculate the degree of association.The degree of correlation between the comparison sequence and the reference sequence is reflected by N correlation coefficients. The correlation between X_i and X_0 can be obtained by finding their average number:

$$r_{0i} = \frac{1}{N}\sum_{k=1}^{N}\xi_{0i}(k) \tag{8}$$

The sixth step is to sort according to the degree of relevance.The correlation degree between the comparison sequence and the reference sequence is arranged from largeness to smallness.The greater the degree of association, the more consistent the changes in the comparison sequence and the reference sequence

2.2 Choosing relevant variables

It is generally believed that the budget expenditure of local public finance is the core index of PPP project's financial affordability.Therefore, this paper combines the actual situation of the financial sustainability of PPP projects in China and selects the annual general public budget expenditure of Xinjiang Uygur Autonomous Region of China as the reference index X_0, selects the PPP project local fiscal investment, regional economic development level, urbanization rate, fiscal decentralization, local fiscal revenue, population size, fixed assets investment and other factors as comparative indicators. Based on this, the impact of the comparison index on the reference index was analyzed.

Table 1   Main Factors and Factor Codes

Factor name	Factor code
Local public budget expenditure	X_0
Per capita GDP	X_1
Urban population quantity	X_2
General public budget income	X_3
Population size	X_4
Fixed assets investment in the region	X_5
Financial income from higher level subsidies	X_6
Local bond issue income	X_7

3 Case Study

The blue book in the "Report on the Development of China's Provincial Economy Comprehensive Competitiveness (2014-2015)" published by the Chinese Academy of Social Sciences (2016) revealed that Xinjiang Uygur Autonomous Region of China ranked 26th in the Chinese provincial economy competitiveness ranking,ranking in the lower reaches of the country.In 2016the per capita GDP of China

was 53980 yuan and the Xinjiang Uygur Autonomous Region of China was 40427 yuan.Based on this, it can be seen from the comparison that the situation of Xinjiang Uygur Autonomous Region can well represent China's underdeveloped areas.In the following, we will use the grey correlation analysis method and select 2012-2016 data to empirically analyze the financial sustainability of PPP projects in the Xinjiang Uygur Autonomous Region.Specific steps are as follows:

The first step, select the added value of the general public budget for each year as the reference series and select the other 7 indicators as the comparison series. Please refer to Table 2 for details.

In the second step, the original data listed above is dimensionless processed using Equation (2.3). The processed data is shown in Table 3.

The third step is to use Mat lab software to get the grey correlation analysis ranking of comparison factors and reference factors, as shown in Table 4.

Table 2   Raw Data on the Main Factors Affecting Fiscal Affordability

Factor code / year	2012	2013	2014	2015	2016
X_0	2058.9	2378.8	2681.8	3016.9	3174.5
X_1	33796	37553	40648	40036	40427
X_2	981.98	1006.93	1058.91	1114.5	1159.47
X_3	908.97	1128.49	1282.34	1330.85	1299
X_4	2232.78	2264.3	2298.47	2359.73	2398.08
X_5	6258.38	8148.41	9744.68	10729.32	9983.86
X_6	34.5	0	1998.1	2326.8	2471.9
X_7	0	0	110	580	815

Table 3   Main Factors Affecting Financial Affordability: Dimensionless Data

Factor code / year	2012	2013	2014	2015	2016
X_0	1.000	1.155	1.303	1.465	1.542
X_1	0.831	0.924	1.000	0.985	0.995
X_2	0.847	0.868	0.913	0.961	1.000
X_3	0.683	0.848	0.964	1.000	0.976
X_4	0.931	0.944	0.958	0.984	1.000
X_5	0.583	0.759	0.908	1.000	0.931
X_6	0.014	0.000	0.808	0.941	1.000
X_7	0.000	0.000	1.000	5.273	7.409

Table 4   PPP Financial Affordability Gray Correlation Analysis

Ranking	Comparative factor	General public budget expenditure correlation
1	Regional fixed asset investment	0.908
2	General public budget income	0.888
3	Urban population	0.877
4	Population size	0.822
5	Financial income from higher level subsidies	0.751
6	Local issuance of bond income	0.585
7	Per capita GDP	0.497

4 Result Analysis

Using the grey correlation analysis method, the correlation degree between the various comparative factors in the financial affordability of the Public-Private Partnership projects and the local public budget expenditure can be obtained.The ranking table can be found that the highest correlation factor of the financial capacity in PPP projects is fixed asset investment. The second is the general public budget revenue and the number of urban population.The increase of urban population will increase the demand for public goods and have a greater impact on financial affordability.Population size and superior

financial subsidies are more strongly correlated with financial affordability.The correlation between local bond income and per capita GDP and financial affordability is poor.

Observing the above results, we can see that the financial sustainability of the Xinjiang Uygur Autonomous Region of China has a strong correlation with regional fixed asset investment.By reading the Xinjiang Statistical Yearbook (2017), the annual investment in fixed assets for the years 2012-2017 and its share in local GDP, the investment in PPP projects and their proportion of the investment in fixed assets are now drawn together in the Figure 1 for readers' comparison.
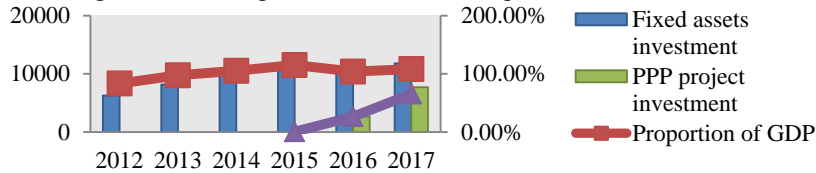
Figure 1   Comparison Chart

Observing the above figure, we can see that theXinjiang Uygur Autonomous Region of China continued to increase investment in fixed assets from 2012 till now.Fixed asset investment in each year accounts for a large proportion of the local GDP.Especially after entering 2014, the amount of fixed assets investment even exceeds the gross national product of the region,Xinjiang has entered the stage of relying on investment to drive economic development.The reasons behind the high investment in fixed assets are as follows:First, the Xinjiang Autonomous Region of China is located in the inland area with inconvenient transportation and backward infrastructure.If we want to change the backward situation in Xinjiang and promote the development of Xinjiang's economy, we must vigorously promote investment in fixed assets, improve infrastructure, overcome infrastructure shortcomingsand attract more companies to Xinjiang of China.Second, the proposed "Belt and Road" of Chinese's national strategy in 2015 provided Xinjiang with new opportunities for development.As an important hub of the economic belt of the Silk Road and an open window to the west, Xinjiang of China has energetically carried out investment activities under the support of national policy to inject new vitality into the economy of Xinjiang.The investment of PPP projects in Xinjiang Autonomous Region of China from 4.929 billion in 2015 to 26.410 billion in 2016 and 770.615 billion in 2017are inseparable from the increase in fixed assets investment.

Table 5   Quantity of PPP Projects and Investment in Government and Social Capital in Each Year

	2015	2016	2017
Government investment in PPP Projects	24.3	656.3	1161.58
Social capital investment in PPP Projects	24.99	1983.85	5097.35
Number of PPP projects	17	431	589

As can be seen from Table 5the PPP project has injected capital vitality into Xinjiang's annual investment in fixed assets.Especially in the past three years, the relatively high investment in fixed assets and the support of national policies have created a good environment for the development of PPP projects, attracting a large amount of private investment to participate in infrastructure construction.It has increased the proportion of investment in PPP projects year by year, greatly alleviating the financial pressure of local governments.Note that increasing investment in fixed assets reached more than 1 trillion, even was put forward in 2017 in the Xinjiang Autonomous Region of China of fixed assets investment target of 1 trillion and 500 billion.However, from the above shown charts, we can see that the financial income composition of Xinjiang is relatively large from higher level financial support and local government bond income.In particular, financial support revenue from superiors accounted for over 70% of the budget revenue in the past three years.From the perspective of the development of PPP projects in recent years, the vast majority may be concentrated in infrastructure such as transportation, municipal engineering, and water conservancy constructionand so on. Projects with more than 30 years' investment duration are not in the minority.As we all know, as long as the PPP project is within the project cooperation period, the government will put a certain amount of financial expenditure into it every year until the end of the project.Assuming that Xinjiang's fiscal revenue is still mainly dependent on higher government subsidies and government bond income in the future and it continues to make high fixed assets investment targets while the PPP project is still pouring into Xinjiang,the financial affordability of the Xinjiang Autonomous Region of China is worrying.It is likely that a larger portion of

the PPP project will be at risk of being unfinished.Therefore, we must consider the affordability of financial supply to avoid hidden risks caused by the introduction of PPP mode.It is expected that the implementation of the PPP model will not only increase the efficiency of the public goods, but also ease the pressure on local government financial expendituresin order to promote the role of public goods supply.

5 Conclusion

5.1 Optimizing the structure of local fiscal revenue and introducing PPP projects rationally

Under the current circumstances, the PPP projects form a mutually beneficial relationship with the investment direction of the Xinjiang Autonomous Region of China in developing infrastructure.The introduction of the PPP projects can alleviate the pressure of local financial expenditures. However, it should also consider its own fiscal revenue structure.In order to ensure sustained and stable economic development in Xinjiang areas, the PPP projects should land smoothly.On the one hand, the competitiveness and economic attraction of Xinjiang areas must be enhanced through local policy support, the transformation of the economic development mode and the search for new economic growth points.On the other hand, the quantity of PPP projects should be controlled reasonably and the admission standards should be improved. The aim is to promote the development of the PPP projectsfrom quantity to quality.

5.2 Make a reasonable investment target of fixed assets

When local governments set targets for investment in fixed assets,on the one hand, we should decide whether we need to increase investment in building according to our own economic development.On the other hand, we should also consider the financial input of subsequent PPP projects.High investment in fixed assets is not only provided by social capital in PPP project, but also provided by local government financial expenditure. According to the current situation of the PPP projects in the Xinjiang Autonomous Region of China, 40% of the fixed assets investment is provided by the government finance.If the Xinjiang Autonomous Region of China continues to formulate a high fixed asset investment, it will squeeze out the financial investment in the PPP projects in the later period, leading to a risk of tailwind.

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Problem and Strategies Analysis of Product Processing Quality Management for Medium Auto Parts Enterprise in Supply Chain

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Abstract: The current management model can no longer meet the requirements of sustainable improvement if only vehicle manufacturer is taken as the core enterprise in the supply chain. Based on the location of auto parts enterprise in the supply chain, the concept of medium auto parts enterprise is proposed. The problem of product processing quality management for medium auto parts enterprise is analyzed. Based on supply chain lifecycle, this paper attempts to analyze the vehicle manufacturer as the core enterprise which is just suited to carry out the supply chain quality management in the incubation period of the supply chain. In the construction period and the operation period of the supply chain, taking the medium auto parts enterprise as the core enterprise is more suited for supply chain quality management.
Key words: Product processing quality; Medium auto parts enterprise; Supply chain lifecycle; Requirement analysis; Supply chain

1 Introduction

At present, competition from vehicle manufacturers emphasis on product development time of supply chain and competition for quality reliable control of products (Carvalho et al. 2010). The role of vehicle manufacturers has transformed into the system integrator of Assemble-to-Order due to they are highly dependent on tier one suppliers, forming the auto product supply chain network system with the participation of vehicle manufacturers, complete system suppliers, component suppliers, raw material suppliers, and interchangeable parts suppliers. As a result, the vehicle manufacturers have increased the requirements for the technical capabilities of auto parts suppliers for the outsourced management of parts.

In current research, the quality management of the supply chain is only carried out by the auto manufacturer as the core company. It is easy to ignore the quality problems in the product installation process and increase the quality risk of the supply chain. Especially in the case of asymmetric information, manufacturers and suppliers determine their individual quality levels to maximize their own profits in quality contracts (Hu, 2010). These bring more quality risks to supply chain management. So about 30% of the external quality of the automotive industry is caused by suppliers and 15% is related to the manufacturer's assembly (Liker et al., 2004). And Helper and Kuan (Helper and Kuan, 2016) points out only 37% of automotive suppliers are in the catalog of vehicle manufacturer NAICS 3363. It makes the quality management of the supply chain difficult to predict due to the lack of correct quality control information.

There are also some other problems arising from the current quality management model of the auto parts supply chain. According to the China Automotive Complaint Analysis Report for 2016~2017, complaints about auto product quality are still hot spots for consumer complaints. In the 169 brands and 691 cars, the total complaints of the self-owned brands and joint-brand cars were as high as 99%, and only about 30% of car manufacturers responded and accepted 100% of the complaints, reducing the customer complaints relief index and influence of brand purchase index. The decrease in the index directly affects the efficiency of car brands. The complaints about the quality of automotive products could not be dealt with and resolved in time. These problems hinder the current supply chains model lack of reasonable supply chain lifecycle requirement plan. Researchers have identified the problems. Chandak et al. (Chandak et al., 2014) pointed out that due to the complexity of the supply chain, small and medium enterprises should further consider the management of the product life cycle. However, the evaluation and verification of the quality level depend on the vehicle manufacturer, since there is no complete product processing quality information network in auto parts supply chain. The current study mainly focuses on the analysis of suppliers' relationship and quality level (Chen et al. 2017), the risk of

supply chain quality (Klingebiel et al., 2015; Thun and Hoenig, 2011), the model of supply chain quality management (Akbaripour et al., 2015), which is based on the core enterprises of vehicle manufacturers. But there is not been thoroughly analyzed and studied from the perspective of product processing quality management in auto parts suppliers.

To improve the quality of product processing quality supply chain management centered on vehicle manufacturers, this paper considers the coordination of the medium auto parts enterprise and analyzes the existing practical engineering problems in the product quality supply chain management of auto parts by describing the relationship between medium auto parts enterprise and the upstream and downstream enterprises. And it attempts to analyze the application stage and product quality management characteristics of medium auto parts enterprise and proposes the strategies to solve the problems.

2 Problem of Product Processing Quality Management in Auto Parts Supply Chain

In this section, the concept of medium auto parts enterprise is proposed to give its place of prominence in auto parts supply chain. Taking medium auto parts enterprise as point cut, this paper analyzes the existing practical engineering problems in the product quality supply chain management of auto parts by describing the relationship between medium auto parts enterprise and the upstream and downstream enterprises. The analysis also lays a foundation for further analysis of quality management requirements of the medium auto parts enterprises.

2.1 Concept of medium auto parts enterprises in the supply chain

At present, domestic and foreign scholars have not yet formed a unified definition of the supply chain, but the description of the supply chain includes the following aspects. (1) The object of the supply chain is the upstream and downstream enterprises which are related to the internal relations in the fields of processing, transportation, and service. (2) The goal of supply chain is to achieve information sharing between upstream and downstream business, such as customer demand information, transportation logistics information, maintenance service information, and product quality information. (3) The purpose of the supply chain is to meet cost reduction requirements by sharing information while ensuring the quality of the product, including production planning costs, logistics transportation costs, manufacturing costs, and other additional costs.

This paper only emphasizes the product processing quality of auto parts supply chain, so the object of the product processing quality of auto parts supply chain consists of the vehicle manufacturer and its suppliers which are responsible for product processing and manufacturing. The suppliers are all auto parts enterprises. And only the first tier suppliers are directly related to the vehicle manufacturers. The second tier suppliers are directly related to their own upstream enterprises which are also first tier suppliers of vehicle manufacturers.

It is clear that there is a type of auto parts enterprises which are the subject of product processing quality control and management and play a dominant role for vehicle manufacturers. They are responsible for the final processing quality of the product and the communication between assembly factories (such as vehicle manufacturers, engineer company, chassis company etc.) and their secondary suppliers. To highlight the importance of these auto parts enterprises in the supply chain, we define these auto parts enterprises as medium auto parts enterprises.

2.2 Characteristics of product processing quality management in auto parts supply chain

Medium auto parts enterprise is a first tier supplier directly associated with assembling factory. As the first tier supplier of assembly factory, the upstream of medium auto parts enterprise is the assembling factory and has its own downstream supplier.

The main function of medium auto parts enterprise is to synthesize and match supply chain product processing quality. Figure 1 shows the cooperation mode between foreign vehicle manufacturers, domestic joint venture vehicle manufacturers, and medium auto parts enterprises.
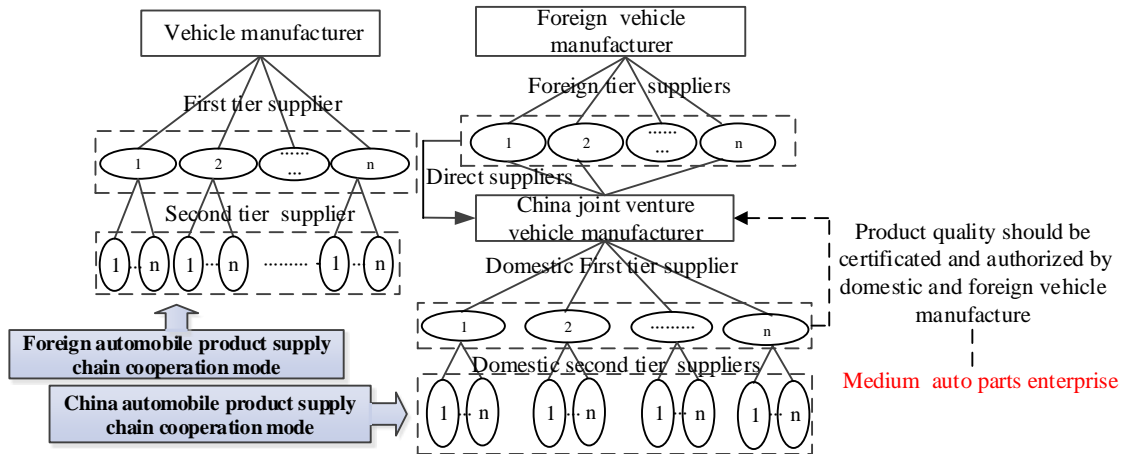
Figure 1   Cooperation Mode between Vehicle Manufacturers and Medium Auto Parts Enterprises
Source: Supply chain management and operation mode of an auto parts enterprise in China

From Figure 1, it can be seen that foreign first tier suppliers can directly supply the vehicle manufacturers due to their participation in the development stage, but for Chinese joint vehicle manufacturers, medium auto parts enterprises are not involved in the product development stage, and the product quality level depends on foreign vehicle manufacturers. It should take the Chinese domestic vehicle manufacturers as core business, jointly developing the localization of new products. At the same time, due to the imperfection of supply chain quality management, the following problems still exist:

(1) As the core enterprise of Assemble-to-Order (ATO) supply chain, assembly factory (such as vehicle manufacturer, engineer company, chassis company etc.) directly assemble auto parts provided by Tie 1 suppliers, ignoring the quality risks caused by their own installation and assembly, making medium auto part enterprises take on the main responsibility of product quality risk in supply chain.

(2) In the 21st century, the competition of auto brands emphasizes on product quality and cost in the supply chain. However, they have not formed a unified management model for product quality standards and indicators between vehicle manufacturers, medium auto part enterprises, and second-tier suppliers.

(3) Each node enterprise in the supply chain with the biggest motive for profit maximization maximizes to choose the product quality level, has not taken into account the influence of its own product quality level of its upstream enterprise on product quality control. As a result, the supply chain cost control measures are not perfect, bringing more technical challenges to medium auto parts enterprise.

3 Strategies for Auto Parts Supply Chain Management

In this section, through the comparison and analysis of the product quality transmission of taking vehicle manufacturing or medium auto parts enterprise as a core enterprise, it is analyzed that the current management model cannot be met only by taking vehicle manufacturers as the core enterprise. Based on supply chain lifestyle, the quality management characteristics and control points of each stage of supply chain lifecycle are clearly given.

3.1 Transfer process analysis of product processing quality

Yan (2013) analyzes the typical transmission process of product information and quality flow with the vehicle manufacturer as the core enterprise. However, this analysis method ignores the status of product quality control in the medium auto parts enterprises. Figure 2 illustrates the difference of product quality transmission model in the supply chain with vehicle manufacturers as the core enterprise and with the medium auto parts enterprises as the core enterprise.
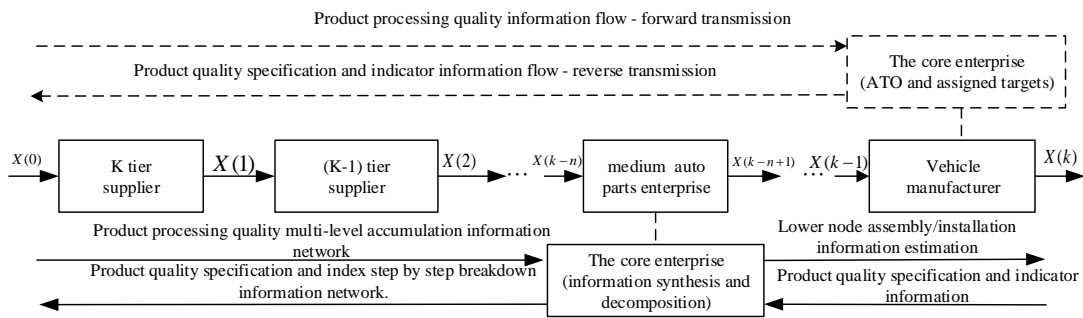
Figure 2   Product Processing Quality Transmission Model in Supply Chain

As shown in Figure 2, the existing research is based on taking the vehicle manufacturer as the core enterprise. The forward transmission of product processing information is transmitted from the product quality information (X (0)) of the K tier suppliers to the upstream nodes until vehicle manufacturers. The reverse transmission of product quality specification and index information is from vehicle manufacturers to downstream nodes step by step. However, if medium auto parts enterprise is taken as the core enterprise, in the forward transmission, medium auto parts enterprises are not only synthesizing quality information from downstream enterprises but also considering assembly information of the vehicle manufacturer. In the reverse transmission, medium auto parts enterprises should cooperate with vehicle manufacturer decompose product quality specifications and indicators, monitor the downstream enterprises requirement dynamics of the quality specifications and indicators. So this paper proposes taking medium auto parts enterprise as the core enterprise to improve the design scheme of product processing, to effectively provide technical support to the vehicle manufacturer, and to reduce product processing and manufacturing costs.

3.2 Strategies of product processing quality management in supply chain life cycle

On the basis of supply chain lifecycle proposed by Chang (2012), with the auto parts product quality management as the starting point, the application stage of taking medium auto parts enterprise as a core enterprise is analyzed.

(1) In the incubation period, the task for vehicle manufacturers is to seek better quality suppliers. For suppliers, it is a technical support to provide the product quickly and effectively, and obtains the quality certification from vehicle manufacturers. Product quality management is carried out by vehicle manufacturers during the supply chain incubation period. The second tier suppliers cooperate with medium auto parts enterprises to provide product quality guarantee scheme to the vehicle manufacturer. Meanwhile, vehicle manufacturers complete the evaluation and certification of medium auto parts enterprises product quality level, and build the supply chain product quality management system. Therefore, at this stage, vehicle manufacturers are the core enterprises to meet the requirement of supply chain product quality management.

(2) During construction period, a stable cooperative relationship has been established between vehicle manufacturers, medium auto parts enterprises and second-tier suppliers. Medium auto parts enterprise and second-tier suppliers have received quality certification from vehicle manufacturers. The key task in this stage is to provide feedback and improvement on quality problems that happen during the trial production stage. Vehicle manufacturers inspect the products provided by medium auto parts enterprise, and provide feedback of inspection information to medium auto parts enterprise. Medium auto parts enterprises propose a product quality improvement plan and release it to a second-tier supplier based on the feedback information. According to the improvement information given by medium auto parts enterprises, the second tier suppliers adjust product quality control scheme, and then send product final information to medium auto parts enterprises. At this stage, product quality management is carried out around the medium auto parts enterprise. Therefore, medium auto parts enterprise is the core enterprise to meet the requirement of supply chain product quality management.

(3) During the operation period, products have entered the mass production stage. It is also a stage in which vehicle manufacturers require medium auto parts enterprises to provide products with stable quality levels. The medium auto parts enterprises must not only consider the influence of their own equipment, environment, and process fluctuation on product quality stability, but also consider the impact of accumulative quality errors caused by natural or artificial factors from second-tier suppliers,

and also consider the assembly influence mode and accuracy of vehicle manufacturer. Product quality control and management are carried out around the medium enterprise in auto parts industry. Therefore, a medium auto parts enterprise should be the core enterprises to meet the requirement of supply chain product quality management.

3.3 Strategies of product quality management for medium auto parts enterprise facing ISO/TS 16949:2016

ISO/TS16949:2016 is the basis for the implementation of supply chain product quality management, emphasizes its universality and suits for various types and services. It is also one of foundation in this paper that proposes medium auto parts enterprise as the core enterprise to carry out product quality management in the supply chain. In view of new demands of ISO/TS16949:2016, the strategies of product quality management for medium auto parts enterprise should be further improved from the following aspects:

(1) Taking the medium auto parts enterprise as core enterprise, the product quality assurance system should be established to improve the planning and analysis of product quality.

(2) Taking the medium auto parts enterprise as core enterprise, the product quality transmission and prediction model should be built to improve product process quality control.

(3) Taking medium auto parts enterprise as core enterprise, the product quality tracking, and risk prediction system should be created to track potential risk prediction and emergency response plans of product quality, and to improve the competitiveness of supply chain products based on quality and time.

4 Conclusion

This paper introduces the concept of medium-size auto parts enterprise and indicates that the chief status of auto parts enterprise has been ignored in current auto parts supply chain management model. Based on supply chain lifestyle, it points out that supply chain members should undertake different work task at each supply chain lifecycle stage. During the construction and operation periods of the supply chain, it is urgently to take medium auto parts enterprise as the core enterprise to implement the auto parts supply chain management.

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An Empirical Study on the Impact of Supplier Relationship Quality on Procurement Performance of Overseas Construction Supply Chain

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Abstract: "The Belt and Road" Initiative is a top-level design in China, since the date of the proposal, the number of overseas projects in China has increased on a large scale. With the increasingly important role of supplier relationship management in the supply chain procurement strategy, research on supplier management and procurement management in overseas construction supply chain is emerging. On the basis of the study of related literature, starting from the view of construction supply chain management, thepaper constructed a theoretical hypothesis model and studied the relationship between supplier relationship quality and supply chain procurement performance, and made assumptions on the mediating effect of supply risk in this relationship. The purpose of this study is to provide a theoretical basis for optimizing supplier relationship and improving procurement performance in overseas construction supply chain of China's construction enterprises.
Key words: Constructon supply chain; Procurement performance; Supplier relationship quality; Supply risk

1 Introduction

In September and October 2013, "The Belt and Road" Initiative, namely the construction of "new Silk Road Economic Belt" and the concept of "twenty-first Century Maritime Silk Road" have been put forward. In recent years, along with the "The Belt and Road" concept gradually implemented, the number of China's overseas projects is booming. In the first half of 2016, the project that China's construction enterprises signed has reached 3080, the total amount of the contracts are worth $51 billion 450 million, representing an increase of 37% over the same period last year, it accounted for 51.6% of the total number of new overseas projects contracted by China in the first half of 2016. Faced with such a booming overseas construction market, research on overseas construction projects has also become a hot spot.

Because of the characteristics of overseas projects, the risks faced by them are more unique and more prominent than those in China. Overseas engineering projects alwayshave higher investment and are much more complicated than those at home, the process standards, design requirements and quality standards mostly follow the standards of British, American and European, the time limit is tight and the cost of project delay is high (Yu Xuni, 2013). In addition, overseas engineering projects usually have a longer period of general construction, a larger number of interest units involved and huger amount of investment than inboard (Li Hui, 2015). And from the two aspects of project implementation and project implementation process, the risk identification of overseas projects is carried out, including objective natural disaster risk, social security risk, economic risk, legal environment risk and many other aspects. On this basis, the engineering supply chain in the construction of overseas projects is often faced with more complex external environment than in China, and also because the constructon supply chain itself has many types of resources, management work covers the whole process of construction, and the relationship between the members of the supply chain is constantly in the dynamic evolution process, the relationship between supplier relationship quality and procurement performance in overseas construction supply chain is very complex. In order to help our construction enterprises to reduce the cost and improve the profit, it is very necessary to carry out this research.

Based on the literature of the related fields, this paper built a hypothesis model based on the questionnaire survey data of the construction field scholars and practitioners, and discusses the many factors that affect the relationship between the supplier relationship quality and the procurement performance. Through the hypothesis and verification of the structural relationship between these factors, the mediator variable is found, and the effective ways to improve the performance of supply chain procurement in overseas construction projects are presented.The resultsof this study can also provide reference and guidance for the work and decision-making of relevant enterprises.

2 Literature Review and Research Background

2.1 Supplier relationship quality

The quality of relationship was first born in the field of marketing, and better relationship quality is more conducive to increasing consumer loyalty. With the development of supply chain management theory and the maturity of engineering supply chain theory, the relationship quality is gradually introduced into construction supply chain management. In order to further study the quality of supplier relationship, many scholars have begun to divide supplier relationship quality into multiple dimensions, and studied them respectively.

Based on the empirical study of 561 international project contracting enterprises, it can be concluded that the relationship between partners was the most important relationship capital of the enterprise. The relational capital includes three dimensions: trust, reciprocity and information sharing, The different dimensions together affect the performance of the firm (Sarkar, 2001). In relation to supplier relationship quality, Foreign scholars took the lead in the study of relationship quality, through the investigation and analysis of the relationship between the salesman and the customer, they firstly established the relationship quality model, and divided the relationship quality into two dimensions of trust and satisfaction (Crosby et al. 1990). And the later scholars conducted three dimensional division of trust, satisfaction and commitment in the study (Smith, 1998). SomeChinese scholars studied the quality of supplier relationship in the International Sourcing market. They believes that the main influencing factors of supplier relationship quality under international environment are information exchange, mutual trust and communication barriers (Zhang Yue, 2008). Based on the perspective of relationship marketing and quality management, the author has established the dimensional division of trust, communication, commitment and cooperation of the supplier relationship quality under the international market. Later domestic scholars had established a multidimensional impact model of supply chain relationship quality and government procurement performance, by the questionnaire survey, it is found that supplier relationship quality has a significant positive impact on government procurement performance (Wang Hong, 2012). In the study, the author divides supplier relationship quality into three dimensions: trust, satisfaction and commitment. Based on the characteristics of the researches, this paper selects trust, communication and cooperation in three dimensions for further research.

2.2 Supply risk

After studied the information risk of supply chain risk in depth, combined with information management theory and risk management theory, a strategy to effectively encourage and restrain enterprise behavior through the establishment of profit distribution and risk sharing mechanism is proposed (Yang Hongfen et al. 2002), it can also promote the information sharing among enterprises, reduce the risk of supply chain and the probability of bullwhip effect, improve the competitiveness of the supply chain and to eliminate the information risk. This also shows the significant impact of supplier relationship quality on supply risk. When it comes inboard, Chinese scholars combined with relevant research results, selected multiple indicators to measure the risk management of logistics service supply chain. According to the risk evaluation index system, the relevant evaluation of logistics service supply chain is carried out, and strategies for coping with related risks are pointed out (Guo Zhaohai 2013). It is found that positive information communication with suppliers will bring positive help to risk control. According to the evaluation of the risk factors in several construction supply chains (Wenzhen, 2011), the author set up a fuzzy comprehensive evaluation index system of two levels to measure the risk of construction supply chain. In this system, the author believes that the risk of suppliers plays a very important role in this system, and supplier relationship quality has a significant positive impact on supply risk. Based on the above researches, the following hypotheses are proposed.

H1a: trust has a significant negative impact on the risk of construction supply chain.
H1b: communication has a significant negative impact on the risk of construction supply chain.
H1c: cooperation has a significant negative impact on the risk of construction supply chain.

2.3 Procurement performance

In the actual operation of engineering supply chain, internal and external uncertainties will influence the supply chain risk. The domestic and foreign literature on risk identification and management of the supply chain has pointed out that the identification work in the risk study is weak and should be strengthened in the future work (Zhou Yanju, 2006), the author made a quantitative research on risk identification, evaluation and risk management feedback mechanism to enhance corporate performance. In the field of empirical research, after analyzed the risk management strategy of

Engineering Supply Chain under EPC (EPC) mode (Zhiqiang, 2009), the risk assessment index system of engineering supply chain is also proposed. In the first level risk index of this system, the author divides the risk factors according to the different responsibilities of the different stages of the construction supply chain, and improves the performance of the enterprise through the management of the risk. Withthe data collected through field visits, interviews and workshop seminars, the identification and classification method of the uncertainty source of Engineering Supply Chain under ETO (order Engineering) mode is studied (Jonathan et al. 2013), the author also puts forward corresponding control strategies to eliminate uncertainty in engineering supply chain, reduce risks and improve performance.Based on the above researches, the following hypotheses are proposed.

H2: supply risk has a significant negative impact on procurement financial performance of construction supply chain.

Because the quality of the supplier relationship embodies the tightness of the cooperation between the supply and demand parties in the engineering supply chain, the quality of this relationship will inevitably affect the performance of the two parties, including the ocurement performance. Based on the theory of relationship capital, the establishment of a relationship network between construction enterprises and suppliers can bring about performance improvement for enterprises, and supplier relationship is an important resource for enterprises. The difference of performance between enterprises is due to the special heterogeneous resources owned by enterprises. The foreign scholars first proposed the importance of purchasing performance to the realization of an enterprise strategic goal, and found the impact of closer supplier relationship to a high level procurement performance (Stanley, 1994). In view of the resource based theory, the relation capital theory and the transaction cost economics, a structural equation model is established (Mahesh et al. 2011), which takes the supplier relationship as the dependent variable, the enterprise performance as the independent variable, and obtains the significant positive effect between the supplier relationship quality and the enterprise performance. On the basis of empirical research of government procurement, the quality of supplier relationship has a significant positive effect on the performance of government procurement (Wang Hong, 2012). Based on the above researches, this paper proposes the following hypotheses.

H3a: trust has a significant positive impact on the procurement financial performance of construction supply chain procurement.

H3b: communication has a significant positive impact on the procurement finance performance of the construction supply chain.

H3c: cooperation has a significant positive impact on the procurement financial performance of construction supply chain procurement.

2.4 Proposed conceptual model

At present, the research on the relationship between supplier relationship quality and procurement performance under the background of overseas engineering supply chain is not comprehensive enough. For this reason, there is no mature conceptual model for the study of overseas construction projects. Through combing the literature, on the one hand, we divide the supplier relationship quality from three dimensions: trust, communication and cooperation. On the other hand, using supply risk in engineering supply chain as an important mediator，and studied how the supplier relationship quality affects procurement performance in the supply chain under overseas background. This paper attempts to propose a multi factor conceptual model for the impact of supplier relationship quality on supply chain procurement performance in overseas projects，as shown in Figure 1
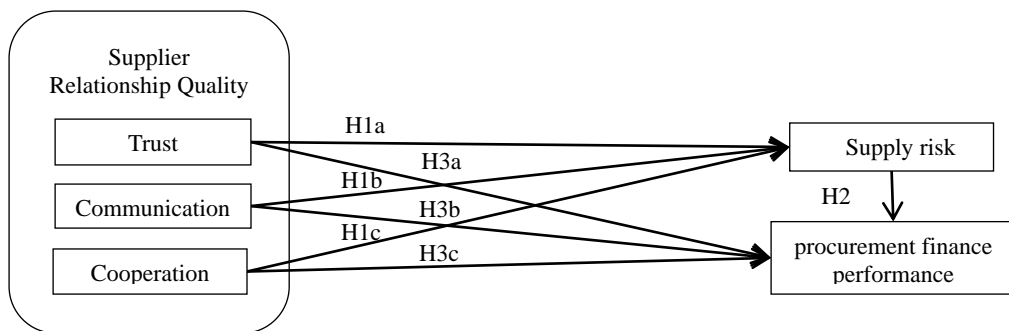
Figure 1   Conceptual Model

3 Research Design

According to the previous literature research and model construction, this paper carried out the design of the questionnaire. The first part of the questionnaire is about the basic information of the subjects. The main part of the questionnaire adopts the Likert scale, from 1 to 5, respective from "very disagree" to "complete consent". The survey was conducted for the middle and primary managers of an enterprises with overseas construction projects. From the beginning of November 2017 to the end of December 2017, 110 formal questionnaires were issued, 97 questionnaires were collected, 6 questionnaires were deducted, and a total of 91 questionnaires were collected. The recovery rate of the questionnaire was 88.18%, and the effective percentage was 93.81%.

In order to verify the accuracy and reliability of the scale, the reliability and validity of the scale must be tested in order to ensure the correctness of the results. In this paper, SPSS 18 software is used to test the KMO scale of the questionnaire, and the Cronbach's Alpha coefficient of the scale is analyzed. The reliability and validity of dimensions of supplier relationship quality, supply chain procurement performance and supply risk data are shown in Table 1.

Table 1   Reliability and Validity Analysis Table

Variable	index	KMO	Cronbach's Alpha
Trust	A1、A2、A3		0.860
Communication	B1、B2、B3	0.851	0.825
Cooperation	C1、C2、C3		0.807
Supply Risk	D1、D2、D3	0.733	0.769
Procurement finance performance	E1、E2、E3	0.699	0.886

Generally speaking, when the value of Cronbach's Alpha is at 0.7-0.8, the reliability is acceptable. When the value of this system reaches 0.8-0.9, the reliability is very good. For the KMO test, the general KMO statistics in 0.8-0.9 show that it is very suitable for analysis. At the time of 0.7-0.8, it is suitable for analysis. At 0.-0.7, it is not suitable for analysis. In contrast, the Cronbach's Alpha coefficients and KMO values in Table 1 are in line with the requirements.

4 Results and Analysis

Through the analysis of the reliability and validity of the model and data, the results show that the structural equation model constructed in this paper is ideal in terms of reliability and validity, which is suitable for further structural equation analysis. We continue to use AMOS21.0 software to analyze the fit indices and path of the model, so as to test the hypothesis. The result of the path analysis of the model is shown in Table 2.

Table 2   Path Coefficient and Correlation

Path	Path coefficient	Estimate	C.R.	P	Result
Trust - supply risk	.17	.16	3.40	***	adopted
Communication - supply risk	.37	.20	5.02	***	adopted
Cooperation - supply risk	.36	.24	4.77	***	adopted
Supply risk - procurement financial performance	.28	.19	3.82	***	adopted
Trust - procurement financial performance	.19	.18	2.71	.01	adopted
Communication - procurement financial performance	.23	.14	3.38	***	adopted
Cooperation - procurement financial performance	.19	.17	4.25	***	adopted

According to the model path coefficient and the significant data shown in Table 2, it shows that 9 causality in the model are all proved, and the hypotheses in the study are adopted.

SPSS18.0's PROCESS plug-in is used in this paper to use Bootstrap method to test the intermediary effect of supply risk. The 95% confidence interval of indirect effects of trust, communication and cooperation on purchasing financial performance is [0.0314, 0.3727], [0.0525, 0.3814], [0.0091, 0.4262], respectively, none of the 0 indicates that the mediating effect of supply risk is significant.

5 Conclusion

Based on the above research, we draw the following conclusions:

First, it is of great significance to maintain and improve the three dimensions of trust, communication and cooperation in the relationship quality. It is vital to maintain the smooth development of the procurement performance of the enterprise supply chain. This also illustrates the importance of developing strategic partnership and the implementation of strategic sourcing in the overseas construction projects.

Secondly, because of the characteristics of overseas construction projects, the risks faced by them are more unique than those of China. The risks in two aspects of supply and demand will have extremely serious impact on the work of both the supplier and the supplier. It is of great significance for overseas construction and construction enterprises to improve risk warning capability and improve risk emergency management mechanism.

Finally, as a multi-party and complex system, the construction supply chain requires cooperation among all members, mutual trust and reciprocity, active sharing of communication information, and placing the overall interests of the construction supply chain in the first place. Only if there is mutual benefit, can the relevant members of the supply chain be able to maximize their own interests.

In this paper, the quality dimension of supplier relationship in construction supply chain is divided, and the influence of construction supply chain risk on the relationship between supplier relationship quality and procurement performance is studied. But because the relationship quality in the supply chain is a concept involving both suppliers and demand-side, Therefore, in the future research on the impact of supplier relationship quality on procurement performance, we can analyze the performance of suppliers, Considering the supplier's performance factors in the procurement performance, we introduce the variable of demand risk to conduct a deeper study. In this way, we can ensure that the research is more comprehensive and at the same time, we can more specifically study the internal relationship and impact of supplier performance and procurement performance.

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An Empirical Analysis on the Convergence of Manufacturing and Information Industry and Its Affecting Factors

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Abstract: Industrial convergence is a new trend of contemporary economic development, a booster for upgrading industrial structure and changing the mode of development. Promoting industrial convergence has a profound impact on the economic development of our country. Based on the data of manufacturing industry segmentation and information industry convergence, this paper establishes multiple linear regression model and ridge regression model, and empirically analyzes the impact of various factors on industrial convergence. The results shows that technological innovation and consumption structure upgrading play a more important role in industrial convergence, and government regulation has a relatively weaker impact on convergence, while the training of composite talents has lagged behind the impact of it. In view of the empirical conclusions in technological innovation, talent training and other aspects, this paper puts forward some suggestions on how to deepen the convergence of manufacturing and information industry in China.
Key words: Industrial convergence; Influencing factors; Multiple linear regression; Ridge regression

1 Introduction

Industrial convergence refers to the phenomenon that the traditional boundary between different industries tends to blur or even disappear, and then a competition synergy between horizontal industries appears, thus forming a phenomenon of greater compound economic effect. The traditional extensive economic growth mode could no longer meet the requirements of economic development. Fostering industrial convergence has become China's new economic growth point, which contributes to transforming the economic development pattern and optimizing the industrial structure. The pursuit of profit maximization by enterprises has prompted the diffusion and absorption of emerging technologies, which has allowed cross permeation of technologies from different industries, resulting in a common technology platform and technology convergence. Economic deregulation of government has lowered entry barrier, makes it possible for enterprises to operate across industries, and provided a good environment for industrial convergence. Modern high-quality composite talents, large multinational cross-industry companies and upgrading of consumer notions are all important driving forces for industrial convergence. These factors have promoted the spread and application of the same technology in different industries, resulting in crossing and overlap between different industries and collaboration between companies in different fields has created greater composite economic effects. Therefore, the deep study of scientific and technological innovation, government regulation and other factors on the specific impact of industrial convergence has an important role in enhancing China's industrial competitiveness, optimizing the allocation of market resources, and forming a new economic growth point.

Most scholars believe that technology and government regulation are the main factors that affect the industrial convergence. For example: Zhi Caoyi (Zhi Caoyi,2001) thinks that technological innovation and government deregulation leads to the formation of competitive and cooperative relationship between enterprises in different industries, and thus industrial convergence occurs. Ma Jian (Ma Jian, 2002) holds that technological innovation is the internal cause of industrial convergence, and the relaxation of economic regulation is the external reason of industrial convergence. Chen Xiaotao (Chen Xiaotao, 2007) discusses the influence of technology diffusion and absorption on the formation of industrial convergence from three aspects: the distance of technology diffusion, the speed of technology diffusion and technology absorption. Zhang Haiyan and Wang Zhongyun believe that technological progress has promoted the formation and convergence development on the creative industries of national culture tourism in China.Dan Yuanyuan and Luo Wei argue that technological innovation and convergence are the main reasons for promoting industrial convergence, while the relaxation of government regulation provides a loose macro-environment for industrial convergence. Other factors that affect industrial convergence include the development of multinational corporations and the cultivation of compound talents, in which Li Wuwei (Li Wuwei, 2002) thinks that industrial

convergence is the embodiment of the inherent law of industrial development. And the factors to promote industrial convergence include industrial innovation, relevance between industries, transnational corporations, and so on. Chen Liuqin (Chen Liuqin, 2007), Xiao Yefei(Xiao Yefei, 2014), Liu Xiangping (Liu Xiangping, 2014) have studied the motive force of China's industrial convergence from the aspects of technological innovation, competition and cooperation relationship of enterprises, pursuit of scope economy, the development of multinational corporations, deregulation and so forth.Chen Caijuan (Chen Caijuan, 2008) clarifies the motive force of industrial integration from enterprises and talents. She thinks that enterprises are the main body of industrial convergence and compound people are the key to industrial convergence. The cultivation of compound talents and the merger and reorganization of enterprises can form a new integrated enterprise. Wu Haijin (Wu Haijin, 2009), Qi Liangqun and Xiu Guangli all think that government policies, the main role of enterprises, technological innovation, and the cultivation of composite talents will affect industrial convergence. And the latter holds that the high correlation, technological innovation and the need to upgrade the industrial structure between industries germinate convergence together. Some scholars have added micro-level--the factors of enterprise management and product. For example: Yoffie (Yoffie, 1997) thinks that management innovation is another significant factor affecting the convergence of the information industry. Zhou Zhenhua (Zhou Zhenhua, 2003) takes telecommunications, radio television and publishing as the research object, add the organizational structure and management innovation of enterprises in influencing factors besides the development and deregulation of information technology. Han Xiaoming (Han Xiaoming, 2006) has divided into different models to study the fundamental causes of industrial convergence. It is considered that the enterprise's pursuit of output efficiency and growth sustainability, the pursuit of economic benefits and the appropriate scale are respectively the fundamental reasons for the convergence of the output mode evolution and the internalization of industrial division of labor. Guo Dongyang (Guo Dongyang, 2014) analyzes the influence of product industry channel, product effectiveness, professional knowledge, specialized assets and industry concentration degree on the convergence of manufacturing and logistics industry.

To sum up, domestic scholars believe that the main factors affecting industrial convergence are: technological innovation, government regulation, enterprise management model innovation, the development of transnational corporations and compound talents and so on. First of all, the study of domestic scholars on the factors affecting industrial convergence is very comprehensive, which analyze the many motive power of industrial convergence but mainly focused on qualitative analysis. And without specific data as the support, it is impossible to quantitatively describe the contribution degree of each factor to industrial convergence. However, with the emergence of the important role of industrial convergence in economic development, it is particularly necessary to provide decision basis and policy effect for decision makers more accurately. Secondly, there are few articles that put the factors of consumption structure upgrading, technological innovation, government deregulation and so forth together to study the influencing factors of industrial convergence. Though technology, government, enterprises and other factors play an important role in the development of industrial convergence, the promotion of consumption structure upgrading on the driving force of industrial convergence still cannot be ignored. The change of consumption structure will directly cause the change of producer's expectation to the market and the adjustment of the company's production decision, thus promoting the intersection between the business to form the emerging integrated industry. For example, the desire of consumers for convenient shopping has prompted the emergence of online shopping platforms, that is, the convergence of traditional sales industry and the Internet has led to a new industry. Finally, the factors affecting industrial convergence can be divided into two levels: macro aspect mainly including technology, talent, government, multinational corporation, consumption structure, etc.; micro aspect including organization, management and products of enterprises, etc.

2 Analysis of the Influencing Factors on the Convergence of Chinese Manufacturing Industry and Information Industry

There are numerous factors that affect the industrial convergence, and the areas with different degree of development will have different level of talent, science and technology, openness, consumption view, etc., the differences of which will lead to the uneven degree of industrial convergence in different regions of our country. The technology, labor factors and development environment of different industries will also lead to uneven degree of industrial convergence. This paper will qualitatively analyze the factors that lead to the difference of industrial convergence between

regions and industries in China through the two aspects of region and industry. The convergence degree is measured by input-output method, that is, the proportion of information technology output to total output is used to represent the convergence degree between information industry and manufacturing industry. Its mathematical formula can be expressed as follows:

The convergence degree of Information Industry and Manufacturing Industry i

$$= \frac{Input\ of\ information\ technology\ in\ production\ process\ about\ industry\ i}{Total\ output\ of\ industry\ I} \times 100\%$$

Table 1   Ranking on the Convergence Degree of China's Manufacturing Subdivision and Information Industry(Unit：%)

Ranking	2007	2010	Ranking	2007	2010
1	Instrument and cultural office machinery manufacturing industry (26.4638)	Instrument and cultural office machinery manufacturing industry (24.0502)	8	Chemical industry (0.8250)	Chemical industry (1.0069)
2	Electrical machinery and equipment manufacturing industry (6.7681)	Electrical machinery and equipment manufacturing industry (6.7979)	9	Metal products industry (0.7127)	Metal products industry (0.8779)
3	General specialized equipment manufacturing industry (3.1057)	General specialized equipment manufacturing industry (3.0656)	10	Petroleum processing, coking and nuclear fuel processing industry (0.5897)	Non-metallic mineral products industry (0.6446)
4	Transportation equipment manufacturing industry (1.7668)	Transportation equipment manufacturing industry (1.9747)	11	Wood processing and furniture manufacturing (0.5641)	Wood processing and furniture manufacturing (0.6441)
5	Paper printing, culture and education sports goods manufacturing (1.5993)	Paper printing, culture and education sports goods manufacturing (1.6233)	12	Non-metallic mineral products industry (0.5405)	Food manufacturing and tobacco processing industry (0.5824)
6	Metal smelting and Calendaring Industry (1.1712)	Metal smelting and Calendaring Industry (1.1692)	13	Textile industry (0.5045)	Petroleum processing, coking and nuclear fuel processing industry (0.4865)
7	Textile, clothing, shoes, hats, leather, down, down and its products industry (0.9155)	Textile, clothing, shoes, hats, leather, down, down and its products industry (1.0261)	14	Food manufacturing and tobacco processing industry (0.4955)	Textile industry (0.4850)

Source: Calculated by the author (based on China input-output tables for 2007 and 2010)

After using the input-output method to estimate the convergence degree of Chinese manufacturing subdivision industry and information industry and ranking, the results come out as table 1. It can be seen from Table 1 that the ranking of the industrial convergence degree in 2007 and 2010 is basically parallel with no significant change, and the range ability of the financial convergence degree of each industry in the two years is relatively tiny. In 2007, the convergence degree less than 1.0 per cent was the food, tobacco processing, textile, non-metallic mineral, etc. 8 industries, and in 2010 it fell to only textiles, petroleum processing and coking, nuclear fuel processing, food manufacturing, tobacco products, etc. 6 industries. In 2007, there are three industries: metal smelting and calendaring processing industry, papermaking, printing, culture and education sports goods manufacturing, transportation equipment

manufacturing, etc. 3 industries reached the convergence degree ranging from 1.0% to 2.0, and it increased to 5 industries in 2010. The chemical industry and textile, clothing, shoes, hats, leather, down and their products industries have been added. The convergence degree more than 2.0% was instrumentation and cultural office machinery manufacturing, electrical machinery and equipment manufacturing and general Specialized equipment manufacturing industry three industries. The industry of the best convergence result was electrical machinery and equipment manufacturing industry, it was 5.086; and the industry of the worst convergence result was food manufacturing and tobacco processing industry with 0.674%.

The internal motive force of the development of industrial convergence is industrial relevance and the goal of the enterprise profits maximization. For example, the manufacturing industry of instruments and cultural office machinery has the characteristics of high technology, high output, low energy consumption, low material consumption and low pollution, which meet the requirements of changing the mode of economic development in the country at present. And as the basic means of information measurement and control, with the progress of science and technology and the acceleration of informatization this industry has a high degree of correlation with other industries, bearing big driving effect and considerable potential for development. Based on the above characteristics, local governments have actively supported the development of the manufacturing industry of instrumentation and cultural office machinery, thus attracting highly-qualified composite talents and multinational companies to enter the industry. These factors will further promote the convergence of the industry and the information industry in terms of technology absorption and diffusion, business intersection and penetration. And for example, although the textile industry is an important component of China's traditional industry, its benefits are now declining and its contribution to the whole economic output value is relatively small. And it is also facing the existing circumstances that the enterprise information level is not high, the technical equipment is backward, the high-quality human resources is insufficient, the cost of factors of production is upward, the environment pollution is serious and so on. This determines that although the barriers to entry in the industry are very low, they are unable to attract international companies with advanced technology and management experience, as well as talent, which in turn leads to a low convergence degree between the textile and information industries.

To sum up, through the comparison of the convergence degree between the manufacturing subdivision industry and the information industry, it is found that the technical characteristics of the industry itself will cause great differences in attracting talents and introducing foreign capital of the industry, thus resulting in the otherness of the convergence degree between the industries. Combined with the research of domestic and foreign scholars and the qualitative analysis of the actual data, this paper establishes the model by selecting the data from 1995 to 2011 to quantitatively analyze the affecting degree of technological innovation, government regulation, the development of multinational companies, the cultivation of compound talents, the changes of consumption structure and other factors on industrial convergence.

3 Model Establishment and Empirical Conclusions

3.1 Model hypothesis and index selection

Through the theoretical analysis on the influencing factors of industrial convergence in the previous chapter, it can be seen that five factors, technological innovation, government regulation, the scale of multinational corporations, the number of compound talents and the upgrading of consumption structure, will have a certain degree of impact on industrial convergence. Based on the above analysis, this paper makes the assumptions given in Table 2:

Table 2 Model Hypothesis

Variables	Measure index	Hypothesis
Technological innovation	$= \dfrac{Technological\ innovation\ R\&D\ Expenditure}{Revenue\ of\ major\ activities} * 100\%$	It is the internal driving force of industrial convergence, and it has positive relationship with it.
Government deregulation	$= \dfrac{\dfrac{Proportion\ of\ large\ and\ medium\ enterprises - sized\ enterpris}{Number\ of\ large\ and\ medium - sized\ enterprises}}{Total\ number\ of\ enterprises} * 100\%$	It provides an external environment for industrial convergence and has a positive relationship with it.

Continual Table 2

Variables	Measure index	Hypothesis
Development of multinational corporations	*Multinational corporation scale* $= \dfrac{Foreign\ capital}{Total\ paid - in\ capital}$	It is an important thrust of industrial convergence and has a positive relationship with it.
Cultivation of compound talents.	*Number of composite talents* $=$ *total number of ordinary undergraduate graduates in subdisciplines* $-$ *total number of ordinary undergraduate graduates*	It is an important force to promote industrial convergence, and it has a positive relationship with it.
Consumption structure upgrading	*Technological innovation* $= \dfrac{Per\ capita\ non-material\ consumption\ expenditure\ of\ urban\ residents}{Per\ capita\ total\ consumption\ expenditure\ of\ urban\ residents}$	It is another thrust of industrial convergence, and it has a positive relationship with it

3.2 Data processing

This paper takes the manufacturing industry as an example to study the factors that affect the convergence between manufacturing industry and information industry. The data are derived from the China Statistical Yearbook and the China Statistical Yearbook of Science and Technology. The proportion of sales revenue of new manufacturing products to the main business income and the proportion of R & D expenditure to main business income these two sets of data are derived from the China Statistical Yearbook of Science and Technology, and the other data are all from the China Statistical Yearbook. The convergence degree is calculated by the input-output method according to the international input-output table[1]. There is a big difference between the sample of compound talents and other samples, so it is more persuasive to take logarithm of this set of data to reduce the gap between samples. Because our country only began to implement the double degree system in 2004, the data of compound talents are all zero in 1995-2003. In view of this, this paper introduces a virtual variable D to distinguish the two periods. That is,

$$D = \begin{cases} 0 \ldots \ldots \text{Before the implementation of the double degree policy} \\ 1 \ldots \ldots \text{After the implementation of the double degree policy} \end{cases}$$

Table 3   Results of Unit Root Test

Variables	Data	Test results	Variables	Data	Test results
y	Original data	Acceptance of original hypothesis	x_3	Original data	Acceptance of original hypothesis
	First order difference	Rejection of original hypothesis		First order difference	Rejection of original hypothesis
x_1	Original data	Acceptance of original hypothesis	x_4	Original data	Acceptance of original hypothesis
	First order difference	Rejection of original hypothesis		First order difference	Rejection of original hypothesis
x_2	Original data	Acceptance of original hypothesis	x_5	Original data	Acceptance of original hypothesis
	First order difference	Rejection of original hypothesis		First order difference	Rejection of original hypothesis

To avoid pseudo regression, the unit root test is performed on the original data and the first order difference data of all variables before regression analysis. The test results are shown in Table 3 that accepting the original assumption means there is a unit root in the group data, and rejecting the original hypothesis indicates the data is stable. You can see from Table 3 that all variables are first-order stationary, and then do cointegration tests on variables y, x_1, x_2, x_3, x_4, and x_5. That is to say, the unit root test is done for the residual series obtained by linear regression. The test results show that there

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[1] Since《China input-output table》was published only in 1997, 2002 and 2007, 《China input-output extension table》was published only in 2000, 2005 and 2010, the years of date are few. The data are derived from the International Input-Output Association website.

is no unit root in the residual series, thus there is a long-term cointegration relationship between variables and we can make multiple linear regression.

3.3 Model establishment

3.3.1 The establishment of multivariate linear regression model.

Model 1 takes the proportion of new product sales income to the main business income as a dependent variable, the proportion of the R & D expenditure of manufacturing industry to the main business income, the proportion of large and medium-sized manufacturing enterprises to all enterprises, the scale of multinational corporations, the number of compound talents and the proportion of non-material consumption to total consumption as independent variables to make linear regression model. The regression results analyzed by eviews6.0 are shown in formula (1). It can be seen from formula (1) that technological innovation, the development of multinational corporations and the upgrading of consumption structure are positively correlated with the industry convergence, which is consistent with the model assumptions in the previous section. However, the government regulation and the cultivation of compound talents are negatively related to industrial convergence, which is not in accordance with the hypothesis in the previous section. The fitting degree is very high that the R^2 value of model 1 is 0.985 and the modified R^2 value is 0.971. The F statistics value of model 1 is 73.680, which is significant at the confidence level of 99.9%, that is, the whole variable has a better explanation for the model. The T statistics value of the variables x_2 and x_4 are -1.318 and -1.247 respectively, which means they are significant at the confidence level of 85%. And the T test value of the variable x_3 is 0.883 denoting the coefficient of the variable is significantly crossed that the variables is not obvious to the industry convergence. The model fitting result is contrary to the reality, and R^2 statistics value of the model is very large but the T test value of each variable is very small. Thus, we can tell it that the model has multiple collinearity.

$$y = 0.276 + 1.031x_1 - 0.007x_2 + 0.006x_3 - 0.006x_4 + 0.033x_5 \tag{1}$$

3.3.2 The establishment of ridge regression model.

Further collinearity diagnosis of the model shows that the VIF values of the variables x_1 and x_5 are 4.907 and 4.597 respectively, the eigenvalue is close to 0 while the dimension is 5 and 6, and the conditional index value is far bigger than 10, which indicates that the model has a serious multiple collinearity. In this paper, the method of ridge regression is used to eliminate the influence of multiple collinearity on the model. Specially used for the analysis of collinear data, ridge regression is an improved least square estimation method. When there is multiple collinearity between independent variables, the variance of regression coefficient estimation is very large, the estimated value is very unstable, and the estimation model is quite different from the actual model. By introducing ridge parameter k and adding a positive constant matrix kI to XX, the estimated value of coefficient is more stable than the model obtained by multivariate linear regression according to $\hat{\beta}(k) = (XX + kI)^{-1}XY$.
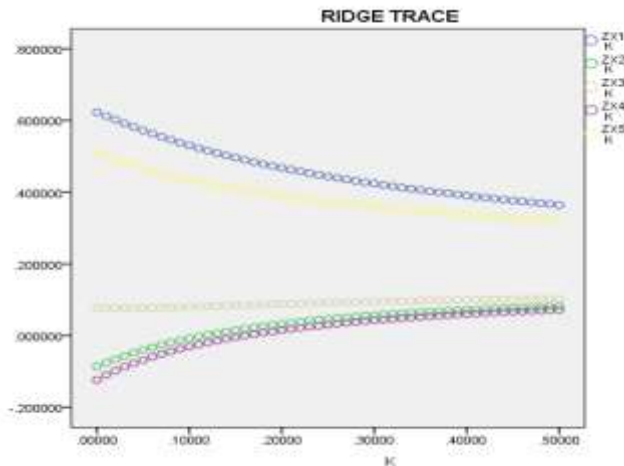
Figure 1   Ridge Trace

First, we use Spss19.0 to standardize all the independent variables and get the new variables $zx_1, zx_2, zx_3, zx_4, zx_5, zx_6$. Then take 0.01 as step size to make the ridge trace map of all variables between 0.0 and 0.5. The result is shown in Fig.1 that the ridge trace tends to be stable and R^2 is 0.914

when k value is 0. 45. Finally, given k is 0.45, the ridge regression equation of the standardized variable is shown as formula (2). The R^2 of model 2 is 0.914 and that of modified model is 0.876, which is lower than that of the original model but the effect of this model has reached a good level. The F test value of model 2 is 23.528, which is significant at 99.9% confidence level.

$$y = 2.317 + 0.104zx_1 + 0.024zx_2 + 0.032zx_3 + 0.021zx_4 + 0.12zx_5 \qquad (2)$$

Through the comparison of model 1 and model 2, it can be seen that the coefficient of unreasonable variables becomes reasonable through ridge regression, that is, the relationship with industrial convergence of the variables of government regulation and the cultivation of integrated talents is changed from negative effect to positive effect. According to table 4, the T test value of the model has also changed greatly. The coefficient of the other variables is significant at the confidence level of 90% except the cultivation of compound talents is significant at the confidence level of 85%. Technological innovation and consumption structure upgrading play a greater role in deepening industrial convergence, while the other variables have a weaker effect on industrial convergence. The government's loosening the economic regulation of various industries to provide a good environment for the industrial convergence is the indispensable external condition which the industrial convergence can take place. The government is not involved in the internal dynamic mechanism of industrial convergence, which may lead to the smaller coefficient of variable x_2. As early as 1995, our country put forward the strategy of rejuvenating the country through science and education, but the cultivation of compound talents started late that there is a shortage of compound talents now. Besides, exerting the effect of the investment of compound talents on industrial convergence needs a long time and this effect is lagging behind, so the influence of compound talents on industrial convergence is relatively weak. Although the development of multinational corporations in China has been very rapid since China's entry into WTO, the introduction, digestion and absorption of foreign advanced technology has always been a difficult problem for our government and enterprises. Therefore, the role on the development of multinational corporations in China has not been fully demonstrated, as a result of which the role of this variable in promoting industrial convergence is not fully played out.

Table 4   T Test Value and P Statistics Value of Model Variables

Model	Technological innovation		Government deregulation		The development of multinational corporations		The cultivation of compound talents		Consumption structure upgrading	
	t	p	t	p	t	p	t	p	t	p
Model1	4.503	0.001	-1.247	0.106	0.883	0.189	-1.318	0.095	5.658	0.000
Model2	5.973	0.000	1.281	0.100	1.711	0.044	1.149	0.148	6.805	0.000

4 Conclusion

Through qualitative and empirical analysis of industrial convergence in different provinces and manufacturing industry segments, we can see that technological innovation, government regulation, talent cultivation and other factors exactly affect the development of industrial convergence. Some conclusions obtained in this paper are as follows.

(1) The integration between technology-intensive industry and information industry is the highest, followed by labor-intensive and capital-intensive industries.In the measurement of theconvergence degree of manufacturing and information industries, instruments and cultural office machinery, electrical machinery and equipment manufacturing industries and etc. ranked in the top basically belong to technology-intensive industries, which have a higher correlation with other industries. It is easier for such industries to apply information technology to the production process and thus to integrate with the information industry. And the food industry and tobacco processing industry and etc. ranked at the bottom basically belong to labor-intensive or capital-intensive industries. Compared with the R & D investment of information technology, they pay more attention to the use of labor resources and capital. These industries are less related to other industries, so they do not have a good convergence with the information industry.

(2) The influence of technological Innovation and consumption structure upgrading on Industrial Convergence is significant.In the multivariate linear regression model, technological innovation and consumption structure upgrading are positively correlated with industrial convergence. And in the Ridge regression model, the effect of technological innovation and consumption structure upgrading on promoting industrial convergence is significant.The innovation and development of information technology is the basis of the convergencebetween information industry and other industries. The

empirical analysis shows that compared with other factors, technological innovation has a greater impact on industrial convergence. Similarly, along with the increase of people's income and the improvement of the living standard, the consumption structure and the consumption idea have also had the obvious change, this has directly caused the change of the product and the service, thus has promoted the emergence of many new products and the emerging industry. It also promoted the development of industrial convergence.

(3)The deregulation of the government, the development of multinational corporations and the training of compound talents have no obvious effect on the industrial convergence.In the multivariate linear regression model, the government deregulation and the training of composite talents are negatively related to industrial convergence. Although the development of multinational corporations is positively related to industrial convergence, its impact is very weak. In the Ridge regression model, the government deregulation, the development of multinational corporations and the training of composite talents all have positive effects on industrial convergence, but the degree of action is not obvious. To a large extent, government regulation has caused barriers to entry between different industries, and the government has not really participated in the internal mechanism of industrial convergence. The development of multinational corporations is an important driving force of industrial convergence, but the role of this variable in deepening industrial convergence has not been fully demonstrated. In addition, there is still a great space for the development of compound personnel in our country.

On the basis of the above three basic conclusions, this paper will put forward the following suggestions on how to promote technological advancing, further expand the scope of government deregulation, strengthen talent cultivation, optimize the development of multinational companies in China and accelerate the upgrading of consumption structure thus deepening the industrial convergence degree.

(1) It is an effective means to deepen the convergence degree of information industry and manufacturing industry in our country by vigorously developing the information technology industry of new generation and enhancing scientific and technological innovation ability of enterprises, universities and scientific research institutions. Specifically, we can enhance the innovation ability of information technology in our country through the following aspects: first, to establish information service centers in different regions to further promote the construction of digital cities in China, to deepen "the convergence of three networks" thus promoting the full coverage of information networks in various regions such as communications and the Internet networks; second, to actively promote enterprise informatization, to promote the application of information technology in various industries thus achieving the penetration of information technology in all production links of enterprises, to vigorously support the informatization of small and medium-sized enterprises thus laying a foundation for the convergence between information industry and other industries in China; third, to further enhance the comprehensive strength of enterprises in science and technology, to establish and improve a system of technological innovation that takes the enterprise as the main body, market as the guidance and combined with production, teaching and research.; fourth, to guide the technological cooperation between upstream and downstream enterprises, evaluate national and provincial innovative enterprises and give corresponding encouragement to different levels of enterprises in order to stimulate the vitality of enterprise innovation.

(2) Speeding up the transformation of government functions to create a looser policy and institutional environment for industrial convergence is indispensable. First of all, it is necessary to play the fundamental role of the market in the resources allocation and relax the economic regulations on various industries. For example, we can enhance the competitiveness of enterprises in the domestic and foreign markets by canceling or partially abolishing the price, investment, service and other restrictions of the regulated industries. Second, to deepen the reform of state-owned enterprises, to promote the agglomeration of state-owned capital into high-tech industries, strategic emerging industries and other fields thus improving the core competitiveness of large state-owned enterprises is important. Thirdly, we should strongly support the development of small and medium-sized enterprises, lower entry barriers and improve the relevant policies or regulations and security system of small and medium-sized enterprises to create favorable conditions for the fair competition of enterprises. Finally, we need to strengthen the construction of characteristic industrial parks and high-tech zones on all regions and guide the gathering of traditional industries and high-tech industries so that the convergence between the two can be realized.

(3) It is initial to fully explore the role of transnational corporations in the economic development of our country. On the one hand, the government should guide enterprises to merge and restructure

across regions and industries, improve the level and quality of utilizing foreign capital, improve the domestic investment environment, and increase the intensity of attracting investment from high-tech industries and strategic emerging industries, broaden the channels for the utilization of foreign capital, optimize the utilization of foreign capital structure, and innovate ways of utilizing foreign capital. On the other hand, domestic enterprises should rely on all kinds of key projects in our country, vigorously introduce foreign core technology, key equipment and advanced management experience, and give priority to developing foreign investment projects with high scientific and technological content and high added value.

(4) We need to highlight the cultivation of compound talents needed in modernization construction and set up interdisciplinary professional mechanisms in universities and scientific research institutions to provide talents guarantee for deepening industrial convergence and speeding up the industrial structure upgrading. Besides, we can improve the quality of higher education, focus on the cultivation of innovative scientific and technological personnel, comprehensive technical personnel. We will step up the introduction of talents, strive to internationalize major cities, speed up the construction on community, school, medical services of urban internationalization and so on, achieve bilingual services in both Chinese and English on government websites, increase the foreign language service content of government windows and public service units to provide comfortable living and working environment for foreign excellent managers and technicians. We will strengthen cooperation between Chinese enterprises, universities and scientific research institutions and international economic and technological institutions, encourage them to cooperate with advanced foreign enterprises, colleges and institutions, and support enterprises' talents, science and technology personnel to go abroad for training and participate in international economic and technological exchanges. We should encourage enterprises to improve our talent market, accelerate the construction of a talent market information platform, and provide more comprehensive information for enterprises and talents.

(5) In response to the current diversified and personalized needs of consumers, on the one hand, enterprises should keep up with the changes in market demand and make rapid adjustments. Enterprises in various industries need to adopt advanced information technology to detect market trends so as to take the lead in time and profit. On the other hand, people's curiosity about new things and the pursuit of a convenient life have forced enterprises to produce kinds of products that can meet the various needs of consumers. This will promote the interaction and penetration of enterprises in different industries, even mergers and acquisitions, thus promoting industrial convergence. Therefore, guiding people to change the consumption notion to promote the consumption structure upgrading can deepen industrial convergence.

Acknowledgement

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Analysis of Export Efficiency of Hubei Manufacturing Industry

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Abstract: In this paper, DEA (Data Envelopment Analysis) method is used to calculate the total factor productivity index of Hubei manufacturing industry in 2006-2015 Malmquist, and the vertical and horizontal comparison is made. The results show that the manufacturing industry in Hubei province exports the main reason is that the enterprise scale, insufficient investment; secondly because of lack of innovation, lack of technical innovation; at the same time the enterprise internal management has certain improvement but its amplitude is smaller. On this basis, the paper puts forward some policy suggestions.
Key words: Manufacturing; Export efficiency; DEA; Malmquist index

1 Introduction

What really concerns the long-term economic growth of a country is not the "quantity" of exports, but the "quality" of exports.Hausmann, Hwang&Rodrik, 2007China's manufacturing exports have leapt to the top of the world, but its export products are mainly concentrated at the end of the global value chain. On May 19, 2015, under the backdrop of the Chinese economy entering a new normal, the State Council issued Made in China 2025 and proposed the development goal of entering into a manufacturing powerhouse of the world by 2025. China's 13th Five-Year Plan also clearly states that it is necessary to further promote international production capacity and equipment manufacturing cooperation and accelerate the optimization and upgrading of foreign trade. It can be seen that how to become a "powerful country" from the "big country" in the manufacturing industry and improve the efficiency and quality of manufacturing product exports has become an urgent and important issue.

Hubei, which is located in central China, has encountered the same problem: the manufacturing industry is large but not strong. The export delivery value of Hubei's manufacturing industry increased from 44.01 billion yuan in 2006 to 167.85billion yuan in 2015, with an average annual growth rate of 16.11%. From a structural point of view, the industries with a high proportion of export delivery values include agricultural and non-staple food processing industry, textile industry, textile and clothing, apparel and chemical raw materials, and chemical manufacturing industries. In 2015, the export delivery value of the above four sub-sectors was 57.049 billion yuan, accounting for 33.81% of the total. This phenomenon indicates that the main export of Hubei manufacturing industries is mainly high-pollution and labor-intensive industries.

We selected 26 subdivided industries in Hubei Province as a sample to study the export efficiency of the manufacturing industryand uses the DEA method to compare the export efficiency of the subdivided industries in Hubei manufacturing industry horizontally and vertically, and to formulate relevant policies for the promotion of manufacturing exports in Hubei Province. Policy to provide reference.

2 Model

The Malmquist Total Factor Productivity Index was first proposed by Caves, Christensen, and DeWitt in 1982. In 1994, Fare et al. gave a non-parametric linear programming algorithm to make the Malmquist Total Factor Productivity Index method widely used. Timothy J. Coelli (Timothy J. Coelli, 1998), University of Queensland, Australia, introduced the method more systematically. The index is constructed from the input-output vectors observed during the period s and the period t, and is measured by the radial distance related to the reference technology. Because the distance can be either output-oriented or input-oriented, the Malmquist TFP varies depending on the orientation of the use. The paper uses the output-oriented Malmquist Total Factor Productivity Index. The Malmquist Total Factor Productivity Index for the period s is given by:

$$m_0^s \ (q_s, q_t, x_s, x_t) \ = \frac{d_0^s(q_t, x_t)}{d_0^s(q_s, x_s)}$$

Similarly, we define the output-oriented Malmquist Total Factor Productivity Index for period t as:

$$m_0^t （q_s, q_t, x_s, x_t） = \frac{d_0^t(q_t, x_t)}{d_0^t(q_s, x_s)}$$

Among them，(q_t, x_t) and (q_s, x_s) represent the input and output vectors of s and t periods respectively. In addition, d_0^s and d_0^t represent the distance functions referenced by the technique T^s of the s period and the technique T^t of the t period, respectively.

Since the Malmquist Total Factor Productivity Index can be defined using the technology of the period s and the technology of the period t, the Malmquist Total Factor Productivity Index is defined as the geometric mean based on the two indices of the period s and the period t. Therefore, the Malmquist Total Factor Productivity Index is given by:

$$m_0 （q_s, q_t, x_s, x_t） = \sqrt{m_0^t （q_s, q_t, x_s, x_t） * m_0^s （q_s, q_t, x_s, x_t）}$$

Where there are technical inefficiencies, the output-oriented equine MQV may be rewritten as:

$$m_0 （q_s, q_t, x_s, x_t） = \frac{d_0^t(q_t, x_t)}{d_0^s(q_s, x_s)} \sqrt{\frac{d_0^s(q_t, x_t)}{d_0^t(q_t, x_t)} * \frac{d_0^s(q_s, x_s)}{d_0^t(q_s, x_s)}}$$

The ratio outside the root number measures the change in technical efficiency between the time s and the time t measured in output-oriented terms, and the geometric mean of the two ratios within the root number represents the technique between the two periods. Variety. If the assumption of constant returns to scale is relaxed, the above technical efficiency can be further decomposed into pure technical efficiency and scale efficiency. We can get the following formula:

$$\text{Tfpch} = \text{Techch} \times \text{Pech} \times \text{Sech} = \text{Techch} \times \text{Effch}$$

In the formula, Tfpch represents the Malmquist total factor productivity index; Techch represents technological progress; Pech represents pure technological efficiency changes; Sech represents scale efficiency changes; Effch represents changes in technical efficiency.

3 Data Sources and Instructions

The study period of this paper is from 2006 to 2015, and the data are derived from Hubei Statistical Yearbook. Since the Hubei Statistical Yearbook adopted the National Economic Sector Classification (GB/T 4754-2011) standard since 2012, there are some changes in the industry's subdivision industry classification standards. In order to ensure the consistency of statistical caliber and the consistency of data, our paper selects 26 manufacturing sub-sectors as research objects. Among them, the rubber and plastic products industry's data before 2011 is the sum of the rubber products industry and the plastic products industry, and the transportation equipment manufacturing industry is the sum of the automobile manufacturing industry and the railway, shipbuilding, aerospace and other transportation equipment manufacturing industries after 2011. Since the oil processing, coking and nuclear fuel processing industries, and the export value of the tobacco products industry all appeared zero, they were excluded.

Because we use the DEA method to measure the export efficiency of the Hubei manufacturing sub-sector. We select the export delivery value of each sub-industry in Hubei Province as the output variable and the total assets of each sub-sector, total industrial output value, and the average number of all employees as the input variable.

4 Empirical Analysis
4.1 Total factor growth rate and its decomposition of manufacturing export in Hubei

DEA analysis was performed using DEAP 2.1 software. The results are shown in Table 1 and Table 2. They respectively show the Malmquist index and its breakdown of the two sectors of the manufacturing industry in Hubei and time series.

Table 1   2006-2015 The Malmquist Index and its Decomposition

Industry Number	TEC	TC	PTEC	SEC	Malmquist Index
1	1.030	0.987	1.029	1.001	1.017
2	1.010	0.985	1.013	0.996	0.995
3	1.060	1.029	0.982	1.079	1.091
4	0.994	1.005	1.038	0.958	0.999
5	0.939	1.003	1.000	0.939	0.942

Continual Table 1

Industry Number	TEC	TC	PTEC	SEC	Malmquist Index
6	1.000	0.999	1.000	1.000	0.999
7	1.056	0.982	1.031	1.024	1.037
8	0.801	0.989	0.960	0.834	0.792
9	0.870	0.988	1.055	0.824	0.859
10	0.945	0.999	1.068	0.885	0.944
11	0.942	1.013	0.958	0.984	0.955
12	1.005	1.019	1.013	0.992	1.024
13	1.022	1.003	1.025	0.997	1.025
14	0.994	1.005	1.118	0.889	0.999
15	0.877	1.000	1.008	0.871	0.877
16	0.940	1.005	0.974	0.966	0.945
17	0.923	1.023	0.952	0.970	0.944
18	0.938	1.002	1.011	0.928	0.939
19	0.974	0.991	1.000	0.974	0.965
20	1.020	1.000	1.046	0.975	1.020
21	1.035	0.991	1.044	0.991	1.026
22	0.992	1.019	1.002	0.990	1.011
23	1.073	0.989	1.065	1.007	1.062
24	1.000	0.990	1.000	1.000	0.990
25	1.034	0.991	1.066	0.969	1.024
26	1.032	1.003	1.059	0.974	1.035

Table 1 gives the overall situation of total factor productivity of exports of 26 manufacturing sub-sectors in Hubei Province from 2006 to 2015. Among them, there are 11 sub-industry TFP growth rate is positive, accounting for 42.31%; 15 sub-industry TFP growth rate is negative, accounting for 57.70%. The average annual growth rate of the wine, beverage and refined tea manufacturing industry was 9.1%, followed by the electrical machinery and equipment manufacturing industry, with an average annual growth rate of 6.2%. The average annual decline rate of the furniture manufacturing industry was -20.8%.

Looking at the index of pure technological efficiency changes, the overall pure technical efficiency of the various sub-industries in manufacturing industry in China is 1.019, showing a good trend. Of the 26 subdivided industries, 21 sub-industries are greater than or equal to 1, and only 5 sub-industries are less than 1. The top three rankings in the growth rate of pure technology efficiency were Manufacture of Chemical Fibres, Printing and Reproduction of Recording Media and Manufacture of Measuring Instruments and Machinery, with growth rates of 11.8%, 6.8%, and 6.6% respectively.

From the scale efficiency change index, there are 18 industries with a scale efficiency change index of less than 1,indicating that the scale efficiency of various sub-industry exports in Hubei manufacturing industry is not high, and there is room for further improvement.

From the point of view of technological progress, the average index of technological progress is 1, and the progress and decline of Hubei's manufacturing sub-sectors offset each other. The technological progress of the Manufacture of Liquor, Beverages and Refined Tea is most obvious. Followed by 1.9% for c Manufacture of Automobiles and Manufacture of Raw Chemical Materials and Chemical Products.

Table 2   2006-2010 Export Efficiency Malmquist Index and Its Decomposition

Period	TEC	TC	PTEC	SEC	TFP
2006-2007	1.105	0.883	1.095	1.009	0.975
2007-2008	1.088	0.797	1.012	1.075	0.867
2008-2009	0.938	0.907	0.860	1.090	0.850
2009-2010	0.326	3.208	0.800	0.407	1.045

Period	TEC	TC	PTEC	SEC	TFP
2010-2011	2.299	0.468	1.770	1.299	1.077
2011-2012	0.707	1.245	0.912	0.775	0.881
2012-2013	1.500	0.759	1.064	1.410	1.139
2013-2014	1.174	0.780	1.144	1.026	0.916
2014-2015	0.785	1.419	0.792	0.991	1.113
Average	0.979	1.000	1.019	0.960	0.979

As can be seen from the above table, the average annual growth rate of manufacturing exports from Hubei Province during 2006-2015 was -2.1%. Although there has been an increase in 2009-2010, 2010-2011, 2012-2013, and 2014-2015, there have been 13.3% and 15% declines in 2007-2008 and 2008-2009, respectively, and the decline is larger, offsetting the increase. It can be seen that the global financial crisis in 2008 had a very large negative impact on the export of Hubei's manufacturing industry. Both the technical efficiency and the scale efficiency have shown a decrease in the lower range, which has dropped by 2.1% and 4.0% respectively. Although the efficiency of pure technology has grown, it has not been significant, with an annual average of only 1.9%.

4.2 Cross-sectional data analysis of hubei's manufacturing export efficiency in 2015

Table 3   Manufacturing Technology Efficiency and Its Decomposition in 2015

Industry Number	TE	PTE	SE	RTS
1	0.289	0.294	0.983	drs
2	0.311	0.341	0.911	irs
3	0.018	0.075	0.237	irs
4	0.306	0.452	0.676	drs
5	0.567	1.000	0.567	drs
6	1.000	1.000	1.000	-
7	0.035	0.258	0.137	irs
8	0.046	0.519	0.088	irs
9	0.010	0.186	0.054	irs
10	0.048	0.293	0.164	irs
11	0.424	0.680	0.623	irs
12	0.241	0.262	0.922	irs
13	0.365	0.384	0.949	irs
14	0.246	1.000	0.246	irs
15	0.026	0.107	0.243	irs
16	0.045	0.066	0.678	irs
17	0.128	0.170	0.756	irs
18	0.084	0.229	0.367	irs
19	0.112	0.155	0.719	irs
20	0.118	0.157	0.749	irs
21	0.100	0.147	0.680	irs
22	0.088	0.097	0.903	irs
23	0.245	0.266	0.924	irs
24	1.000	1.000	1.000	-
25	0.136	0.424	0.321	irs
26	0.171	0.560	0.305	irs
Average	0.237	0.389	0.585	

In 2015, there were a total of two industries at the forefront of production: Manufacture of Leather, Fur, Feather and Related Products and Footwear and Manufacture of Computers, Communication and Other Electronic Equipment. Their overall efficiency, technical efficiency, and scale efficiency are all optimal, indicating that the export efficiency of these two industries is effective for DEA.

The export efficiency of manufacturing enterprises in Hubei is low in scale. Looking at the scale of returns in 2015, 23 of the 26 manufacturing industries are in an increasing phase, accounting for 80.76%; three industries are in a decreasing phase, accounting for 11.54%; and two industries are in the constant

stage of scale compensation, accounting for 7.69%. It shows that the manufacturing enterprises in Hubei Province have increased their investment, and the expansion of production scale will increase the export efficiency of these enterprises. The pure technical efficiency of the Manufacture of Textile, Wearing Apparel and Accessories and Manufacture of Chemical Fibres are all 1. The pure technical efficiency of these two industries is optimal, but their scale efficiency is not high. The Manufacture of Textile, Wearing Apparel and Accessories is in the stage of diminishing returns to scale, and Manufacture of Chemical Fibres is in the stage of increasing returns to scale. This shows that from the perspective of export efficiency, the former should reduce investment and scale down; the latter should increase input and expand production scale.

In 2015, the average comprehensive technical efficiency, pure technical efficiency, and scale efficiency of various industries in Hubei Province were 0.237, 0.389, and 0.585, respectively. The inefficiency of comprehensive technical efficiency is mainly due to the lack of efficiency of pure technology.

5 Conclusion

From the above studies, we can see that in order to increase export efficiency, Hubei's manufacturing industry should start with increasing scale efficiency and technological progress. Although Hubei is a major province of education but not a major province of innovation, innovation has not yet become industrial competitiveness and increased scientific research investment. And actively promote the industrialization of scientific research results and form an international competitiveness to promote the export of manufacturing products.

From the view of returns to scale, most of the subdivided manufacturing industries in Hubei Province are in the phase of increasing returns to scale, which shows that there is still considerable room for improvement in the scale of manufacturing exports from Hubei Province. That is, Hubei Province should increase investment in manufacturing. Further expand the production scale of manufacturing enterprises, promote the export of manufacturing industries and increase the export efficiency of manufacturing industries.

Acknowledgement

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The International Financial Reporting Standards Adoption and Value Relevance: A Case of Sri Lanka

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Abstract: In line with the global convergence of International Financial Reporting Standards (IFRS/SLFRS), all companies listed in Colombo Stock Exchange (CSE) were required to adopt IFRS/SLFRS in preparation of their financial statements with effect from 01st January 2012. Prior to the adoption of IFRS, these firms reported under Sri Lanka Accounting Standards (SLAS). This study examines two sets of financial statements prepared under the above two reporting regime to identify the improvement in value relevance of financial information. The sample of the study consists of 157 firms listed in CSE during the period of 2007 to 2015. In order to test whether IFRS/SLFRS accounting numbers correlate more strongly with stock prices than SLAS accounting numbers, several measures of value relevance are compared between the pre-IFRS adoption period and the post-IFRS adoption period. This study utilized two value relevance metrics. First, value relevance measure is based on the association (adjusted R^2) from a regression of Stock prices on earnings and book value of equity derived from Ohlson (Ohlson, 1995). Second value relevance metric of this study is based on the explanatory power (adjusted R^2) from regressions of net income on annual stock return separately for good news and bad news firms. The findings of the study revealed that the adjusted R^2 for the firms under SLAS significantly higher than that of under IFRS/SLFRS indicating that the earnings and book value of equity are more value relevant under SLAS compared to IFRS/SLFRS. These results are inconsistent with the prediction and with most of the prior studies. This implies that the adoption of IFRS/SLFRS did not improve the value relevance of financial information instead the value of financial information was deterred for Sri Lankan firms.
Key words: Value relevance; IFRS; SLAS; Sri Lanka

1 Introduction

In Sri Lanka, International Financial Reporting Standards (IFRS) were initially introduced in 2011. However, fully convergence of IFRS took place in 2012 due to the fact that IFRS is highly technical and companies and other bodies needed a considerable period of time to understand these Standards. Only a few companies prepared their financial statements using IFRS in 2011. From 01st of January 2012, all the companies listed in the Colombo Stock Exchange were mandated to prepare their financial statements in accordance with IFRS. Even though this implementation of IFRS was termed as the convergence of IFRS, there was fully adoption of IFRS merely labeling them as SLFRS. Prior to the adoption of IFRS, Sri Lankan firms reported under Sri Lanka Accounting Standards (SLAS) which were virtually same as International Accounting Standards (IAS). There are several purposes of adopting IFRS as a mandatory requirement for financial reporting. According to The Institute of Chartered Accountant (CA Sri Lanka), which is the authorized body for issuing accounting standards in Sri Lanka, the primary objectives of Adoption of IFRS are; (i) to produce high quality, transparent and comparable information in financial statements and financial reporting to help users of information to make economic decision (ii) to promote the use of rigorous application of those standards (iii) to bring about convergence of Sri Lanka Accounting Standards and IFRS to produce high-quality solution. Mandatory adoption of IFRS was expected to bring certain benefits to the country. First, investors are benefited from making available accounting information which is more reliable, relevant, timely and most importantly comparable across different jurisdictions. It will enable them to make rather rational and more valid decisions. Second, from the professionals' standpoint, having considerable knowledge of globally accepted accounting standards empower them to provide their service in various part of the world. Third, complying with IFRS will lead to a higher level of consistency in reporting structure and the requirements; better access to international capital, improve the confidence of international investors.

IFRS are globally accepted high quality a single set of accounting standards issued by International Accounting Standards Board, IASB, in London. The primary objective of IFRS is to reduce information asymmetries between countries (Barth et al., 2008) and different users of the financial statements, primarily investors (Haller et al., 2009). Many studies investigating consequences of IFRS adoption

have revealed that the primary objective of IFRS has been met. The findings of those studies indicate that the accounting quality under IFRS is higher than that of under Local Accounting Standards. (Barth et al., 2008; Capkun et al., 2008). When the quality of financial statements is increased, it reduces the information asymmetries for different users (Tarca, 2004; Ashbaugh et al., 2001) and which in turn affects the efficient allocation of investment among different companies. However, whether or not the mandatory IFRS adoption leads to a higher accounting quality is still controversial. Therefore, Studies which examine the consequences of IFRS adoption are very important, because it provides an opportunity to understand how the IFRS is being applied and whether the required disclosures are useful to investors for equity decision.

The study aims to compare the value relevance of accounting information under two reporting regime. The study period of this paper spans from 2007 to 2015.   During the period of 2007 to 2011, the financial statements of Sri Lankan firms were prepared in accordance with SLAS, and during the period 2012 to 2015 Sri Lankan firm produced IFRS compliance financial statements. This enables the comparison of value relevance of financial information between pre and posts-IFRS adoption. Such comparison is important because it reveals whether or not financial information under IFRS is more value relevant than that of under local accounting standards. Eccher and Healy (2000) argue that IFRS are more suitable and can produce high-quality accounting information when it applies to countries with highly developed capital markets such as the US and UK. It is reasonable to question, even if IFRS are high-quality enforceable accounting standards, whether these accounting standards are optimal for developing and less developed countries where institutional setting and enforcement mechanism are far different from developed countries. Thus, this study provides useful insights to the ongoing debate of whether or not IFRS accounting numbers are more value relevant.

2 Prior Studies and Hypothesis Development

Conceptual Framework for preparation and presentation of financial statements introduced by IASB prescribes four qualitative characteristics that should be embedded in financial information. Among them, one of the most important qualities is relevant. Relevant financial information enables the users to make decision differently. Financial information is relevant, if and only if, it contains a predictive value or confirmatory value. If users can use financial information in predicting future outcomes, information is said to have predictive value. As well as, financial information has confirmatory value if it provides feedback about previous evaluations. Therefore, if financial information is relevant, investors will use this information when making investment decisions. This will result in a closer association between accounting numbers such as earnings and market measures such as Stock prices and returns (Amir, Harris Venuti, 1993; Francis and Schipper, 1999; Ali and Hwang, 2000; Hung, 2000).

There have been several studies, which focus on the value relevance of accounting amounts after the mandatory adoption of IFRS. These include Goodwin, Ahmed and Heaney and Ahmed and Goodwin from Australia; Gjerde, Knivsfla, and Saettem from Norway; Horton and Serafeim and Christensen, Lee, and Walker from the UK. There have also been studies focuses on multiple countries IFRS adoption and value relevance. For example, Capkun, Cazavan-Jeny, Jeanjean and Weiss for 7EU countries; and Wang for 14 EU countries find that no incremental value relevance under IFRS adoption. A study conducted by Christensen, Lee, and Walker and Horton and Serafeim find that UK firms exhibit incremental price relevance under IFRS. Another study conducted by Capkunet al. reveal IFRS financial statement convey more value relevant information relative to local UK GAAP. Wang observe the return and net income reconciliation under IFRS and find that is once again consistent with incremental value relevance for IFRS. All of the studies focus on mandatory IFRS adoption use incremental value relevance approach. The reason is that incremental value relevance approach test whether IFRS information has incremental explanatory power for the Stock price. However, most of the previous empirical studies suggest that IFRS amounts highly value relevant. Thus, the following hypothesis is formulated.

H1: The Value Relevance of post-IFRS accounting information is higher than the value relevance of pre-IFRS accounting information

3 Empirical Method
3.1 Sample and data

The population of this study is all the companies listed on CSE. As on the 01st of March 2018, there are 299 companies listed on CSE representing 20 business sectors. However, the final sample of

the study consists of 157 companies. Following is the sampling procedures of the study. First, all the companies listed under the Banking, Finance, and Insurance industry sector were excluded, since the regulatory and enforcement mechanisms for these companies are far different from that of for other companies. Thus, accounting quality of these companies may be higher than other companies even prior to the mandatory adoption of IFRS (SLFRS). Second, the companies with non-March financial year ending were excluded from the sample. Third, companies quoted on or after 31st March 2015 were excluded due to the sample period of the study spans from financial year 2007/2008 to 2014/2015. Finally, several companies were excluded from the final sample due to insufficient of data available over the sample period. Data for the study were manually collected from the annual report of the firms.

3.2 Value relevance metrics

This study includes two measures of value relevance. First, value relevance measure is based on the association (adjusted R2) from a regression of Stock prices on earnings and book value of equity derived from Ohlson (Ohlson, 1995). Firms with superior accounting quality are expected to exhibit a higher association between Stock prices and earnings because higher quality earnings should better reflect a firm's underlying economics (Ali and Hwang, 2000). Stock price (P), is first regressed on industry indicator variable in order to control for mean differences in Stock price across industries. The residuals from this regression (MVPS*) are then regressed on the book value of equity per Stock (BVPS) and net income per Stock (NIPS). Stock price (MVPS) used in this study is the price of Stocks three months after financial year-end. The reason for this is that financial statements (annual reports) of firms are made available to the public mostly after three months' time. Thus, the first value relevance measure is based on the adjusted R^2 from equation (1).

$$MVPS^*_{it} = \alpha0 + \alpha1 BVEPS_{it} + \alpha2 NIPS_{it} + \varepsilon_{it} \qquad (1)$$

A higher adjusted R^2 indicates that there is a closer association between earnings and Stock prices, therefore greater use of financial information to users. Thus, a higher adjusted R^2 is indicative of a close association between Stock price and accounting numbers.

Second value relevance metric of this study is based on the explanatory power (adjusted R^2) from regressions of net income on the annual stock return. Following Barth et al. (2007) earning and return relationship is calculated separately for the firms with positive and negative returns. This is because the firms are divided into two categorize as good new firms and bad new firms. Then, taking earning as dependent variable two reverse regressions were estimated for good news and bad news firms separately. Same as the equation (01), earning, measured as net income per Stock divided by Stock price at the beginning of the year (NIPS/P), is first regressed on industry indicator variable to control for mean difference across industries. The residual from this regression is named as [NIPS/P] * and which is then regress on annual stock return (RETURN). Following Lang, Raedy, and Wilson (2006) and Barth, Landsman, and Lang (2008), annual stock return (RETURN) is measured as the natural logarithm of the ratio of stock price three months after fiscal year end to stock price nine months before fiscal year-end, adjusted for dividends.

$$[NIPS/P] ^*_{it} = \alpha0 + \alpha1 RETURN_{it} + \varepsilon_{it} \qquad (2)$$

As with previous equation (01), this regression was estimated separately for pre-adoption and post-adoption periods. A higher adjusted R^2 indicates that there is a closer association between earnings and return, therefore greater usefulness of financial information to users. Thus, a higher adjusted R^2 is indicative of higher value relevance.

4 Data Analysis and Results

4.1 Descriptive statistic

This section presents descriptive statistics for the sample firms to provide insight into firm characteristics. Descriptive statistics for test variables are presented in Table 1. Specifically, Table 1 presents the descriptive statistics for each of these variables pooled over the sample period. In order to reduce the effects of extreme observations variables have been winsorized at the 2.5 and 97.5 percentiles.

Table 1   Descriptive statistics for test variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Obser.
			Test Variables			
RETURN	0.050	0.085	1.859	-2.029	0.905	1256
NIPS/P	0.117	0.061	0.706	-0.085	0.182	1256
MVPS	199.628	70.500	1,300.000	4.900	332.981	1256

Continual Table 1

	Mean	Median	Maximum	Minimum	Std. Dev.	Obser.
			Test Variables			
BVPS	143.082	53.578	777.975	2.242	210.785	1256
NIPS	12.975	4.112	79.375	-3.375	20.821	1256

The average Stock price (MVPS) for firms over the sample period is Rs.199.62. The median Stock price is quite lower at Rs.70.50 reflecting skewness in price. Fundamentally, based on theories of market efficiency, the annual means for MVPS should follow the pattern for NIPS. However, reported mean values for MVPS and NIPS do not show such a close pattern indicating the inefficiency of the market. The descriptive statistics for the annual Stock returns (RETURN) show the overall mean (median) value of 0.050 (0.085). This variable is measured as the natural logarithm of the ratio of stock price three months after fiscal year end to stock price nine months before fiscal year-end, adjusted for dividends.

4.2 Results of the value relevance metrics

This study employed two value relevance models to compare the association between accounting information and Stock prices under pre-IFRS and post IFRS period. The first model is based on the relationship between Stock price and accounting information (BVPS & NIPS). The second model measures the relationship between annual stock return (RETURN) and accounting information (NIPS/P*) and is estimated separately for both good news firms and bad news firms. Regression results of the first model reveal that there is a significant positive association between MVPS* and BVPS&NIPS (results are not reported here). Similarly, annual positive stock return (Good News) is positively correlated with net income per share scaled by stock price.

Table 2   Summary of the results for value relevance metrics.

Value relevance	Prediction	Pre IFRS R^2	Post IFRS R^2	H_1
MVPS* and BVPS & NIPS		41.84%	34.78%	Not supported
NIPS/P* and RETURN Good News Bad News	Pre IFRS <post-IFRS	5.16% 2.48%	1.87% 1.56%	Not supported

Adjusted R square (R^2) for each value relevance metrics for each period are tabulated in Table 2. As shown in the Table 2, nearly 42 percent of the variation of stock price is explained by the variation of book value per share and net income per share in the pre IFRS period whereas only 34.78 percent of the variation of stock price is attributable to the variation of selected accounting information variables indicating that the deterioration of value relevance of accounting information following IFRS adoption. The findings of the first regression are inconsistent with the prediction and therefore hypothesis one is rejected. The results of the second value relevance metrics are also inconsistent with the prediction. This study predicted that there would be a higher association between annual stock return and net income per share scaled by share price in the post-IFRS adoption period. According to the Table 2, the adjusted R^2 value for the pre IFRS adoption period for the good news firms is 5.16 percent and that of for bad news firms is 2.48 percent. Showing a decline in value relevance of accounting information, the adjusted R^2 value for the post-IFRS adoption for good news (bad news) firms is 1.87 %(1.56%). But as expected, results indicate that higher adjusted R^2 value (5.16%, 1.87%) for good news firms during both pre and post-IFRS adoption. However, the regression results as a whole do not support the hypothesis developed in this study thereby hypothesis one is rejected.

5 Conclusion

This study compared the value relevance of accounting information between pre-IFRS and post IFRS adoption period.   Collecting data from a sample of 157 firms listed in CSE over the period of 2007 to 2015, this study employed two value relevance models in line with Ohlson (Ohlson, 1995). In the first model, book value per share and net income per share regressed against stock price to uncover the association between accounting information and share price. In the second model, the annual stock return was regressed against net income per share scaled share price.

This study found that the value relevance of accounting information is relatively low in the post-IFRS adoption period. These results were inconsistent with the prediction of the present study and most of the prior studies which have concluded that the value relevance of IFRS accounting numbers is

higher than that of under local accounting standards. Even though, the present study reveals that a decline in value relevance of accounting information following IFRS adoption in Sri Lanka, such decline cannot be directly attributable to the IFRS adoption. Further, the results of the study neither condemn nor discourage the use of IFRS in preparation of financial statements. This is because there is no substantial evidence to claim such decline in value relevance of accounting information following IFRS adoption since the value relevance models used in the study may not sound enough to capture the value relevance in a weak institutional setting. Moreover, such a deterioration of value relevance of accounting information may be attributable to the recent market manipulation in the CSE such as insider trading and "pump and dump" tactics that artificially jostle share prices towards the benefit of a handful of individuals.

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Standardization of the Prosthetic Fitting Process in China: A Case Study of Hubei Province

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Abstract: It is particularly important to study and promote the standardization of prosthetic fitting process in the face of a large group of physically handicapped people and ever-growing demand for prosthetic fitting. Through field research with interviews and observations, this study examines the current situation of prosthetic fitting process and makes analysis on the standardization of the process in Hubei Province. Findings indicate thatprosthetic fitting process in Hubei province is relatively complete, with advantages of comprehensive services and systematic evaluation. However, there are still some limitations, such as a lack of prosthetic fitting use evaluation institutions, no early strength training for handicapped, and shortage of professional talents. We further propose countermeasures including enhancing the level of professional evaluation, improving prosthetic training equipment, and training professional talents, etc., expecting to accelerate the standardization of prosthetic fitting process.
Key words: Prosthetic fitting; Standardization; Case study; Hubei province

1 Introduction

In recent decades, with the joint action technology and economic factors which contribute to the high rates of safety misadventure and traffic accident, the number of the physically handicapped population is increasing. The growing number of physically handicapped persons drives growth in demand for prosthetics.In the meantime, forphysically handicapped people from different physical conditions, economic levels and living environment, their demand for prosthetics varies. The key to application of assistive devices and technologies is adaptation, as there is no best assistive device, just most suitable one, and adaptability is benefit for utilization of residual functions and improvement of the situation. In April 2011, China Disabled Persons' Federation (CDPF) conducted a nationwide real-name survey on the need for rehabilitation of people with disabilities, and it found that 91.9% of the people with disabilities demanded for assistive devices. From November 1, 2012 to October 31, 2013, the rate of disabled persons receiving prosthetic fitting services in the urban and rural area of China is 20.7% and 16.3% respectively. There are significant disparities between the actual configuration and needs of assistive devices for the disabled persons in China (Zhong et al, 2014). Prosthetic fitting is an important means for amputee rehabilitation and returning to society.For amputees and people with amelia, prostheses are artificial limbs and devices that directly compensate for limb disability, which can enhancetheir compensatory functions, reduce or offset physical disorders, and thus promote their participation in social life.

Prosthetic fitting promotes development of the work on persons with disabilities, and takes an important role in the supply and demand relations in the market. A variety of practices have been carried out on prosthetic fitting in China. As far as the ways and effects practices are carried out, mostly take hardware development as the starting point to drive the development of prosthetic fitting, focusing on technology research and development and technical operations. Actually prosthetic fitting is not only a technical problem, but it also involves needs investigation, adaptation services and effective evaluation, etc., which are a complete process. Construction of a standardized and specialized prosthetic fitting process is conducive to meet the varied and individualized needs of physically handicapped people, to ensure the quality of prosthetics, and to improve the service level and service efficiency of prosthetic service organizations. In this way, the independent living capacity of physically handicapped people can be restored, and their early return to family and society can be achieved. Through a systematic and in-depth exploration in the prosthetic fitting process in Hubei province, this studyaims to analyze the present situation and existing problems of prosthetic fitting process, and put forward corresponding feasible countermeasures, expecting to promote the standardization of prosthetic fitting process.

2 Literature Review

Previous studies in China mostly discuss the status quo of prosthetic fitting, analyze the problems existing in prosthetic fitting and put forward countermeasures, and carry out the research on the application of science and technology according to the specific amputation situation when carrying on the case analysis.Wu et al. (Wu et al., 2008) studied the patients with thigh amputation in Sichuan province, and concluded that the procedure of prosthetic assembly includes systematic rehabilitation intervention, prosthetic assembly, and intensive training for prosthetic assembly and its use methods after amputation. Han et al. (Han et al., 2017) considered that prosthetic assembly includes four procedures: rehabilitation and training prior to prosthetic installation, temporary prosthesis assembly, form prosthetic and functional reinforcement training and walking adaptation training in various complex environments. Liu et al. (Liu et al., 2017), in another case study in Guangdong province, stated that prosthetic fitting could be treated first, then designed, manufactured and installed. In the study of prosthetic fitting process in Hubei Province, Zhao et al. (Zhao et al., 2002) focused on the use training of patients, which was divided into three parts: standing training, balance training, walking training and the application of walking aids. Subsequently, Zhao et al. (Zhao et al., 2004) in the process of intelligent hip prosthesis assembly, it is proposed that the procedure of prosthetic assembly should include: preparation before assembly, assembly and training of temporary prosthesis, configuration of prosthesis, fabrication and assembly of prosthetic receiving cavity. Five parts of prosthetic debugging and walking training. Yang et al. (Yang et al., 2005) studied and analyzed 17 patients with spinal cord injury. It was concluded that the prosthetic assembly process was divided into three parts: different orthosis and training of the lower extremities. Overseas researchers present a more detailed picture of the issue, focusing on the users' perspectives on the prosthetic fitting. Webster et al. (Webster et al., 2012) described the rate of successful prosthetic fitting over a 12 month periods; described prosthetic use after amputation; and explored factors associated with greater prosthetic fitting, function, and satisfaction. Findings indicated most individuals achieved successful prosthetic fitting by one year following a first major non-traumatic lower-limb amputation, and utilization and function of prosthetic fitting depends on both medical variables and psychosocial factors. Leow et al. (Leow et al., 2013) described short finger stumps fitting process and evaluated 10 patients'fitting. Lineham et al. (Lineham et al., 2014) describes the revision process of the prosthetic fitting, and to improve prosthesis fit and comfort through a case report.

To sum up, comprehensive research on prosthetic fitting process rarely exist in China. The existing researches on prosthetic fitting process are mainly focused on the economically developed areas, mainly using case study method to elaborate andanalyze the prosthetic fitting process in cases. Cases highlight the stage of training before prosthetic fitting and prosthetic use training methods, regardless of any other stages. Convergence shows in the prosthetic fitting process elaborated in existing researches, and standardized and professional prosthetic fitting process is not brought up. Also, demand and training items and duration of individual client are stressed, making the prosthetic fitting process not universally applicable; in addition, different procedures of the process are briefly described, and some parts are missing. The research in Hubei Province is insufficient. The number of disabled persons in Hubei province is 3.794 million, of which 1.057 million are limb disabled, about 1000 of them are amputees each year, and 70,000 of them can stand and walk after installing prostheses and orthotics. Hubei Province is one of the three provincial experimental zones for social security and public service for the disabled in China. There are a huge amount of physically handicapped persons and heavy demand for prosthetic fitting in Hubei Province, which is typical and representative. It is of practical significance to analyze the status quo of prosthetic fitting process in Hubei Province.

3 Data and Methodology

Qualitative research methods are adopted in this study, and the central part of China, Hubei province, is taken as the case. By field research method, the research team visited the Orthotics and Prosthetics Center of Hubei Disabled Persons' Federation, which is one specialized rehabilitation organization set under Hubei Disabled Persons' Federation, specializing in prosthetics and orthotics manufacture and fitting. We got first-hand data through interviews and observations. There are eight technical persons, five of which holding professional qualification certificates; they design prosthetics, fit them and provide services for patients with different physical conditions. During the research, the staff of the center elaborated on the general situation of prosthetic fitting in Hubei province and the fitting process, guided the research team members in visiting the housing conditions the center provided for patients, equipment for manufacturing prosthetics, prosthetics molds and training facilities, and introduced the usage methods of all facilities one by one, so as to deepen the research team members'

understanding on prosthetic fitting process, and provide detailed and authentic data for the study in this paper.

4 Research Findings

The prosthetic fitting process in Hubei province includes: prosthetic fitting plan put forward, needs investigation, expectations assessment, stump measurement, mold manufacture, prosthetic manufacture and fitting, use training, effects evaluation.

4.1 Prosthetic fitting plan

Every year Assistive Devices Resource Center for Persons with Disabilities of Hubei Province under Hubei Disabled Persons' Federation puts forward the prosthetic needs quota plan for physically handicapped persons in accordance with the plan of CDPF. Currently, except for persons amputated for traffic accidents and those who have compensation amount, for factors like limit of human resources and plan quota, every year only 20-30 people can get prosthetic fitting.

4.2 Need investigation

Based on the situation of physical disabilities and fundamental prosthetic fitting standard for those with the need, Disabled Persons' Federation of the city and county conduct preliminary investigations in the city and county, and civil affairs commissioners report the number of eligible persons to Orthotics and Prosthetics Center of Hubei Disabled Persons' Federation. If family economic conditions are not so good, physically handicapped persons with Disabled Identification Card may submit an application to local competent departments, and get fund support from the project. Other patients with need for prosthetic fitting may fit prosthetic after they submit application to Disabled Persons' Federation and prove qualified after investigation.

4.3 Expectations assessment

A t initial stage, Hubei Orthotics and Prosthetics Center will conduct preliminary investigation on patients' basic information, such as their occupation, amputation parts, and amputation reasons, whether there is record for them fitting prosthetic, family economic conditions, fund resource for first fitting, and whether they have other disabilities. Then they learn about some other aspects, such as their living conditions before prosthetic fitting, daily activities (bathing, walking outside, simple housework, doing manual labor, bicycling, etc.), main entertainment activities, whether the neighborhood committee carry out collective recreational activities or not, so as to manufacture prosthetics that are suitable for their living environment.

4.4 Stump measurement

After the number of persons for prosthetic fitting is confirmed, based on different situations, one of the following two programs is chosen to conduct measurement on the stump part of patients: if the number is proper, local government staff organize patients to go to the center for treatment; if the number is too large, the center dispatches medical staff to local places for stump measurement before prosthetic fitting.

4.5 Mold manufacture

Technical staff make molds at Disabled Persons' Federation of the county or city according to the fitting measurement chart, and take the molds back to the base.

4.6 Prosthetic manufacture and fitting

a. Technical staff first conduct prosthetic modelling on the basis of measurement statistics, one day for one case approximately; b. When the prosthetic gets dry by airing, use machine to polish it smooth on surface; c. Install parts; d. Fit prosthetic for patients, check the suitability and try sample; e. Adjust the prosthetic for patients whenever needed; f. On completion of adjustment, coat the prosthetic with foam of similar color as skin, and prosthetic manufacture is completed. The complete prosthetic manufacture process takes about one week.

There are two types of prostheses at the Orthotics and Prosthetics Center of Hubei Disabled Persons' Federation: stainless steel and titanium-tin. Stainless steel prosthetic is heavier; while titanium-tin one is lighter, and can be subject to appropriate modifications during exercises, which save effort and is more comfortable, but more expensive. The comfort level of prosthetic is relevant to materials, and certain differences exist between the materials of normal prosthetic and more expensive ones.

4.7 Use training

The center provides professional training equipment for patients in fundamental training such as walking, ascending and descending, going upstairs and downstairs. During training period, patients can

live at the center for three to five days based on their individual adaptation conditions. The center provides free accommodation for patients and patients' family members.

4.8 Effects evaluation

After physically handicapped persons leave the base, the center arranges follow-up visits to them within one to three months, and makes proper adjustment and modification on the assistive devices. Now for limit of human resources, follow-up visits are mainly telephone follow-up, only few done by revisit. The content for follow-up includes: a. Situation of the prosthesis: whether part of the skin is red and swollen; whether the weight-bearing area is proper or not; whether the prosthetic alignment is proper or not; whether the false foot is fractured or not; whether the socket is proper and without damage or not, etc.; b. Prosthetic use conditions: daily walk distance; weight-bearing capacity; whether the patient can drive or not, etc.; c. Current state of life: whether the patient is capable of working, his/her self-care status, etc.

The service lifetime prosthesis for one case is about two years. In case the patients are in need of prosthetic refitting, they may apply to the local Disabled Persons' Federation.

5 Conclusion

Standardization and professionalization of prosthetic fitting process play a vital role in development of prosthetic fitting and rehabilitation of physically handicapped persons. It requires specified process and steps for prosthetic fitting: prosthetic fitting plan put forward, needs investigation, expectations assessment, stump measurement, mold manufacture, prosthetic manufacture and fitting, use training and effects evaluation.

The work of prosthetic fitting in Hubei province has made some achievements. First, it provides convenient services. Orthotics and Prosthetics Center of Hubei Disabled Persons' Federation has set up a number of stations, which execute similar process, and among them there is close communication—patients can go to the nearest one for prosthetic fitting. Sometimes, the center arranges staff to go to villages and towns or local government makes unified arrangement for patients to go to the center for treatment, which is very convenient for users. Second, it has a comprehensive evaluation. The center has prepared "Prosthetic Disposal List of Orthotics and Prosthetics Center of Hubei Disabled Persons' Federation" and "Prosthetic Fitting Follow-Up Visits Record" to make full-scale record and evaluation on patients, which improves the standardization level of prosthetic fitting process as well while meeting patients' need for prosthetic fitting and manufacturing suitable ones for them. However, there are some limitations of the prosthetic fitting process in Hubei province. First, there are absence of professional evaluation institutions. In the prosthetic fitting process, the center takes full charge of expectations assessment and effects evaluation, and no professional third party evaluation institutions are set up, which affects the assessment results and reduces accuracy and satisfaction of prosthetic fitting. Second, it lacks the early strength training for handicapped. While for follow-up work, the center has not made training plan for restoring muscle strength of stump up to now, and special equipment for muscle strength training is in lack. After being amputated, patients' stump muscle strength atrophy, and this hinders prosthetic fitting. Third, there is a shortage of professional talents. In prosthetic fitting process, nearly all steps are completed by technical staff of the center, which is difficult for them to provide fine services.

We would like to propose suggestions from the following three aspects. First, set up third-party evaluation institutions to promote evaluation professionalization. We can organize organizations for persons with disabilities and the representatives, think tank/research institutions to conduct third-party evaluation; support development of third-party medical service evaluation, health management service evaluation and consultation services. Second, perform special muscle strength training, introduce and innovate muscle strength training methods. Before prosthetic fitting, muscle strength training needs to be done to restore muscle strength: improve range of motion of stump upper joint, enhance stump skin elasticity, improve sense of balance of the body, and strengthen muscle strength of ipsilesional upper and lower extremity and the body. Third, establish a professional talents training mechanism for rehabilitation of physically handicapped persons, and improve a long-term safeguard mechanism which is beneficial for growth and ability displaying of professional prosthetic talents; expand talents training scale, pay special attention to nurturing grassroots rehabilitation professional technical personnel and backbone of the subject, and steadily improve professional skills.

Acknowledgement

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Design and Implementation of University Financial Information System Based on Business Process Reengineering

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Abstract: This paper mainly explores the theory and practice of business process reengineering and using this methodology in financial information systems of Chinese universities. It established an event-driven process reengineering to integrate accounting processes of financial information system. And the implementation of event-driven system can improve comprehensive budget controlling, financial supervision and provide more valuable information for decision-making. Itis concluded that event-driven and process reengineering optimized the value of financial information system and provides asolution to support the process of continuous improvement.

Key words: BPR; Financial management; Information system; Event-driven

1 Introduction

The first proponents of the Business Process Reengineering (abbreviated as BPR) theory started in 1993; the concept of business process reengineering was defined for the first time in history. Business process is a set of defined activities which have multiple input, after a series of transformation they output multiple results which is kind of appreciation for users. When we organize all the actual process of input and output of the object types and logical classification, business process can be divided into original business process, financial accounting process and decision-making process. The theory of business process reengineering was initially based on the requirement to increase market competitive power. The rapid development of information technology and the wave of globalization involve more and more companies and makes traditional "bureaucracy management" based on the division of labor theory is gradually difficult to adapt to organizational development.

MIT conducted a study called "management" to explore how to use the booming computer information technology to provide new ideas for the development of the enterprise management, and puts forward the concept of reengineering. A redesign of business processes is to enterprises within and across organizational boundaries between workflow and procedure diagnosis and innovation. The continuous change of the enterprise environment and the experience of strategic management have led industrialists and theorists to constantly seek new solutions and promote the development of enterprise management theory.

Domestic scholar states that the methodology of process management is based on that first of all process improvement are sustainable. Process management is obviously more practical, especially compared with the rapid development of BPR. In practice, the thought of process management has begun to play a huge role in enterprises; thefinancial accounting in colleges and universities need to become more service-oriented, open and intensive. The financial management mode changes from the accounting growth model to science-based performance appraisal model and also from the reimbursement model to the management decision model. The implementation of financial information system architecture based on business process reengineering is playing an important role in the architecture of financial management hierarchy in colleges and universities.

2 Financial Information System Design Based on Process Reengineering

2.1 Data-flow in traditional financial accounting process

Basic functions of accounting, in the accounting theory, are defined by accounting statement for accounting practice and financial supervision. The functional theory of accounting and financial management also changes with the general environment of accounting, and goes through the "accounting tool theory", "management tool theory", "technical theory" and "information system theory". According to the "information system" hypothesis, the essence of accounting defined as an information system, must satisfy the basic functions of general information system, namely the input, storage and processing, and output function, it is just in line with the accounting business process composition mode. In the traditional accounting business process of colleges and universities, the processing steps of data are shown in table 1 below:

Table 1   data-flow of accounting process

Processing sequence	Data-flow procedure	Data-processing workflow by procedure
1	Input - data collection.	The data acquisition process mainly collects data from the service object and prepares the processing flow.
2	Data processing and storage.	Processing and storage process is to reflect the economic activities related to the data of the original documents for processing: review the original vouchers, prepare and audit accounting vouchers, then the classification, calculation, transmission, and save the results in all kinds of accounting books.
3	Output - generates accounting reports.	Accounting report information is based on the books, the preparation of internal reports and statements provided to the management department, external units and all the information users.

A traditional accounting process of accounting work will complete by the steps shown above, but after a series of function and business process, the accounting supervision and control functions are just static. We know that the traditional forms of accounting include balance sheet, profit statement, cash flow statement, etc. The report of the university also includes the report of the financial statement of the competent department and the financial statement of the ministry of finance. These should be the accounting information for management services, but they cannot directly affect the management process and the original business process. The form of accounting information cannot meet the information needs of the decision-makers. Highly aggregated data is difficult to directly reflect the true operation details of the university. The extraction and analysis of report data has become the responsibility of financial management personnel. The style and type of books and reports restrict managers' direct access to information.

The accounting process cannot give a real-time feedback and control. The occurrence of capital flow must be accompanied by logistics, while the traditional accounting information system generates reports for logistics information in operation, which is reflected in the later stage. While other non-financial reporting forms, there is no opportunity to embed operation processes for information that is important for business oversight and control. A set of outdated information, from a control point of view, is worthless. While there is no effective real-time feedback, the decision makers are unable to control the information received, and the value of the entire information system is greatly reduced.

2.2 Process reengineering of financial information system

Different departments in universities operate in various processes, but the commonality is involved in logistics, cash flow and information flow processing. It is very important to adapt all kinds of financial business activities under new situation, new demands in business activities with various departments or units of relevance, collusion. This makes it possible to implement BPR in financial information system. In order to form a new financial business process chain, the simplest and clear method in find an intuitive way for customer service is to build a process-centric of financial information system within the basic premise of colleges and universities. From the business process reengineering view, accounting, management, planning and design are three respective aspects. Around the financial system, through developing process management across departments set up the whole business realization of process centered information system architecture of new financial business process. The steps of the entire process reengineering of financial information system are shown in figure 1:
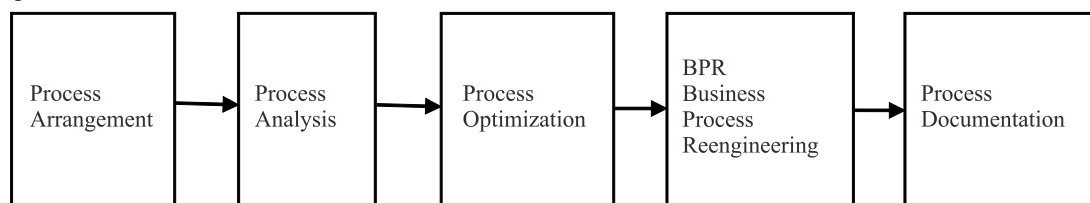
Figure 1   BPR Diagram of Financial Information System

The original business and financial accounting processes have their own orbit, process reengineering will not mess from beginning to end of the orbit, and on the contrary, path will become more complex and orderly. This is due to the use of event-driven approach to process integration. As an

in the computer field object-oriented programming jargon, event-driven refers to when a particular event or an event group requires its corresponding code begins to work, immediately start executing program instructions.

From the perspective of events, the basic structure of event-driven system is composed of event record collection mechanism, event sending and receiving mechanism, and event processing mechanism. The event record collection mechanism is specifically responsible for recording and collecting necessary events or event groups. Event sending and receiving mechanisms are located in the event producer and event responder, responsible for event communication. The event processing mechanism deals with specific events at the back end of the event receiver and returns the corresponding processing results. The following part will show how to use event-driven mechanism to improve business process and realize the concrete process design and implementation of financial business integration.

3 Analysis and Implementation of College Financial Information System Based on Process Reengineering

3.1 Event-driven and data-flow redesign in financial information system

When we use event-driven in accounting and financial management, it refers to the original business processes need to be confirmed by the financial information system, reflect the economic issues or control, supervision and can be directly under the support of information technology, trigger the financial information system to perform the corresponding operation. This means that the financial information system of business process execution process and system logic can be triggered at the same time, and the process won't have to go through artificial secondary process intervention, in the form of documents exported from the system (paper documents, database export documents, etc.), after a long time delay can enter into the financial information system again. The three main event types and contents in the financial processing process of colleges and universities are listed in table 2:

Table 2　Types of Events And Data-flow in Financial System

The event type	The operation process and data-flow	Traditional process	Information system integration pattern
Operation Events	Operation events are the procedure that provides service to a customer during a business process. For example, submit an expense report, submit equipment purchase order, etc.	Artificial processing	Manually process and submit the trigger events to the information system.
Recording events	The occurrence of operational event starts the financial accounting process. The operation behavior that is confirmed will be recorded as accounting matters and stores as data by the form of accounting voucher.	Information system record	The information system records and triggers the approval process and submits the pending approval items to the decision-making level.
Decision-making events	The feedback and approval of financial accounting record of system report information that provided by mostly the decision-making level, generally refers to the managers in the planning, control and evaluation in the process of financial management activities. For example, the approval of equipment requisition, the approval of capital budget, etc.	Manual processing and feedback	Complete the decision within the system and feedback directly to the business processing layer, and complete the business feedback actions within the information system.

In the traditional accounting processing procedure, system and technical checks and balances, accounting personnel is not original business activity of all data, but only comply with the accounting events defined data collection. The result of this is that the same economic business related data is kept in the hands of the accounting and non-accounting personnel for different attributes and purposes. This accounting system neglects a large amount of management information, which leads to the estrangement between financial and non-financial information.

3.2 Implementation of financial information system based on BPR

Financial information system based on event-driven with a set of business processes will integrate all systems including financial data and non-financial data to create a logical data collection, and would not only provide financial accounting confirmation process but also provide all the required information,

and does not produce data storage, such as data inconsistency problem again. But as the event-driven model needs to support event of information demand in response to different motives, there must be two kinds of information is stored for procedure call, namely the method database and model database. Among them, the purpose of the method database is to store various information extraction rules, such as various information validation principles, multiple attribute measurement standards, accounting standards, etc. Model database provides user motivation to satisfy all kinds of data and management model, such as data analysis model, the financial reporting model, data storage model, the prediction model, and other user customizable model, etc. Table 3 lists the main data field table setup examples in the financial system, and table 4 shows an example of the system information triggered by the decision event in the information system:

Table 3   Main Data Field Information Table

Field code	Field name	Field type	Field length	Example
kmbh	Accounting Number	text	10	5001020103
bmbh	Department Number	text	3	301
jje	Debit Amount	number	10	8,900.00
xmye	Balance of project	number	10	300,000.00

Table 4   Project Control (Decision Event) in the Information System

Return string	Implication
1	The fund balance of the project is overspent, and no verification is allowed.
2	The fund balance of the project is not overspent, but the single item limit is overspent, and the verification is not allowed.
3	The item number is incorrect, and the item does not exist in the data dictionary.
0	The fund balance of the project and the amount are not overspent, the verification is allowed.

With the strengthening of the national financial supervision mechanism, the financial management strength and the demand for improvement should fully reflect the leverage effect of financial management in the allocation of university resources. By event-driven as the main line, combining with the university core operation processes and ensure BPR classification, identify the different business, different categories of process management principles and focus, to complete the specific financial business process architecture. The financial management of colleges and universities must be strengthened with students, faculty, assets, and funds for the total resource framework, based on the optimal allocation of resources, play a role of prediction, analysis, and construct the performance evaluation as the goal.

Therefore, financial management information system must increase or strengthen financial supervision, information collection, data analysis, decision-making functions in a quick, powerful integrated information technology platform. And in the same process and business standards, data and communication standards as the basis to build both support daily business processing and to serve the university as a whole management and decision-making system. Eventually at the same time, the university organization management institutions, policies, procedures and measures for the university financial information fusion system, guarantee the legal economic activity compliance as well as the safety of the funds, assets and true, risk prevention and control for economic activities in colleges and universities. College financial information system integrated by process reengineering will serve all levels and departments of colleges and universities, provide a powerful business processing, information query, financial analysis and decision support capability.

4 Conclusion

Using process reengineeringto implement event-driven centered college financial information system would unify the design process in the information system settings module, and put main data together such as name, location, node, and the serial number. Different business process will be set automatically according to the corresponding process, such as approval or submit back step by step approach, driven by trigger event and data in order to implement different link or processing. Function of business collaboration and process through make full use of information technology, and other department or unit outside the campus information system interconnection and interflow, will be treated as financial operation extends to other department or unit, is advantageous for the financial management

activities and decision making level together, to ensure that processes all fronts. It is conducive to strengthening the capital flow, information flow and logistics flow between the financial department and other units or departments.

The internal control framework in the financial information system implementation based on business process reengineering architecture and process driven strengthened the process control management. The process control rules, methods and procedures are all put in system with implement process event tracking, operating records and monitoring functions. At the same time, the internal control of the process is completed from two aspects: management level and process implementation. Intensive flat management concept utilizes information technology and modern information logistics technology to realize automation of business process, reduce or control human intervention. In the framework of the financial information system of university, the management level and the intermediate link are reduced, and the concept of intensive flat management is realized effectively by BPR. Compared with that prior setting values for the entire regulation, financial early warning function through will perform operations or execution results such as data information system automatically send warning or control.

The diversification of funds, the operation of multi-campus and the expansion of the total amount of matters have brought great challenges to the financial management of colleges and universities. At the same time, the comprehensive information of the society has provided a powerful impetus for the development and progress of financial information system in colleges and universities. Therefore, the financial management of colleges and universities needs comprehensive and integrated solutions to support continuous improvement and optimization of business processes. The BPR methodology in financial information systems implementation established an event-driven business process reengineering to integrate operation and accounting process as the center of the financial information system architecture, and the implementation of it can improve interactivity, real-time characteristics for comprehensive budget controlling.

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Research on the Business Model of Non-car Operating Carrier Based on Business Model Canvas

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Abstract: Non-car operating carrier is a new business form in the logistics industry. Using the general tools of the business model canvas, this paper presents nine components of the non-car operating carrier business model, including customer segmentation, value proposition, access channel, customer relations, source of income, core resources and key business, key cooperation and cost structure. These nine elements describe the basic principles of the value creation, transmission and acquisition of the non-car operating carrier.
Key words: Non-car operating carrier; Business model; Business model canvas; Constituent elements

1 Introduction

According to the Opinions on Promoting Online and Offline Interaction to Speed Pp the Transformation and Upgrading of the Innovation and Development of Commercial and Trade Circulation issued by the General Office of the State Council in September 2015, the trials of non-car operating carrier will be implemented to explore the transformation and upgrading of the innovation and development of commercial and trade circulation. In September 2016, the General Office of the Ministry of Transport further promulgated the opinions on accelerating the innovation and development of non-car operating logistics. This document lays the political foundation for the non-car operating carrier enterprises, and clarifies the content of the trials, including the specification of the operation behavior of the non-car operating carrier, promotion of the credit construction of non-car operating carrier, implementation of the incentive policies relevant to non-car operating carrier, encouragement on non-car operating carrier to innovate the operation management mode, and exploration and innovation of management system for non-car operating carriers.

The term "non-car operating carrier" evolves from the vocabulary of "track broker" widely used in USA, and is an extension of non-vessel operation carrier on land. The non-car operating carrier signs the contract of carriage of goods with the shipper, bears the responsibility and obligation of the carrier, and completes the transportation.

Non-car operating carrier, as a new form of business in the logistics industry, is still in the initial stages of development. The industry management department lacks management experience in this new model, although it has managed the carriage of vehicles for a long time. Domestic scholars, studying the business model of non-car operating carrier, mainly draw on the experience of foreign typical enterprises. Jin Zhongxu et al. (Jin Zhongxu et al., 2017) analyzed the status quo and existing problems of the development of domestic non-car operating carrier operating carrier logistics by referring to the logistics model of typical foreign car carriers. Based on new technologies such as cloud computing, the Internet of Things, big data, etc, he has proposed a non-car operating carrier logistics model based on "Internet+", established a one-stop transportation service platform, implemented refined specialized transportation, and expanded value-added services. Wu Xia (Wu Xia, 2017) analyzed the development model of typical non-car operating carrier companies at home and abroad, and put forward the development path of main customers' freight multiplication services based on the "Driver Po" Internet logistics information platform. Taking Wuyi Yun Tong, which is a pilot company for non-car operating carrier, for example.

As a major public pilot platform enterprise for non-car operating carrier, its business model has a certain degree of particularity and certain representation. Wu Yong et al. (Wu Yong et al., 2013) considered that the type of platform is a typical logistics public information platform for enterprises to choose the business model foundation, and only those business models that are compatible with the type of platform can guarantee the sustainable development of the platform. He proposed that SMEs should be the mainstay, adopt a flexible price matching mechanism, establish a joint operation model of government associations, improve privacy protection and credit mechanisms, and provided differentiated services and the use of cloud computing for process integration are the survival path for typical logistics public information platform companies. Chen Huoquan et al. (Chen Huoquan et al.,

2010) believed that the business model of logistics information platform is generally divided into four types: government-owned, government-controlled operations, social capital-holding operations, and social capital operations. The business model of logistics information platform in developed countries and regions adopts government-owned or controlled government investment and financing. In terms of management and operation, it focuses on social operation, and on the profit model, it adopts a non-profit public welfare model.

The logistics industry has reached broad consensus on the reason of the construction of non-car operating carrier, but less discussion has been done on how to build a non-car operating carrier enterprise and what kinds of non-car operating carrier enterprises should be built. However, this is a very urgent task to the development of the industry.

2 The Business Model Canvas Style

Alexander Osterwalder and Yves Pigneur put forwards the business model canvases or business model patterns theory. The business model canvas, as shown in Figure 1, is a general tool for describing, visualizing, evaluating, and innovating business models. Business models are the fundamental principles that describe how companies create value, deliver value and gain value.

Key Partnerships:	Key Business Area:	Value Proposition:	Customer Relationship	Customer Segmentation:
	Key Resources:		Channel Access:	
Cost Structure:			Revenue Sources:	

Figure 1   Schematic Diagram of Distribution of Business Model Canvas components
Source: Alexander Osterwalder, Yves Pigneur. New Generation of Business Model. Machinery Industry Press, 2011.

Similar to the painter's canvas, the business model presets nine spaces that can be filled by business models in the present or the future. The nine components of the business model canvas include customer segmentation (CS), value proposition (VP), channel access (CH), customer relationship (CR), revenue sources (RS), key resource (KR), key business area (KA), key partnership (KP) and cost structure (CS). Customer segmentation refers to the different people or organizations that enterprises want to contact and serve; value proposition refers to a series of products and services that create value for specific target customers; channel access refers to the path that enterprises communicate and contact target customers to deliver value proposition; customer relationship is the type of relationship established by enterprises to keep good relationships with specific target customers; revenue sources is the cash income that enterprises get from a specific target customer. This income is generated from the value proposition that successfully provides to the customer; core resources are the most important assets that are necessary to ensure the efficient operation of a business model; key business area is the most important activity that is necessary to ensure the effective operation of the business model; key partnership is relationship with the suppliers necessary to ensure the effective operation of the business model since some businesses need to be outsourced or obtained from the outside; cost structure refers to the cost structure caused by the above elements of the business model.

In order to present a general tool for describing, visualizing, evaluating, and innovating the business model of non-car operating carrier, some constituent elements of business model of non-car operating carrier were recognized and then the business model canvas of non-car operating carrier was constructed based on the theory of business model canvas. Similar to the views of Alexander Osterwalder and Yves Pigneur, the nine elements of business model of non-car operating carrier were revealed in this paper, including customer segmentation, value proposition, access channel, customer relations, source of income, core resources and key business, key cooperation and cost structure. These nine elements describe how to create and realize the business value for non-car operating carrier.

3 Analysis of Constituent Elements of Business Model of Non-Car Operating Carrier

The nine constituent elements of the business model canvas describe and define the principle of how enterprise creates value, transfers value and obtains value, showing the logic of revenue creation of enterprises. Using the structural model of the business model canvas, the nine elements of the non-car operating carrier's commercial model can be described in detail, as shown in Figure 2.

Key Partnerships: The relationship with the actual carrier can be either the strategic alliance relationship between non-competitors or the supplier relationship.	key Business Area: Provide the shipper with solutions, transport business information, set up transport organizations, etc.	Value Proposition: to provide customers with fast, safe, low-cost transport service	Customer Relationship: personal assistant, special personal assistant	Customer Segmentation: shipper (manufacturing enterprises, business enterprises, third-party logistics enterprises and other enterprise owners)
	Key Resources: Transportation business information matching platform, vehicle source, tourist source, human resource relationship resources, etc.		Channel Access: highway, railway, shipping, air transport mode, multimodal transport, and auxiliary channel	
Cost Structure: The actual carrier's freight human platform development and maintenance fees, etc.			Revenue Sources: Income from value-added services provided by the shipper for the shipper and the actual carrier	

Figure 2 Distribution Diagram of Nine Constituent Elements of Business Model of No-car Freight forwarder

3.1 Customer segmentation

Customers are the most important components of any business model. In the non-car operating carrier business model, the customer segmentation element is used to describe the different groups and organizations that the non-car operating carrier enterprises want to contact and serve. The customer segmentation in the commercial mode of the non-car operating carrier is the shipper. Different shippers have different service requirements and diversified business forms, and thus there is a fragmented market and a diversified market. Different shippers need and provide different products and services to meet their needs and need to be contacted through different distribution channels. Different types of relationships are needed. There are different profitability and willingness to pay for different aspects of products and services. According to the organizational form, the shipper can be divided into manufacturing enterprise, commercial enterprise, third-party logistics enterprise, other enterprise cargo owner, and individual customer of social families. According to the business form, we can divide it into a single transportation demand customer and multimodal transport type demand customer. According to the service time points, the shipper can be divided into short-term customer and long-term customers.

3.2 Value proposition

In the non-car operating carrier business model, the value proposition element is a series of products and services that create value for specific customers. Specifically, the value proposition of non-car operating carrier is to provide fast, safe and low-cost transport services for shippers. Value

proposition creates value by catering to the unique combination of the needs of subdivided groups. The value proposition of a non-car operating carrier can be quantitative (such as cost, price, service speed) or qualitative (such as security, convenient, functional, value-added customer experience). The value proposition element is the value created by the different customer groups of the non-car operating carrier for its shipper. It solves the shippers' transportation service problem or satisfies their demand. Non-car operating carrier has three kinds of value; these are efficiency improvement, operation standardization and service innovation. First of all, as a typical representative of the light asset model, the non-car operating carrier enterprise has the innate function of reducing cost and increasing efficiency in large-scale operation and low-cost operation. Non-car operating carrier enterprises have their unique advantages in technology, management and core resources, and these unique advantages are the important guarantee for their standardized operation. As a service-oriented enterprise, service innovation is its core competitiveness. Service innovation is an important way to create value for non-car operating carriers.

3.3 Channel access

In the non-car operating carrier business model, channel elements describe how to communicate, contact their segmented customers and pass the value proposition. Channel access is the customer contact point, which plays an important role in the customer experience. The channel paths can be divided into own channel and partner channel. In the commercial mode of the non-car operating carrier, the channel mainly refers to the partner channel. The partner refers to the cooperative relationship between the non-car operating carrier and the actual carrier. The channel path in the commercial mode of the non-car operating carrier includes four modes of unimodal transportation, i.e., highway, railway, shipping and aviation; it also includes multimodal transport modes and auxiliary transport modes, such as warehousing, distribution, packaging, circulation processing, handling, loading and unloading, and information processing.

3.4 Customer relationship

In the non-car operating carrier business model, the customer relationship element is the type of relationship that describes the relationship between the enterprise and the specific customer segmentation group. In the customer segmentation group, the establishment of customer relationship type directly affects the overall customer experience. The enterprise customer segmentation group of the non-car operating carrier mainly includes all kinds of enterprise, such as manufacturing enterprise, business enterprise, third party logistics enterprise. It also includes individual customers of social families. Therefore, the type of customer relationship of the non-car operating carrier generally includes two categories: personal assistant and dedicated personal assistant. The personal assistant works by the interaction between people. During the service, the customer can communicate with the customer representatives and ask for help. A dedicated personal assistant includes a dedicated customer representative arranged for a single client. It is the deepest and most intimate type of relationship, and it usually takes a long time to build. The goal of customer relationship is customer acquisition, customer retention and business revenue promotion.

3.5 Revenue sources

In the non-car operating carrier business model, the revenue sources are the important factors that depict the cash income of enterprises from each customer group. If the customer segmentation is the heart of the business model, the revenue source is the artery. Sources of revenue include transaction revenues derived from one-time payments and recurring revenue from customers who continue to pay for value proposition and after-sales service. The main revenue sources for non-car operating carriers are the use of fees, which are derived from charging through specific services. Specifically, the weight of goods transported, the distance from the place of delivery and the length of the delivery time specifically are included into the shipper's consignment expenses. The revenue from the value-added services is provided by the shipper and the actual carrier.

3.6 Key resources

In the non-car operating carrier business model, the key resource element is the most important factor that is necessary to describe the effective function of a business model. Each business model requires key resources that enable enterprise organizations to create and deliver value propositions and reach out to the market, build relationships with customer segments and earn revenue. Key resources can be owned, leased or acquired from key partners. The key resources of non-car operating carrier enterprise include transportation business information matching platform, vehicle source, passenger source, human resources, relationship resources and so on. The transportation business information matching platform of the non-car operating carrier enterprise is generally owned by the enterprise itself,

and the vehicle source is the actual carrier that establishes the partnership. The key resources required by different business models are also different.

3.7 Key business area

In the non-car operating carrier business model, key business is the most important element that companies must do to ensure that their business models are viable. Any business model requires a variety of key business area activities, which are the most important actions that must be implemented. Similar to core resources, key businesses are the basis for creating and providing value propositions, reaching out to markets, maintaining customer relationships and earning revenue. Key business area can be divided into manufacturing products, problem solving, platform or network and other categories. The key business area of non-car operating carrier includes problem solving, platform or network. Specifically, the problem solving is to provide solutions to the business needs of the shipper. The non-car operating carrier receives the business needs of the shipper in the first, and thus provides the solution to the problem. This process increasingly relies on the platform or network business activities. Even the key business area of the non-car operating carrier business model is increasingly related to platform management, service provision and platform promotion. Platform or network includes transportation business information matching, transportation organization, service tracking, settlement, service evaluation, business promotion and so on.

3.8 Key partnerships

In the non-car operating carrier business model, the key element of cooperation is the network of suppliers and partners to enable the effective operation of the business model. Partnership is the cornerstone of the business model. The key partner of the non-car operating carrier is the actual carrier. The relationship between the non-car operating carrier and the actual carrier can be a strategic alliance between non-competitors, or a buyer-supplier relationship that ensures a reliable business. These two basic forms are used to optimize the allocation of resources and business, reduce costs and form a partnership of optimized partnerships and economies of scale. The key partnership of the non-car operating carrier business model is often outsourced to share infrastructure, social resources, information resources, and operating risks. Specifically, the actual carriers get business from the non-car operating carriers, and the non-car operating carriers obtain the specific logistics resources from the actual carriers.

3.9 Cost structure

In the non-car operating carrier business model, the cost structure element describes all the costs incurred by operating a business model, such as creating value, providing value, maintaining customer relationships, and generating revenue. From the perspective of cost structure, business models can be divided into cost-driven business models, value-driven business models, and business models between the two. The cost-driven business model focuses on minimizing the costs. The aim of this approach is to create and maintain the most economical cost structures by adopting low-priced value propositions, maximizing automation and extensive outsourcing. Value-added value proposition and highly personalized service are usually characterized by value-driven business models. On the basis of revenue source, key resources, key business, and important cooperation, the cost structure of a non-car operating carrier mainly includes the carrier's cost of the actual carrier, manpower, platform development and maintenance fees. The cost structure of non-car operating carrier can be divided into fixed cost and variable cost. Fixed costs are mainly concentrated in key resources and important cooperation, and variable costs are mainly concentrated in key business and revenue sources.

4 Conclusion

As a B2B industry, the logistics industry has its own operation rules. The high dependence on the Internet of the non-car operating carrier enterprise is the key to the development of this industry. There have been several prototypes of the commercial mode of non-car operating carrier in China. Since the current business environment, enterprise development stage and enterprise strength of various enterprises are different, the development of business models also vary across enterprises. On the basis of the nine elements of the commercial mode of the non-car operating carrier, the improvement ways of each component discussed in our analysis are worthwhile for further investigations.

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A Review of Malaysian Aquaculture Industries: Issues and Challenges

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Abstract: Aquaculture in Malaysia has become a global seafood industry for food security. Malaysia aquaculture industry ranked 15 out of the leading world producers in 2014 with an estimated 521,000 tonnes of total aquaculture production which is aligned to the 11th Malaysia Plan under the National Agrofood Policy (NAP), 2011-2020. As leading world producers, it is important to learn the foundation of the industry and current challenges encountered by the sector. This paper address six major issues and challenges of the aquaculture sector in Malaysia specifically issues of fish stock depletion, climate changes, current diseases affected farmed aquaculture, the impact of media towards aquaculture industry, non-compliance feeding practised towards halal aquaculture and poor interaction between stakeholders. The methodology of this study involves searching of the divergent trusted database and related information using most popular search engine that covers 55 selected and reviewed journals including major resources database from fisheries authorities: Department of Fisheries Malaysia, Food and Agriculture Organization of the United Nation and WorldFish Centre. A combination of these research findings, newest technology application will be suggested as accurate and timely information on managing aquaculture systems.
Key words: Aquaculture; Industries; Challenges; Malaysia

1 Introduction

Malaysia has become one of the biggest seafood players in the world as it ranked in top 25 world producer in 2014 with an estimated 521,000 tonnes of total aquaculture production (FAO, 2016). Globally, the fisheries sector contributed to 1.1% share of world output in 2013 with 0.4% is contributed from the aquaculture sector (Chan et al., 2017). Apart from that, the agriculture sector contributed 10.7% to the total national gross domestic product (GDP) and the aquaculture sector contributes 8.9% to the total agricultural GDP, created an estimated 1,753,900 million jobs for Malaysians (DOSM, 2016). It shows that the sector not only has offer food security to the country but the aquaculture production has been known as the potential contributor to alleviating hunger and poverty for the world (Allison, 2011).

In Malaysia, the sector has recently encountered several issues and challenges in aquaculture industry (Troell et al., 2014) despite being projected to continuously grow in the near future (DOF, 2016). Hence, the objective of this paper is to highlight all relevant papers and crowd-sourced inputs in the fields particularly selected issues and challenges of the environmental issues, national issues and technology challenges in managing aquaculture system. Therefore, to understand of these related issues, the paper starts with the research methodology of findings the current issues and challenges of Malaysian aquaculture. Then, in Section 2, the overview of aquaculture status in Malaysia is explained in details. Section 3, the issues and challenges of the industry is presented specifically. Section 4 recommends policy enhancement and technology application as tools to improve the issues and challenges; and finally, the conclusions, limitations and implications of the study are explored.

2 Global Issues and Challenges of Aquaculture

The research nature in findings issues and challenges in aquaculture sector are enormous and is not easy to be confined to one paper, thus, the pertinent materials are scattered across diverse journals, conferences papers, the online database including government agencies database. Department of Fisheries Malaysia, Food and Agriculture Organization of The United Nation (FAO) and WorldFish database are the most common database to search for general issues and challenges in Malaysian aquaculture, followed by other classification of local and international agencies (Table 1).

NUMBER OF LITERATURE
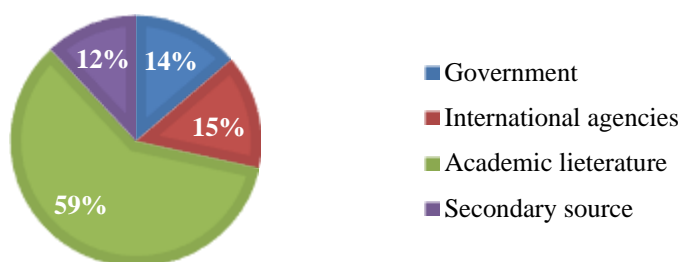
Figure 1   The Relevant Resources to Search the Current Issues and Challenges in the Aquaculture Industry in Malaysia

Publications with the most the recent year 2017 until the past two decades, 1997 were identified. A first quick content screening identified journals and articles either to included or excluded from the analysis. The paper also includes open access and peer-reviewed papers. Since the paper highlights current issues and challenges, most cited references based on the most recent years since 2013 to 2017 while most cited journals in the year 2010 and previous years are used as supporting references to the latest research (Table 1). To optimise the accuracy of the research findings on selected issues, interview with fisheries officers have been conducted in May 2017 to confirm and support the findings particularly resource based on online newspapers. The references were collected in different resources in order to find the relevant subjects and the data, journals and articles were checked by second and third researchers.

Table 1   Articles and Journals that Most Cited in Different Years Based on Identified Major Data Bases

Major databases	Most cited references (in year)							
	< 2010	2011	2012	2013	2014	2015	2016	2017
Government agencies, FAO and WorldFish	3	1	2	2	3	4	7	1
Journals	19	2	3	5	2	7	4	10
Proceedings	2				1	1	2	3
Online newspapers				2	4	1	1	2
Websites			2			1		
Others	5			1	1		2	1

3 The Aquaculture Status of Malaysia

In 2015, the statistics shows that Malaysia has produced 1,998,440 tonnes (total valued RM 13180.5 million), with marine capture fisheries and inland fisheries, estimated at 1,489,974.75 tonnes (valued at RM 9393.7 million) and aquaculture production, including seaweeds, ornamental and aquatic plants, recorded at 508,465.25 tonnes (valued at RM3786.8 million) (DOF, 2016) (see Fig. 2).
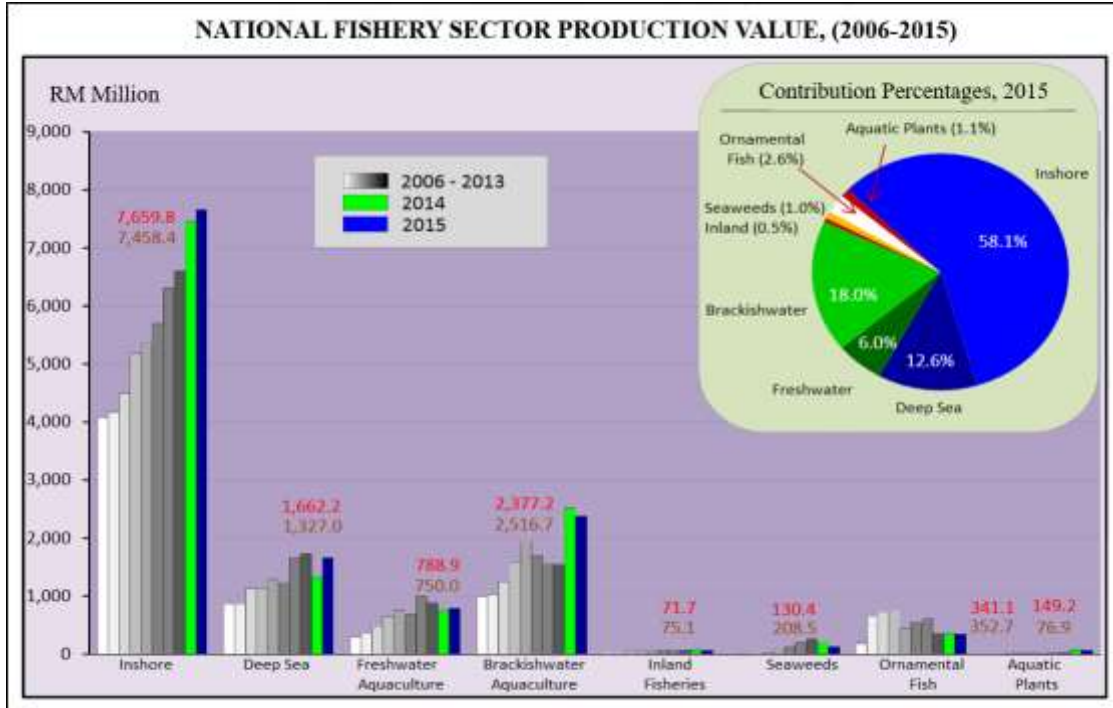
Figure 2   National Fishery Sector Production Value, (2006-2015) (DOF, 2016a)

The fisheries sector in Malaysia contributes 10.7% to the total agricultural gross domestic product (GDP) and, created an estimated 1,753,900 million jobs for Malaysians in agriculture and fisheries sectors (DOSM, 2016) as listed in Table 2. The demand for the fisheries products is increasing annually due to the growing numbers of per capita fish consumption arose from 45 kg in 1998 (Pawiro, 2001) to 58.1kg in 2011 more than any other ASEAN countries (Chan et al., 2017). Due to the rising demand of fisheries product, it is noted that aquaculture governance has made remarkable progress under 11th Malaysia Plan aligning with the National Agrofood Policy (NAP), 2011-2020 that the fisheries sector will continue to be the objectives of agro-food sub sector development as it plays important role in the food security (EPU, 2016).

Table 2   Status of Malaysian aquaculture in 2015

Types	Total	Source
Marine capture and inland fisheries	Production(tonnes): 1,489,974.75 Value (RM): 9393.7 million	(DOF, 2016)
Aquaculture production (including seaweeds, ornamental and aquatic plants)	Production (tonnes): 508,465.25 Value (RM): 3786.8 million	(DOF, 2016)
Fisheries sector contributes to GDP	10.7%	(DOSM, 2016)
Jobs opportunity in agriculture and aquaculture sectors	1,753,900 million	(DOSM, 2016)
Per capita fish consumption	58.11 kg	(Chan et al., 2017)

In contrast, based on the demographic view, the recent statistics shows that most of the employees originate from other countries, Indonesia, Thailand, Bangladesh, and others with 3151 Indonesian labours, followed by others namely Bangladesh and Thailand of 1971 workers, 552 workers, and 144 workers respectively (DOF, 2016). These workers are working in different aquaculture systems around the country.

4 Issues and Challenges in Malaysian Aquaculture Industry

Since Malaysian aquaculture has ranked in top 15 world aquaculture producers, the growth of an industry around the globe should be perceived. The fact is most of the recent surveys agreed that the exponential growth period of the industry worldwide is ended and although the sector will yet continue to grow, the growth projected rate is predicted to decelerate around the world (Béné et al., 2015). Thus,

the world facts aligned with the country data in 2015 shows the declining number of culturists for Malaysian marine farmers at 5.38% and freshwater farmers at   6.62% compared to previous year (DOF, 2016), shows in Table 3.

Table 3   Issues in Aquaculture

No	Issues	Context of review
1	*Fish stock depletion*	Since 2004, of the 600 marine fish stocks worldwide monitored by FAO, 3% are underexploited, 20% are moderately exploited, 52% are fully exploited, 17% are overexploited, 7% are depleted and 1% are recovering from depletion while the research on the global list of fish stocks has ranked Malaysia as ranging from moderately and ranging from fully exploited to over exploited (FAO, 2004). The excessive fishing activities and fleet overcapacity of these stock have contributed to the millions of Malaysian Ringgits cessation of resource rent (Tai, 2014) or in the other words, the rising price of fish has increased by an average of 6.2% yearly since 2005, due to the increasing costs of fishing operations (Aruna, 2014)[1]. Since the capture fisheries production decreasing while cost of fishing operations raising, the price of wild fish may increase that further impetus the rapid growth of aquaculture (Ottinger et al., 2016)
2	*Climate Changes Issues*	Estimation of the loss valued RM 25 million including Perlis, Kedah, P. Pinang, Perak, Johor, Pahang, Terengganu, and Kelantan. The major impacted state is Pahang region with 390 culturists has estimated the loss of RM 7.5 million (Hassan, 2016). As consequences, the effects of climate change on freshwater systems will presumably be increased water temperatures, decreased dissolved oxygen levels, and the increased pollutants toxicity (Ficke et al.,2007) .
3	*Diseases affected farmed species*	The disease could easily affect aquaculture farmed species. The disease outbreak specifically Tilapia Lake Virus (TiLV) has recently affected Tilapia species with significant mortalities up to 90% in farmed tilapia (Eyngor et al., 2014) and is considered to be a potential threat to global tilapia farming particularly countries namely Southeast Asia, Egypt, Israel and South America (Fitzsimmons & LwinTun, 2017). The TiLV or a new Orthomyxovirus, a summer mortalities disease has been found in Israel in 2014 that has affected Tilapia during June to October (known as summer month) when water temperatures rise to over 25 ℃ (Fathi et al., 2017). The detection of TilV in clinical samples are successfully done, however, the potential causes of the disease outbreak until now has not been found (Dong et al., 2017)
4	*Media influences towards aquaculture industry*	The consequence, aquaculture sector not only prone to disease, the media has playing extensive roles in shifting the aquaculture economics. The research found by Fitzsimmons and LwinTun (2017) shows that demand in the US and Europe has been falling since 2014 with the imports decreased yearly even though the price is lower and quality of fish improved specifically in improvised packaging, more value added products and better traceability. They identified that the websites hosted from the United States have clearly given provocative statements about the nutritional facts of Tilapia fish. In the statement referring to the research by Weaver et al., (2008), defined specifically on fatty acid characteristics of Tilapia has the inflammatory effect to consumers that further being cited by more than 100 papers including websites.
5	*Non-compliance towards Halal aquaculture*	Apart from that, the trend issue in food industry worldwide has moved towards demanding halal food for the Muslim population. Thus, Malaysia planned to be a halal hub industry for the Muslim preference by taking precaution on the matter of offering healthy, safe and halal food by providing certifying standards of halal food guidelines: MS1500:2009 (DSM, 2014) to serve[2] the Muslim community in the country. However, Malaysian aquaculture products are still contaminated with the forbidden resource: Muslim scholars named it as non-halal contents resource. For example, gelatin resources are not declared by several countries (Tukiran et al., 2016). Several cases evidence have also found that freshwater fishes were fed with non-halal resource (a resource from pig carcasses and waste)(Norhana et al., 2012) and it is considered as haram (forbidden or proscribed by Islamic law) to consume (Pauzi& Man, 2015).
6	*Poor interaction between stakeholders*	The development of aquaculture industry was supported by upstream and downstream activities (Hempel, 2010). Both activities represent a complete aquaculture supply chain that involved major players in the industry particularly brood-stock suppliers, hatchery farmers, culturist, collectors and related processing companies (Galappaththi et al., 2016). However, the main scarcity in the value chain is the poor interaction between aquaculture players and the fisheries authorities (Department of Fisheries Malaysia). This is due to lack of meaningful communication and the absent of updated information that accessible to aquaculture sector (Shaffril et al., 2009) .

Research suggests that the probable reason for the slower growth also are caused by failure on producing a sufficient variation of genetically improved species (Biscarini et al., 2015) , lack of species-specific feeds (Yue & Wang, 2017), fresh water supply shortage (Béné et al., 2015), culture sites availability for optimal yield (Troell et al., 2014), however, only selected issues will be discussed in this paper that is particularly on fish stock depletion that triggered the rising of feed costs (Béné et al., 2015; FAO, 2012), environmental issues occurred in the country (e.g. flood occurrence and El-Nino phenomena), diseases that affected cultured species (Yue & Wang, 2017), media influences on spreading misinformation (Fitzsimmons & LwinTun, 2017) and other national issues related to unethical feeding practiced towards halal perspective (Saidin et al., 2017), and demographic distribution. As aquaculture industry is a part of SMEs, the industry also surrounded by challenges specifically uncertainty in the external environment and pressures from globalization and market liberalization (Zulhasni, 2015). Those issues and challenges are major concerns to Malaysia as the industry encountered new global competitors and new technology development worldwide.

5 Conclusion

This study provides six major issues and challenges that represent the scenario in the Malaysian aquaculture industry. Among those issues are fish stock depletion, climate change issues, disease affected farmed species, media influences towards aquaculture sector, non-compliance towards Halal aquaculture including poor interaction between stakeholders. Therefore, the paper addressed the issues and challenges that need to be encountered by all aquaculture players. The issues and challenges experienced by the sectors should be tackling through collaboration among stakeholders perhaps using advanced and newest technology that probably give impact to the regional and global economics of aquaculture industry. Moreover, the solutions should be meet the needs of business owners, which contribute to the improvement or innovation initiative to the organization itself.

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Proposed Roadmap of UTM 21st Century Education System Using TRIZ System Evolution Forecasting Methodology

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Abstract: In regards to Education 4.0, UTM has introduced a New Academia Learning Innovation (NALI) model. NALI is designed to be in line with the National Higher Education Strategic Plan that covers the 10 Shifts components. Under Education 4.0 will require human resources with adequate data and digital literacy. Students across disciplines will, therefore, need to gain digital literacy during their studies. For this, the concept of blended learning is emphasized in NALI model. Blended learning is a combination of active and systematic strategy with the use of digital teaching materials in class. This encourages better and more meaningful learning experience for students. In this digital era, globalised online learning, one of the critical components, is essential for supporting student-centred learning. Even though students are able to explore and gain quick information from the web search, however, to craft the digital learning framework for higher education is challenging. In this paper shows the evolution trends of education system road map by using new concept of TRIZ to forecast the direction of future education system.
Key words: 21st century education; Roadmap; Innovation; TRIZ

1 Introduction

For the past few decades, Malaysian higher education system has not only made significant gain in student enrolments, but the achievement has grown wider in global recognition such as research publications, patents, and institutional quality, as well as become a top destination for international students (Wan et al., 2017). For continuously stay abreast with the global trends, Malaysian education system needs to keep evolving over time for providing talent and high-quality graduates. Preparing Malaysian, especially youth generation, that capable to strive in complex and ever-changing future will require strong fundamental transformation of how the higher education currently operate (Grapragasem et al., 2014).

Currently, the impact of industrial revolution 4.0 (IR 4.0) has given a new impetus to educational transformation (Baygin et al., 2016). Thus, new educational programmes will have to be developed to meet changing demands especially across disciplines. The IR 4.0 demands has led to a new paradigm of higher education, known as Education 4.0 that train students to produce innovations. Malaysian thinkers agree the Education 4.0 will be shaped with education that able to produce highly creative graduates with the ability to think critically regardless of their disciplines (Schuster et al., 2016). In the era of IR 4.0 jobs that require creativity are likely to stay. For this, Malaysia Education Blueprint (2015-2025) has identified 10 Shifts that would be needed to take the Malaysian higher education system towards becoming global educational expert and the development of 21stcentury citizenship (Ministry of Education of Malaysia, 2013).

2 Transformation of 21st Century Education System

Growing up with this level of technology means growing up with a completely unprecedented amount of information at your fingertips. There are kids who have never been more than a few seconds away from the answers to their questions, with everything just a quick search away. They are able to teach themselves about any topic they are interested in without even leaving their bedroom. The current cohort of students come from Digital native generation. These two generations have grown up with advanced technology as a given in their homes and classrooms. They are digital natives, as comfortable using apps and code as their grandparents were flipping pages (Šorgo et al., 2017).

Digital native generation are also the most internationally connected in history. They encounter people online from all over the world and can easily make friends on the other side of the planet before they have even left their home state. Schools and parents are also increasingly offering children and young people the opportunity to travel, creating a truly borderless experience of learning. The students in our schools today are intelligent, independent and extremely capable. They are skilled with

technology and comfortable with global and intercultural communication. We can expect that future generations are going to have even more experience in these areas (Cleveland et al., 2016).

A 21st century education is about giving students the skills they need to succeed in this new world and helping them grow the confidence to practice those skills. With so much information readily available to them, 21st century skills focus more on making sense of that information, sharing and using it in smart ways. While digital integration is also fundamental to a thorough 21st century education, it is not enough to simply add technology to existing teaching methods (Echenique et al., 2015). Technology must be used strategically to benefit students. Students are increasingly advanced users of technology even as they enter school for the first time, so this can often mean being open to the possibilities presented rather than attempting to teach and prescribe the use of certain programs. Many a classroom 'technology class' has baffled children by attempting to teach them about programs, websites and hardware that are no longer relevant or that they understand far better than the teacher does (Henderson et al., 2017).

3 The Challenges in 21st Century Education Transformation Roadmap

The 21st century education contained various challenges and also opportunity for education provider such as UTM in excel together with the trends. The form and shape of UTM's 21st century education will eventually change through innovation, but the functionality is always intact as UTM's education system. However, there are lacks implementation and execution of strategy regarding with the transformational of form and function for UTM 21st century education system (Aris et al., 2016). By having those strategy, it will able to have a strong roadmap on the direction of transformation and effectively execute the process of transformation at a higher degree. In the context of UTM's initiatives and transformation strategy towards 21st century education system, this paper will focus on; exploring the predictive trends of transformational shape and form towards 21st century education system and develop a transformational roadmap on the trends of UTM's evolution towards 21st century education system using TRIZ forecasting methodology.

4 The TRIZ Concept of Evolution Trends of Education System towards 21st Century Education

TRIZ is the Russian acronym for "Teoriya Resheniya Izobretatelskikh Zadatch" (теория решения изобретательских задач) meaning the 'Theory of Inventive Problem Solving' Developed in 1946 by soviet inventor Genrich Altshuller and his colleagues. The key objective of TRIZ methodology is to have problem solving processes that rooted from the development of patented invention that is faster and better in term of solving technical or engineering problems. From previous research, the development of invention involved fundamental concept of technological system evolution that consist of repeated trends (Zulhasni et al., 2015 & Rahim et al., 2015). By understanding how technology system evolves, we can foresee the directions of system change and take the opportunities in business competition. There are 9 trends of engineering system evolution in TRIZ methodology (Zulhasni et al. 2015). However, this paper only uses two significant trends that able to support the transformational of education system forwards. The first selected trends are trends of increasing towards supersystem that pushing system towards utilizing the function of external system to carry out the core function of education system, as shows in Figure 1.
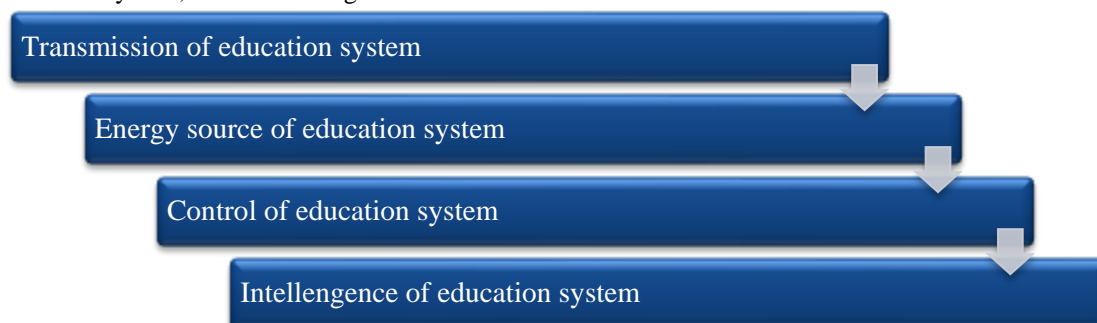
Figure 1   Trend of Increasing of Functionality towards Supersystem of Education System

The second trends are the trends of decreasing human involvement that focus to changing the education system towards less dependency of human in carry out the operation of education system, as shows in Figure 2. The trends started with people interaction of education system and adding supporting system in teaching and learning process. Then, digital elements become important elements in the education system and move towards improving level of connectivity and intelligence in education operation. The final concept of this trends will be the autonomous elements that have been integrated or embedded within the education operational system.
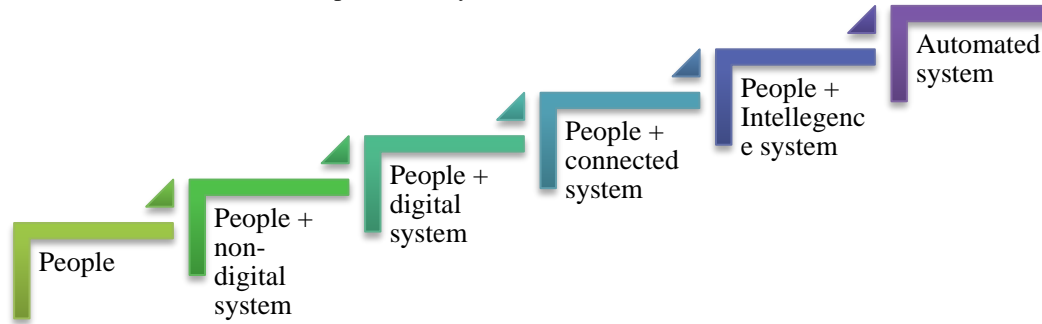
Figure 2　Trends of Digitalization in Reducing Human Involvement of Education System

5 The Transformational Matrix of UTM's 21st Century Education System Evolution

Figure 3 shows the transformational matrix of UTM's evolution towards 21st century education system by combining two selected TRIZ trends that have been mentioned in the previous section. It consists of S-curve maturity model and combined it with two TRIZ the trends of system evolution. The proposed matrix is integrated with another TRIZ tool called S-curve trend.
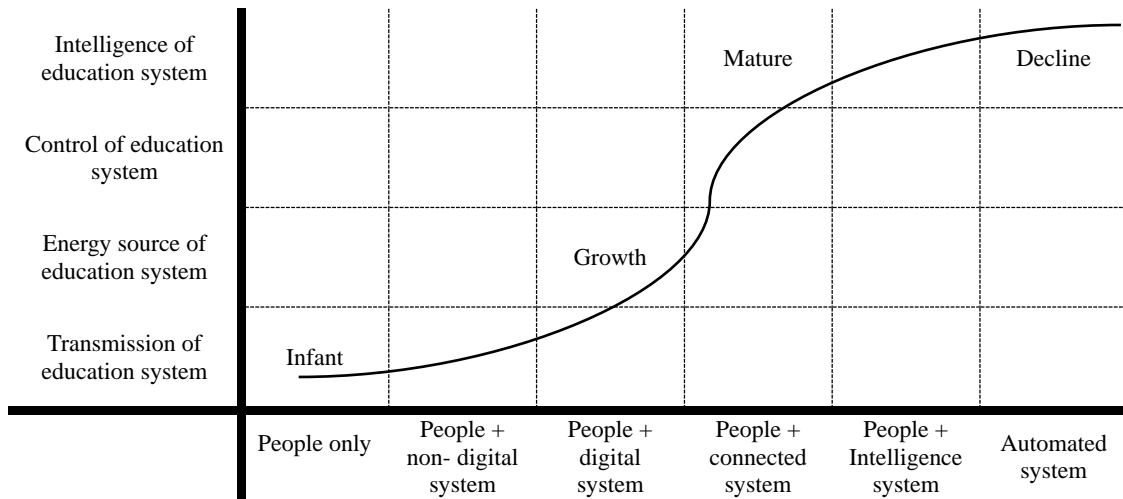
Figure 3　The Transformational Matrix of UTM's 21st Century Education System Evolution

The S-curve consist of system maturity as the education evolves towards 21st century system. There are 4 phases in the S-curve;

(1) Infant phase that represent the new adopter of early transformational changes in conventional education system,

(2) Growth phase that represents the increase of degree of transformational in education system that involved digitalization and outsourcing the specific functions to external education system

(3) Mature phase that represent radical transformation changes of education system towards

connectivity and add more value on the level of control system.

(4) Final phase is decline phase. It represents the optimize education system that highly automate and use high level of intelligent functionality in the operation of education system. From this phase, the optimization leads to saturation of system change and new innovation leaps are critically needed for the education system. Without innovation, the education will be not competitive and phase out eventually in future.

This matrix able to provide UTM a roadmap to prepare and implement phase by phase in transforming current education system to 21st century concept. The realization of these roadmap requires multiple levels of design and development effort and skill. Creating a success transformational education system is also a complex   task and it need to be accepted by its users who are primarily the 21st century higher education students (Veeber et al., 2015). It must be effective in engaging and enriching students learning.

6 Conclusion

The transformational changes are critical to UTM in evolving the education system towards 21st century teaching and learning. The transition must be guided with clear direction and supported with implementation concept of education system transformational changes. The element of digitalization of systems within the education program are one of the critical factors to move forward. However, the form and shape are changes according to technology trends and progress. TRIZ methodology have been introduce in this paper based from the ability to forecast technology evolution with several tools and techniques such as trends of engineering system evolution and S-curve. Based from system functionality, the education system will transfer out to external system that is abundance such as online system that available in the internet. The changes towards automation of education system also pushed the education system evolved and transform to a higher level of functionality.

The TRIZ tools are integrated together and formed the proposed transformational matrix for UTM to evolve its education system towards 21st century goals. The proposed matrix provides UTM to identify their position in terms of education evolution phase and strategize their way forward to the next phase of evolution.

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Towards Developing a Decision-making Tool for Technology and Knowledge Priorities

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Abstract: The main focus of this paper is to propose a method for prioritizing knowledge and technology factor of firms towards sustainable competitive advantage. The data has been gathered and analyzed from two high tech start-ups in which technology and knowledge play major role in company's success. The analytical hierarchy model (AHP) is used to determine competitive priorities of the firms. Then knowledge and technology part of sense and respond questionnaire is used to calculate the variability coefficient i.e. the uncertainty caused by technology and knowledge factor. The proposed model is tested in terms of two start-ups. Based on the initial calculation of uncertainties, some improvement plan is proposed, and the method is applied again to see if the uncertainty of knowledge and technology decreases. In both cases, the proposed model helped to have a clear and precise improvement plan and led in reduction of uncertainty.
Key words: Sense and respond method; Sustainable competitive advantage (Sca); Knowledge and technology (Kt); Uncertainties; Analytical hierarchy process (AHP)

1 Introduction

The world is changing rapidly so is the business environment. This turbulent environment in business world affects the dynamic nature of competitive advantage among firm and makes the competition more intensified. According to Si, Takala and Liu (2010) "The future competitiveness of manufacturing operations under dynamic and complex business situations relies on forward-thinking strategies". One of the key drivers of competition is technology change. Any technological modification which could pioneer a firm in an industry is considered valuable. Although the technology factor plays an important role in obtaining profit for a company, it is not important for its own sake. It is important if can help companies to reduce cost or make differentiation or speed up delivery (porter,1986).

Technology changes and development could create new opportunities and as well as threats to companies (Takala&Zuchetti, 2016). It also important because it can affect industry structure and create new rules of competition. Understanding the effects of technological changes on the structure of an industry has even more importance in the era of digitalization and industry 4.0 (Oettmeier& Hofmann, 2017). It is perceived that competing in "high technology" industry is considered as key to gain profit (Porter, 1986). But it also demands lots of company resource, since it forced company to adapt to the technical requirements of the market continually (Takala&Zuchetti, 2016). So, it is very much important to look at technological capability of firms with resource based view approach and make decision about technology investment regarding companies limited resources.

This paper tries to evaluate technology and knowledge factor and connects it to companies' business strategy. Additionally, it aims to show how technology and knowledge decision reflect uncertainties. Managing uncertainties in business strategy is very important since it is replacing traditional risk management (Takala and Uusitalo). Therefore, this article is a step towards modelling knowledge and technology priorities considering business strategy.

2 Theory Background
2.1 Business strategy

Quinn 1980 defines strategy "the pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole". Nowadays firms need to apply strategies that can grantee their sustainable competitive advantages over others rather than only gaining short term benefit. The notion "sustainable competitive advantages" (SCA) was defined by porter in 1985. He proposed a positioning theory based on generic strategy. His positioning theory classified business strategy in three main categories: overall cost leader ship, differentiation and segmentation. In cost leadership category, companies seek to deliver product and services at lowest price by different means like optimizing process and standardize their products and services. In differentiation category companies seeks to deliver superior products and services by offering high quality and/or customized products and finally in

segmentation group, companies focus on fulfilling unique needs of selected segment of customer based on geography or income level (Porter 1980). This categorization was not comprehensive enough because it did not consider firm's resources and internal capabilities. Based on Wernerfelt (Wernerfelt, 1984), in finding optimal market for a firm, its products and its resources should be taken to account at the same time because resource and product are two sides of a coin for firms. Later on, Barney includes the role of resources in company business strategy as they can bring competitive advantages to firm. Because firms' resources are rare, have no direct substitutes, and help companies to achieve opportunities or avoid threats. Regarding companies' resources, competitive strategy is defined as creating value chain that cannot be implemented or duplicated by others easily (Barney, 1991).

Another classification of business strategy could be based on Miles and snow topology. In this model four business strategy groups are defined: prospector, analyzer, defender and reactor. prospector is those firm which try to lead their industry, their main focus is to deliver high quality products. Analyzer tries to focus on quality and cost simultaneously and remain steady in their market. Defenders try to minimize cost and focus on a mature product or market operation, they concentrate on process improvement and prefer not to take risks. And finally, reactor happens in absence of any clear strategy (Daft, 2009)

2.2 Sense and Respond model (S&R)

This model was introduced by Ranta and Takala in 2007 and assists frim in estimation about what would happen in future. This method is replaced traditional way of planning production and is more based on anticipation customers' need on real time. This method helps firms to collect data regarding their experience and expectation and provides a way for firm about how they see themselves compare others in terms of different attributes. Additionally, it helps firms to see the development of a certain attribute in a specific time frame (Strauss and Neuhauss 1997; Bradley and Nolan 1998; Ranta and Takala 2007).

The sample of questionnaire is presented in the following table:

Table 1   Format of the Questionnaire

Performance attribute	Scale: 1=low, 10=high		Compared with competitors			Direction of development		
	Expectation (1-1)	Experience (1-10)	worse	same	better	worse	same	better
Performance 1								
Performance 2								

In this study, the following attribute has been used for performance measurement in sense and respond questionnaire:

Table 2   Sample of Performance Measurement Which Has Been Applied in This Study

	ATTRIBUTES	
	Knowledge & Technology Management	
1	Training and development of the company's personnel	← Flexibility
2	Innovativeness and performance of research and development	← Cost
3	Communication between different departments and hierarchy levels	← Time
4	Adaptation to knowledge and technology	← Flexibility
5	Knowledge and technology diffusion	← Cost
6	Design and planning of the processes and products	← Time
	Processes & Work flows	
7	Short and prompt lead-times in order-fulfillment process	← Flexibility
8	Reduction of unprofitable time in processes	← Cost
9	On-time deliveries to customer	← Quality
10	Control and optimization of all types of inventories	← Quality
11	Adaptiveness of changes in demands and in order backlog	← Flexibility
	Organizational systems	
12	Leadership and management systems of the company	← Cost

	ATTRIBUTES	
13	Quality control of products, processes and operations	← Quality
14	Well defined responsibilities and tasks for each operation	← Flexibility
15	Utilizing different types of organizing systems	← Flexibility
16	Code of conduct and security of data and information	← Cost
	Information systems	
17	Information systems support the business processes	← Time
18	Visibility of information in information systems	← Time
19	Availability of information in information systems	← Time
20	Quality & reliability of information in information systems	← Quality
21	Usability and functionality of information systems	← Quality

2.3 RAL model

To integrate sense and respond method to Miles and snow typology, RAL model is used. RAL is abbreviated from responsiveness, agility and leanness. According to Takala (2012), a firm can be optimized in terms of responsiveness, agility and leanness by prioritizing quality, cost, time and flexibility.

Figure 1   RAL Model

2.4 Technology and knowledge rankings

Knowledge and technology requirement is added to sense and respond questionnaire to gather information about companies' knowledge and technology priorities. Since the company's resources is limited, so it is very important to find the technology focus which is align with company business strategy and can grantee firms competitive advantage and profitability. Based on Marone (Marone, 1989), technology can provide opportunities and bring competitiveness to firms. Additionally, technology strategy plays an important role in the success of technology-based startups and improves their competitive advantage (Campos et.al, 2009). Therefore, companies should integrate it to their business strategy.

To gain sustainable competitive advantage and create core competences, knowledge and intellectual capital also plays significant role. According to Libut (Libut, 2001), achieving sustainable competitive advantages is mainly based on knowledge meaning that in order to create value chain, knowing how to do thing is as important as having access to special resources. To create value chain, knowledge should be shared effectively within firm while be protected from liking outside. So, to gain competitive advantage knowledge, skills and intellectual property should be easily shared inside the firm but difficult to be copied by competitors. This kind of knowledge which is "difficult to express, formalize or share", called tactic knowledge. Tactic knowledge is very much related to firms' experience, organization structure and routines (Libut, 2001). The role of technology in organization and getting competitive advantage is even more important in terms of "technology entrepreneurship" and high tech business and so many studies has been conducted to investigate it in terms of resource based view, dynamic capabilities and core competence (Bailetti, 2012).

To evaluate knowledge and technology impact on firm business strategy, respondents have to estimate each attribute of sense and respond questionnaire in terms of basic, core and spearhead technology. In other word respondents should detect the share of these three technologies in term of each

attribute while the sum of all shares is 100%. Here, basic technology means the kind of technology which is used commonly and can be purchased or outsourced. Core technology refers to the technology that is bringing competitive advantage to company currently and spearhead technology refers to future technologies.   These three different technologies differ each other in terms of required resource and knowledge. This difference influences a lot in firm's strategy implementation and in particular to the success of high tech-based business (Takala et al, 2013).

Table 3   Technology and Knowledge Share for Different Attributes

	Basic	Core	spearhead
Performance 1			
Performance 2			
Performance 3			
Performance 4			

3 Method

In this study, analytical hierarchy process (AHP) model and knowledge and technology part of sense and respond questionnaire is used. AHP method is used to weight the component of RAL method: quality, cost, time and flexibility. Analytic Hierarchy Process (AHP) method is based on pairwise comparison between criteria and was introduced by Saaty in 1980. This method is "a multi-attribute decision instrument that allows considering quantitative and qualitative measures and making tradeoffs". In order to calculate the partial uncertainty regarding to each type of technology, this paper suggests variability coefficient. The formula is as follow:

$$\text{Coef. Var}_{\text{Basic}} = \frac{\text{Standard Deviation}_{\text{Basic}}}{\text{Average}_{\text{Basic}}} \quad (1)$$

$$\text{Coef. Var}_{\text{Core}} = \frac{\text{Standard Deviation}_{\text{Core}}}{\text{Average}_{\text{Core}}} \quad (2)$$

$$\text{Coef. Var}_{\text{Spear Head}} = \frac{\text{Standard Deviation}_{\text{Spear Head}}}{\text{Average}_{\text{Spear Head}}} \quad (3)$$

The above formula shows the level of deviation among participants' response in terms of each technology type regarding different component of RAL model. After calculating the coefficient of variance (CV) for different type of technology, the next step is to calculate risk level in partial and in total. The following formula is used to calculate the partial and total risk of technology:

$$c_1: \text{Quality}, c_2: \text{Time}, c_3: \text{Cost}, c_4: \text{Flexibility}$$

$$\underset{c_1,c_2,c_3,c_4}{TotalTK\ risk}\ (RMS) = \sqrt{\sum_{c_1,c_2,c_3,c_4}\left[\left(\sum_{b_1,c_1,sh} Coef.Var_i\right)^2\right]^2}$$

$$Partial \begin{cases} \underset{c_1,c_2,c_3,c_4}{TK\ risk\ Basic}\ (RMS) = \sqrt{\sum_{c_1,c_2,c_3,c_4}\left[\sum_b\left(\frac{std_i}{mean_i}\right)^2\right]^2} \\[2ex] \underset{c_1,c_2,c_3,c_4}{TK\ risk\ Core}\ (RMS) = \sqrt{\sum_{c_1,c_2,c_3,c_4}\left[\sum_{core}\left(\frac{std_i}{mean_i}\right)^2\right]^2} \\[2ex] \underset{c_1,c_2,c_3,c_4}{TK\ risk\ Sh}\ (RMS) = \sqrt{\sum_{c_1,c_2,c_3,c_4}\left[\sum_{sh}\left(\frac{std_i}{mean_i}\right)^2\right]^2} \end{cases} \quad (4)$$

When all the risk is calculated, next step is to calculate sustainable competitive advantage (SCA) index, using the following formula:

$$TotalRisk(Geom) = [(1 - SCA)TKrisk]^{\frac{1}{2}} \quad (5)$$
$$TotalSCArisklevel = 1 - TotalRisk(Geom) \quad (6)$$

4 Case Studies and Data Collection

The data and cases which are presented in this study are gathered during the student work shop in Warsaw University of life science in Poland. The data which are presented here, are based on high tech startup companies and the decision in which technology focus is crucial in their success. Additionally, they have limited resources as startups and resource allocation plays critical role in setting their strategy. Considering all above, cases are presented here are fit to examine the proposed method here.

During case studies, different group has started the data collection step by defending main attributes in project (regarding project goal and its mission). Then the next step is to estimate these main

criteria in terms of different technology share (basic, core, speared). When the data is gathered, final stage is to calculate the variability of coefficient and risk level and to examine how improvement plan might affect the risk of technology deployment.

5 Results

5.1 Case 1: establishing a new transportation company based online scooter

The mission of this start up is to offer high quality and environmental friendly transportation services for customer and having fun simultaneously. The business model of this start up is as follow: customer can rent a scooter on the station via app and they can leave it whenever they want. Since the process of renting works with net and online application, therefor it is very easy and accessible. Customers are charged based on minutes while the starting three minutes is considered free of charge especially for preparation. No driving license is needed for driving scooter and only ID card is enough. There is promotion for long term contact and you can have a friend (or company) with you using the scooter each time. This starts up has the following partners: manufactures of scooters, leasing company, local government, advertising company and eco-friendly organizations. Customer target group are: people who follows environmental friendly life style, passengers in rush, people who likes using technology in everyday life. The core idea behind this start up is to offer rental high-quality scooter for a short period of time. This business needs some spearhead technology (advance technology) such as: stations with sun panels and tablets with navigation system. The current competitive priorities for company are: safety and flexibility, availability and cost. And in future it slightly changes to: safety and cost, 2. availability and flexibility. Manufacturing business strategy index for past and for future is presented in the following table:

Table 4   Manufacture Business Strategy for Scooter Starts Up, in Past and in Future

	Cost	Quality	Delivery	flexibilty	Inconsistency
Past	0.074	0.513	0.138	0.275	0.004
Future	0.275	0.513	0.138	0.074	0.004

The source of uncertainty in term of technology is presented in the next figure. As the pictures demonstrates, spearhead technology reflects the highest level of uncertainties in technology and knowledge decision making process.
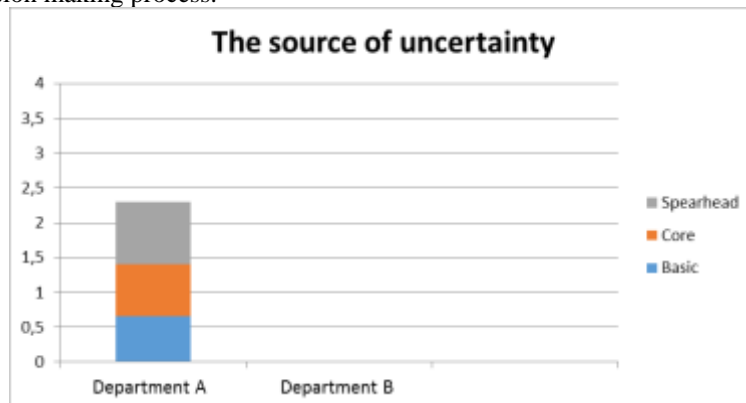
Figure 2   The Source of Uncertainty in Technology Type, Current Situation

Considering the available resources and company main goal and to decrease the level of uncertainty the following improving plan has been suggested: 1. to locate ten rental stations in the city center containing five scooters at each, 2. Customers could return the scooter at the station free of charge otherwise there is extra charge in case of leaving scooter somewhere else in the city. 3. Constantly observe the availability and the location of demand and relocate station to more popular areas if needed. After implementation the improvement plan, the source of uncertainty would look as follow:
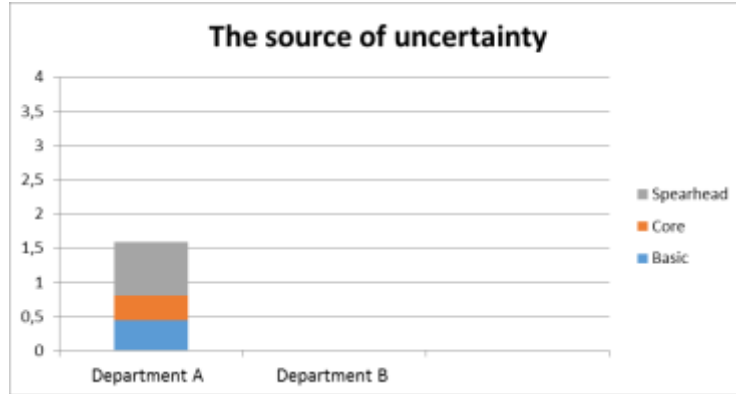
Figure 3   The Source of Uncertainty in Technology Type, after Improvement Plan

Comparing figure 2 and 3 shows that total uncertainty decreases by 25% after improvement plan. While spearhead technology holds the biggest share of risk and uncertainties in past and after improvement plan. Following the formula 1-6 the partial and total risk of technology would be as follow:

Table 5   The Summary of Risk Level

	Technology and Knowledge risk			Total risk (Geom)	Total SCA risk level
	Basic	Core	Spearhead		
Past	0.66	0.74	0.88	1.33	0.36
Future (after improvment plan)	0.45	0.35	0.78	0.97	0.31

The following bar charts show the source of risk and uncertainties in technology deployment has changed after implementation of improvement plan.
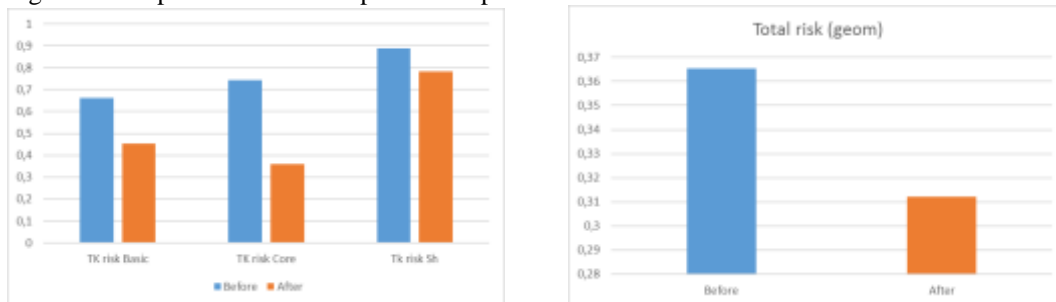
Figure 4   Comparison of Risk Share in Terms of Each Technology, Current (before) and Improved (after)

Having searched the source of uncertainty among sense and respond attribute, the following criteria are detected as critical before suggestion of improvement plan:
   (1) Training and development of company's personnel
   (2) Short and prompt lead time in order-fulfilment process
   (3) Reduction of unprofitable time in process
   (4) On-time delivery to customer
   (5) Control and optimization of all type of inventories
   After improvement plan, the critical attribute would be:
   (1) Code of conduct and security of data and information
   (2) Information system supports the business process
   (3) Visibility of information in information system
   (4) Quality and reliability of information in information system

5.2 Case 2: establishing an entertainment start up based on portable scape room idea

The core idea behind this start up is that the group of people enter to a space room (in here truck trailer) and in order to find the exit way, they need to solve a mystery. This scape room is portable and is able to reach to customer place. This entertainment vehicle is suitable for all the ceremony like wedding, birthdays, parties and all sort of events which people needs to be entrained. The spearhead technology in

this start up is "holographic design" while truck could be considered basic technology and advertisement channel is core technology.   The business strategy priorities for this company are: (1) quality. (2)delivery, (3) flexibility and 4. cost.   They are presented in the following table:

Table 6　Company Competitive Priorities in Past (before improvement plan)

	Cost	Quality	Delivery	flexibility	Inconsistency
Past	0.057	0.499	0.284	0.160	0.004

Technology and knowledge requirement of this company is filled by seven respondents mainly from marketing, design and logistic department and the results is presented in the following:

Table 7　Knowledge and Technology Share- before Improvement Plan

No	Quality			Flexibility			Cost			Delivery		
	Basic	Core	Spearhead	Basic	Core	Spearhead	Basic	Core	Spearhead	Basic	Core	Spearhead
1	80	20	0	30	50	20	60	30	10	80	20	0
2	20	40	40	15	63	22	30	50	20	10	70	20
3	20	50	30	10	70	20	10	60	30	25	35	40
4	10	45	45	0	50	50	10	45	45	20	40	40
5	30	60	10	0	70	30	30	40	30	20	60	20
6	30	60	10	0	70	30	30	40	30	20	60	20
7	80	20	0	30	50	20	60	30	10	80	20	0

Uncertainties related to technology deployment before implementing improvement plan is demonstrated in the following bar chart:
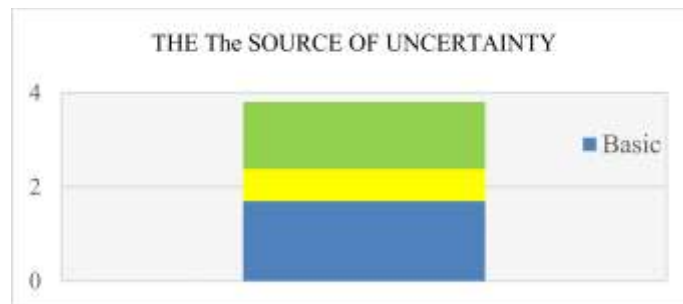
Figure 5　The Source of Uncertainty in Technology Part, Before Improvement Plan

As the bar chat shows, basic and spearhead technology causes the biggest share ofuncertainty in this start up. Some improvement plan has been suggested as follow to decrease the level of uncertainty like: deploy mobile phone app, to increase the truck numbers and projects at least one yearly, corporate with fuel company, offering bonus to customer in case of recommending the company to someone else, and implement customer satisfaction survey constantly. After the improvement plan, knowledge and technology requirement for each type of technology would be as follow:

Table 8　Knowledge and Technology Share-after Improvement Plan

No	Quality			Flexibility			Cost			Delivery		
	Basic	Core	Spearhead	Basic	Core	Spearhead	Basic	Core	Spearhead	Basic	Core	Spearhead
1	30	60	10	30	50	20	20	60	20	80	20	0
2	30	50	20	15	63	22	30	50	20	70	15	15
3	20	50	30	10	70	20	10	60	30	75	15	10
4	20	50	30	10	50	40	10	45	45	60	20	20
5	30	60	10	10	60	30	30	40	30	65	25	10
6	30	60	10	10	60	30	20	50	30	60	15	25
7	40	50	10	20	50	30	30	60	10	80	20	0

And the uncertainty related to each type of technology is presented in the next figure:
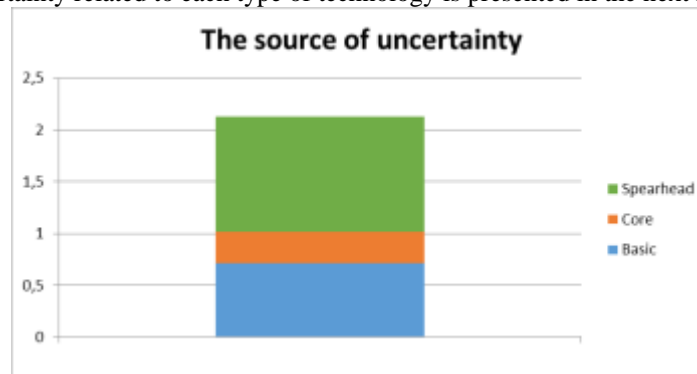
Figure 6   The Source of Uncertainty in Technology Part, Before Improvement Plan

Comparing figure 5 and 6 shows after implementing improvement plan, the main source of uncertainty is spearhead technology.

Uncertainty related to technology and knowledge is presented in the following table:

Table 9   The Summary of Risk Level

	Technology and Knowledge risk			Total risk (Geom)	Total SCA risk level
	Basic	Core	Spearhead		
Past	1.69	0.68	1.4	2.31	0.48
Future (after improvment plan)	0.71	0.30	1.11	1.35	0.37

Having searched the source of uncertainty among sense and respond attribute, the following criteria are detected as critical before suggestion improvement plan:

1.Adoption to knowledge and technology

2.Design and planning the process and product

And after improvement plan, critical attribute would be:

1.On time delivery to customer

2.Quality control of product, process and operation

3.Utilizing different type of organizing system

4.Code of conduct and security of data and information

5.Quality and reliability of information in information system

6 Discussions and Conclusion

This study tries to present a new decision making to evaluate the technology priorities considering business strategy. This tool supports decision makers to decide about technology focus regarding companies' business strategy and its internal resource.

The presented SCA model-based knowledge and technology here provides decision maker better tool towards gaining sustainable competitive advantages by making right decision regarding different technology level. The technology decision could be increasing investment or out sourcing for example.

Moreover, the model provides the possibility of:

Observing the right type of operation strategy (cost, quality and time) which could result in company better performance

Investigating which company unit follow company business strategy and which not

Take better strategic action by knowing the criteria which are unbalanced in terms of resource allocation

Companies which are presented here are high tech start-ups. And in both, spearhead technology plays significant role in creating uncertainties. Using this new development tool, these start-ups were able to reduce the risk related to technology deployment for spearhead technology and in total. The proposed model also is connected to sense and respond method which enable companies to detect the focus attribute to maximize their profit regarding company competitive advantage which could be differentiation or cost reduction for example.

Although the effect of technology and knowledge on SCA observed by the proposed model here is not significant, it cannot be neglected. The main role of this paper is to investigate the effect of different

technology types on SCA level considering the uncertainties in different technology level.

The analysis and proposed tools are performed on high-tech startups in which technology and specially advanced technology plays significant role. The proposed model in this paper is a suitable tool for decision makers in showing firms' strengths and weaknesses and also in detecting the focus area towards gaining sustainable competitive advantage.

Acknowledgement

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Feature Selection on Arabic Document Classification: Comparative Study

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Abstract: Feature selection is standard techniques that used to improve the accuracy and efficiencyof the document classificationsystem.The high dimensionality of the feature space is a major problem in documentclassification. Feature selection technique is the process of reducing the vast number of the space features in document classification. The aim of this study to explorethe impact of featureselection techniques namely-Chi-square (CHI), and Information Gain (IG) on the accuracy of Arabic document classification. The experiment conducted using Support Vector Machine (SVM) classification technique.K-fold cross-validation examined to evaluate classifier, and f1-micro used to test the classifier. The Term Frequency-Inverse Document Frequency (TF-IDF) used to extract features. Experiments Analysis reveals that the feature selection techniques have a significant impact on the classification accuracy. Findings of this study show that the Chi-square feature selection techniqueoutperformed the information Gain feature selection technique. The SVM classifier achieved 95.42% micro-F1 value when feature size equals 4000 and by using Chi-square feature selection technique.
Key words: Arabic text classification; Feature selection techniques; Text preprocessing

1 Introduction

The Document classification is becoming more critical with increasing the massive amount of electronic documents. The massive number of features is a significant challenge in document classification which reduces the performance of document classification and time-consuming. Feature selection technique is used to reduce the feature space by selecting the essential features. Classifying documents manually is becoming time-consuming and much more difficult than before because of the massive amount of information accumulation on a daily basis in different information resources. Automatic Text Classification (ATC) is a machine learning technique which aims at assigning a text document automatically to a thematic category from a predefined set of classes. ATC has a vital role in many information retrieval applications such as sentiment analysis(Dahou et al., 2016), website classification (Ahmadi et al., 2011), email filtering (Sakurai and Suyama, 2005),spam filtering (Al-Kabi et al., 2012)and automatic indexing(Percannella et al., 2005).

The document in text classification system must pass through a set of stages(Ayedh et al., 2016).The first stage is document preprocessing which Include tokenization, normalization, stop word removal and stemming. The second stage is feature extraction and feature selectionthat extract features and select the criticalfeature. The final stageis document classification wherein the training and testing data are divided from a collection of documents. In this stage, the classification algorithm build model from training data and evaluated by test data.

In Document classification, the researchers deal with the problem of the high dimensionality of feature space thatreduces the accuracy and efficiency of the document classification system .Feature selection used to solve the problem of the high dimensionality of feature space by selecting the criticalfeatures.Moreover, in thisresearch, weinvestigated theimpact of feature selection techniques namely- Chi-square, Information Gain on the accuracyof accuracy of Arabic document classification.

The remainderpart of this paper is organized as follows; Section 2 discusses Literature Review. Section 3 presents the research methodology. Experiment work and result described in Section 4, and finally conclusion is presented in Section 5.

2 Literature Review

The vast majority of the research on documentclassification has been investigated in Latin-based languages and other languages, however Arabic document classification still in the fancy stage.

The influence of stop word elimination on Arabic document classification evaluated byAl-Shargabi et al.(Al-Shargabi et al., 2011).They testedseveralclassification algorithms, and concluded that the SVM

with sequential minimal optimization achieved the highest accuracy and lowest error rate. The impact of preprocessing om Arabic document classification investigated by Ayedh et al (Ayedh et al., 2016a)Examined the impacts of normalization,stop word removal and stemming on the accuracy of Arabic document classification.Three machine learning classification algorithms used to build the classification model. Chi-square feature selection selected the essential features. They concluded that the superiority of the SVM classifier over the other classifier algorithms when thenormalization and stemming combined.

The influence of stemming technique on Arabic document classificationevaluatedby Duwairiet al. (Duwairi et al., 2009). They concluded that the light stemming approach enhances the accuracy and outperformthe other approaches.

Ayedh et al(Ayedh et al., 2016b) Investigated three feature weighting approaches that depend on inverse document frequency (IDF) namely , Term frequency (TFiDF), the position of the first appearance of a word (FAiDF), and the compactness of the word (CPiDF) on the classification accuracy.Several feature selection techniques are used to select the critical features namely Chi-square (CHI), Information gain (IG), GalavottiSebastiani-Simi Coefficient (GSS),and Goh and Low (NGL) coefficients.Support vector machine (SVM) learningused to build the model of classification. Their results showed that the notability of the GSS over the other feature selection techniques when TFiDF, CPiDF,andFAiDF feature weighting method are combined.

Zaki et al. introduced a hybrid system for Arabic document classification(Zaki et al., 2014) grounded on the semantic vicinity of terms and the use of a radial basis modeling.Stop word elimination, normalization, and stemming techniques were investigated as preprocessing tasks.They implemented the hybridization of N-gram + TF-IDF statistical measures to calculate the similarity between words. Theyfound the use of radial basis functions developed the performance of the system.

Al-Tahrawi and Al-Khatib estimated the Polynomial Networks(PN)inArabic document classification and compared the performance with severalalghorithms such as Support Vector Machine, Naïve Bayes, and J48 on Alj-News dataset(Al-Tahrawi and Al-Khatib, 2015). Their results showed that the PN was very competitivebut not the best for all the categories in the dataset. Theyrecommended some points for future work to improve the performance of PN.

Elhassan and Ahmedstudied the effect of stemming techniques including Khoja and Light stemmers on Arabic document classification(Elhassan and Ahmed, 2016). Various machine learning algorithms investigated to build the model of classification system namely Sequential Minimal Optimization (SMO), Naïve Bayesian (NB), J48 and K-nearest neighbors (KNN). Their result showed that the Sequential Minimal Optimization (SMO) classifier outperform others classifiers and the light stemmer outperforms the Khoja stemmer.

Mesleh evaluated several feature selection techniques on Arabic document classification based on support vector machine(Mesleh, 2008). The preprocessing tasks normalization, stop word removal and stemming were examined in their experiments. Their experiments resultsshowed that the Ng-Goh-Low (NGL) coefficient, the Galavotti-Sebastiani-Simi (GSS) coefficient and chi-square significantly outperformed the other techniques.

3 Research Methodology

An Arabic Document Classification framework usually consists of three main stages, pre-processing stage, feature extraction（representation）, feature selection stage, and finally, the document classification stage. Pre-processing stage contains the process that transforms the text into a suitable format. Feature extraction stage is the process that extract the feature from text and transforms it into the numericalvector, feature selection is the process of selecting the important features. Document classification includes classification model evaluation and classification model construction. The description of these phases are presented in the following figure1.
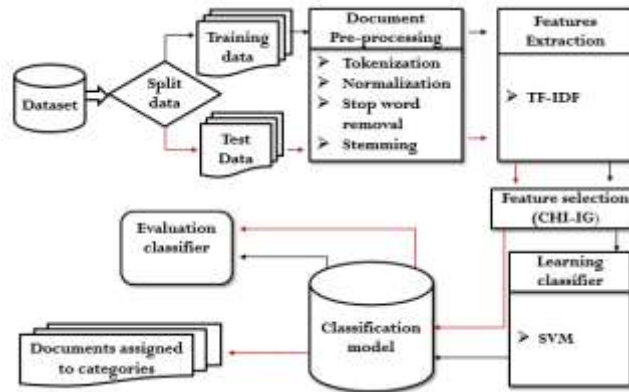
Figure 1   Arabic Document Classification Framework

3.1 Document pre-processing

Document pre-processing is the process that transforms the original textual words into standard structure documents classification. Also known as the first step in document classification (categorization) system. Pre-processing technique used to reduce the ambiguity of words and enhance the performance of classification.Document pre-processing include various techniques such as tokenization, normalization, and stop word removal,and stemming.Tokenization is the process that dividing the texts into tokens .Normalization is the method that convert character into stander format ,remove Arabic diacritics, numbers, Latincharacters, and non-Arabic characters. We used the same techniques of normalization(Larkey et al., 2002).Stop word is insignificant word in your dataset, sothe stop word removal a list[1]of Arabic stop word prepared to be eliminated from all the documents. Stemming technique define as the process that reduce the wood to their root or stem ,we usedTashaphynestemmer (https://pypi.python.org/pypi/Tashaphyne/) as their performance(Oraby et al., 2013).

3.2 Feature extraction and selection

The second stage of document classification process called feature extraction and feature selection .Feature extraction is the process that extract features from text and convert it into numerical vector to be suitable for machine learning algorithms. Several different methods have been used to extract features. One of the most common methods is TF-IDF(Ayedh et al., 2016a).Feature selection aims to select the most applicable words that differentiate (one topic or class from other classes) between classes in the dataset.Various feature selection techniques have been investigated for document classification. In our paper, we suggested Chi-square (CHI), and Information Gain (IG) feature selection techniques.

3.2.1 Chi-Square

Chi-square testing (χ^2), which is defined as a well-known discrete data hypothesis testing method from statistics; this technique evaluates the correlation between two variables and determines whether these variables are independent or correlated(Thabtah et al., 2009). χ^2 Value for each term t in a category c can be defined by using equations (1) and (2)(Sebastiani, 2002).

$$\chi^2(t_k, c_i) = \frac{|Tr| \cdot [p(t_k, c_i) * p(\overline{t_k}, \overline{c_i}) - p(t_k, \overline{c_i}) * p(\overline{t_k}, c_i)]^2}{p(t_k) * p(\overline{t_k}) * p(c_i) * p(\overline{c_i})} \tag{1}$$

And is estimated using

$$\chi^2(t, c) = \frac{N*(AD-CB)^2}{(A+C)*(B+D)*(A+B)*(C+D)} \tag{2}$$

Where:

A = The frequency of t and c occurrences,

B = The frequency of t occurrences without c,

C = The frequency of c without t,

D = The frequency of non-occurrence of both c and tand N is the quantity of document.

3.2.2 Information Gain

Information gain is commonly used as a term goodness criterion in machine learning. Information gain measures the amount of information obtained for category prediction by knowing the presence or absence of a term in a document(Zifeng et al., 2007),(Xu et al., 2005).The IG idea is to determine features that reveal the most information about the categories. The IG of feature t is defined as:

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[1] https://github.com/yalhag1/Arabic-stop-word-list

$$IG(t,c_i) = \sum_{i=1}^{i=m} p(t,c).log\frac{p(t,c_i)}{p(t).p(c_i)} + \sum_{i=1}^{i=m} p(t^-,c_i).log\frac{p(t^-,c_i)}{p(t^-,c_i)} \quad\quad (3)$$

And is estimated using:

$$IG(t) = \sum_{i=1}^{i=m} A.log\frac{A}{(A+C)(A+B)} + \sum_{i=1}^{i=m} B.log\frac{B}{(B+D)(A+B)} \quad\quad (4)$$

3.1 Document classification

The final stage of the document classification process is called document classification wherein the training and testing data are divided from a collection of documents .In this stage, we examined a popular statistical classification and machine learning technique for document classification namely support vector machine (SVM)(AbuZeina and Al-Anzi, 2017) to build the model of document classification. We have developed our application using Python Programming to implement the experiments .The parameters setting of SVM used in python programming such as SVC(kernel='linear', C=1) .

4 Experiment and Results

4.1 Arabic Data collection

To evaluate the impact of feature selection on Arabic document classification, we have used an in-house dataset that collected from numerous published papers for Arabic document classification and gathered from Arabic news websites.The collected dataset contains 1000 documents divided into 6 categories of economy, medicine, politic, religion, science, andSport. In this Arabic dataset, each document must be assigned to one of the conformingclass directories. The statistics of the dataset are shown in Table 1. The largest category contains around 351 documents, whereas the smallest category contains nearly 54 documents.

Table 1   The Statistic of Document in the Corpus

class name	Number of documents
Economy	92
Medicine	42
Politics	274
Religion	54
Science	351
Sport	187
Total	**1000**

4.2 Accuracy analysis

In this paper, all documents in the dataset were prepared by converting them to UTF 8 encoding. Feature selection methods namely Chi-square and information gain were carried out by constructing feature sets that consist 1000, 2000, 3000, 4000, and 5000 features.SVM techniques performed to observe the accuracy of document classification system. K-fold 10 cross-validation examined to evaluate classifier.Several mathematic rules such as recall (R), precision (P), and F-measure (F) are investigated to evaluate the performance of classification model to classify documents into the correct category which are defined as follows:

$$Precision = \frac{True\ postive}{True\ postive + False\ postive} \quad\quad (5)$$

$$Recall = \frac{True\ postive}{True\ postive + False\ negative} \quad\quad (6)$$

$$Micro - F1 = \frac{2*\ Precision \times Recall}{Precision\ +\ Recall} \quad\quad (7)$$

4.3 Result and discussion

Resulting F1-micro obtained from the dataset based on the impact of feature selection techniques namely Chi-square and information gain are illustrated on Table 2.

Table 2   F1 Measure Scores for Feature Selection Techniques

Classification algorithm	Feature size	CHI	IG
	1000	0.9370	0.9271
	2000	0.9452	0.9401
SVM	3000	0.9521	0.9482
	4000	**0.9542**	0.9521
	5000	0.9522	0.9522

According to the proposed method of feature selection methods namely-Chi-square and information gain has different impact based on SVM classifier algorithm. The evaluation was investigated after preprocessing tasks namely –normalization, stop word removal and stemming technique .TF-IDF extract features to be appropriate for machine learning classification. The results show that the feature selection methods have different impact based on type of feature selection methods and features size. The Chi-square feature selection method overcome the Information Gain feature selection method with all the feature size except when the features size equal 5000 they have the slimier impact . The best result found with Chi-square feature selection method when feature size equal 4000.

5 Conclusion

In this study, we investigated the impact of featuresselection techniques namely- Chi-square (CHI) and information gain (IG)on accuracy of Arabic document classification. Support vector machinelearning algorithmhave been investigated to solve the problem of text categorization. TF-IDF used to extract features. Findings of the study show that the Chi-square (CHI) feature selection technique outperform the information gain feature selection technique. Based on features selection techniques and the number of feature sizethe performance and accuracy in Arabic documents classification have different impact. We believe this results will be helpful for examiners in document classification system to choose the property method of feature selection technique and the number of features. Future research would focus on study how to choose the optimal feature selection method and important featuresfor Arabic document classification based on optimization algorithm such as genetic algorithm.

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Empirical Study on the Antecedents Predicting Organizational Resilience of Small and Medium Enterprises in Bangladesh

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Abstract: Human values and affective traits were found to predict attitudes toward the use of different types of knowledge-based theory through creative climate. In this study (N =329), we aimed to gain a more comprehensive understanding of those predictors toward use in a structural equation model (SEM), provided a better overview of a possible structural path that drives to such antecedents for Small and Medium Enterprises (SMEs) in Bangladesh. Precisely, we predicted and found that the relations between the variables and impact of different variables were modeled and tested by applying SEM. Based on the questionnaires survey on SMEs in Bangladesh, this empirical study indicates that all the predictor variables significantly influence the endogenous variables except knowledge management (KM) and employee resilience (ER), and creative climate (CC) and organizational resilience (OR). The study provides several theoretical and practical implications for further research.
Key words: Creative climate; Knowledge management; Employee resilience; Organizational resilience

1 Introduction

In today's competitive environment, organizations enlarge globally and face a lot of contests to meet their objectives. To survive and contend successfully in the dynamic atmosphere, organizations require proactive work climate for performing at high standards to yield for long-run sustainability of the organization (Majeed, 2011). To keep in line with it, CC is the essential element to the long-term success and subsistence of organizations. Ultimately, most managers realize that a productive workforce and climate will provide a global, sustainable and competitive advantage for a learning organization. On the same lines, KM has attracted individual responsibility of employees' (Li et al., 2013). Recently, researchers have paid interests in this arena because of its acute role displayed in the competitive business world as well as OR (Linnenluecke, 2017). Empirical studies imitated that the antecedents predicting creative climate are KM, ER, and OR which practically mentioned in several studies. Besides, resilience in organizations and among employees is relevant in any context which introduces challenges and transcends a post-disaster context (Näswall et al., 2015). This little adaptation capability is undoubtedly a matter for the development of organizations in the modern edge. However, the ability of a knowledgeable resource in any organization to learn faster than those in other organizations establishes the only sustainable competitive advantage at the disposal of a learning organization (Geus, 1988). It is the link between learning organization and the success in changing the environment. To address this issue, According to Denyer (2017), OR is required for businesses to respond to the interruptions as well as positively adapt in the face of challenging conditions, leveraging prospects and delivering sustainable performance improvement. By addressing these rationales, this study intends to figure out how CC, KM, and EM directly influence OR rather than CC and KM affect OR through ER.

2 Theoretical Background and Hypotheses Substantiation

2.1 Impact of creative climate on the relationship between employee and organizational resilience

Organizations need to shape a climate that stimulates creative climate. CC is the organizational appearances as perceived by its members (Ekvall, 1996). It also encourages people to generate new ideas and helps the organization to grow and increase its efficiency and at the same time it enables members to generate and implement creative ideas more effectively (Ekvall et al., 1983). Accordingly, OR is the ability of the organization to cope with modification through continuous replenishment of business operations to prevent deterioration and disuse (Scott, 2007). In today's rapidly-changing environment, ER is a critical resource for organizations. In this progress, ER plays a great role in this context (Näswall et al., 2013), as the definition of ER builds on the definition of OR, defined as "a function of an organization's overall situation awareness, management of keystone vulnerabilities, and

adaptive capacity in a complex, dynamic, and interconnected environment". Therefore, the hypotheses of these relationships are:

H2. Creative climate significantly predicts employee resilience

H4. Creative climate has a positive impact on organizational resilience

2.2 Influence of knowledge management association with employee and organizational resilience

KM is one of the most important sources for the organization to achieve the sustainable competitive advantage and adaptation. Prior studies posited on developing resilience by focusing on individuals' knowledge and adaptability (Sutcliffe and Vogus, 2003), and self-enhancement skills and attachment style (Bonanno et al., 2002). In this connection, resilience in leaders has been shown to affect subordinates' and the organization's performance (Youssef, 2004). With the view in mind, KM as a strategy to manage organizational knowledge assets helps in management decision making, and enhances keenness and increase capacity for creative climate and innovation (Nowack et al., 2009). The process of KM, i.e., knowledge acquisition, distribution, interpretation and organizational retention, paves the way for enhanced organizational enactment (Lee and Choi, 2003) by solving the business hitches and exploring the potential growth opportunities. Nonaka (2007) mentioned that KM involves the acquisition, creation, and use of information for change that can culminate in innovation and, ultimately, organizational resilience (Hamel and Valikangas, 2003). To support this, Grant and Kinman (2012) also painted the inescapability of resilience for employees working in ardently challenging and different occupation. In this regard, to bridge this gap, we hypothesize:

H1. Knowledge management has a positive effect on employee resilience

H3. Knowledge management positive impacts organizational resilience

H5. Employee resilience influences organizational resilience significantly

2.3 Relationship between creative climate and knowledge management

Basically, climate for creativity investigates how the prevailing workplace environment supports creativity of SMEs in Bangladesh. To achieve this, researchers and practitioners need to understand the influence and relationship of CC on knowledge management. A part of this, Service and Boockholdt (1998) concluded that CC is related to and has a major impact on psychological processes particularly in knowledge-base organization. Consequently, these components exert a direct influence on the performance and outcomes of individuals, working groups and the organization. Study conducted among managers of information technology in Malaysia revealed that organizational CC had a positive and significant impact on KM (Samad, 2010). Furthermore, it is often investigated that creative organizational learning is increased from knowledge process capabilities that create, transfer, and use knowledge (Malhotra, 2004), and the result of increased organizational creativity is improved organizational performance . Based on the preceding discussion, we propose the following hypothesis:

H6. Creative climate significantly predicts knowledge management

To emulate a clear demonstration of the present investigation, we developed a conceptual framework (Figure 1) based on insights gained from the prior studies.
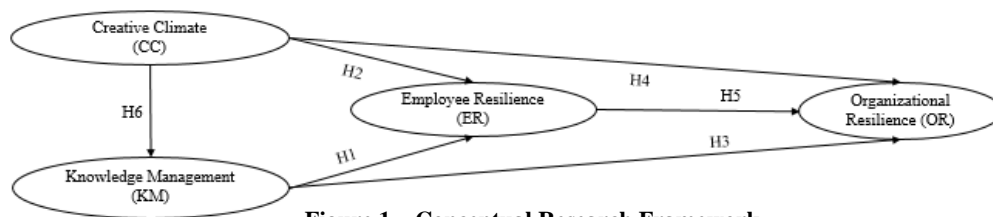
Figure 1   Conceptual Research Framework

3 Research Design and Methodology

3.1 Respondents' demographic features

Detailed demographic characteristic of the respondents has been reported below the table (1):

Table 1   Participants' Demographic Profile (N=329)

Variables	Categories	Frequency	%	Variables	Categories	Frequency	%
Gender	Male	252	77.0	**Education**	Master	105	32.0
	Female	77	23.0		Others	224	68.0
Age	Below 35 Years	186	57.0	**Tenure**	Below 10 Years	208	63.0
	Above 35 Years	143	43.0		Above 10 Years	121	37.0
Size	Small	176	53.0				
	Medium	153	47.0				

3.2 Survey instruments

A total of 480 questionnaires were delivered through the offline and online survey, but 343 responses were received. In the screening test, 13 responses were dropped out to address the issues of common method bias, missing data, outliers, and data normality. Survey instruments of creative climate (Kim and Yoon, 2015), knowledge management (Noruzy, Dalfard, Azhdari, Nazari-Shirkouhi, and Rezazadeh, 2013), employee resilience (Näswall et al., 2015) and Organizational resilience is adopted from Mafabi et al. (Mafabi et al., 2012) that consists of organizational competitiveness, organizational adaptiveness, and organizational value, were used in this research. Notably, a 5-point Likert scale has been used for the sake of uniformity in measuring the variables. The scales ranged from strongly agree (1) to strongly disagree (5). Microsoft Excel 2016, AMOS version-20, and IBM SPSS version-21 analytical tools were used to operate the data.

4 Measurement Models Evaluation
4.1 Model specification with construct validity, reliability, and goodness-of-fit statistics

Measurement model evaluation considers several issues to test the measures' authenticity. Fit indices, construct validity, and reliability were examined. With 38 manifest variables, the confirmatory factor analysis (CFA) did not yield a good output. Due to issues involved in the regression weights and items' loading, one item from CC, five items from ER, one item from KM, and five items from OR were deleted. Estimates on the CFA demonstrate a good fit (χ^2/df =1.345, GFI = 0.912, RMR= 0.023, CFI = 0.969, TLI = 0.964, IFI=0.969, RMSEA = 0.032) (Hair Jr et al., 2014a). Convergent validity has been measured with average variance extracted (AVE) and composite reliability (CR). The table 2 reveals that all the criteria are above the threshold limit: minimum AVE=0.502 (0.50) and composite reliability=0.754 (>0.700). We also observed that the square root of the AVE of a construct is higher than its correlation with any other constructs. Thus, the convergent and discriminant validity results reports no concern on validity issues (Hair Jr et al., 2014b).

Table 2   Measurement Model'S Correlation Matrix, CR, AVE, and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. Gender	-.080	1									
3. ED	.166**	-.009	1								
4. FS	.290**	-.279**	.124*	1							
5.Tenure	.824**	-.120*	.212**	.356**	1						
6. CC	.009	-.061	.057	.120*	.034	**0.722**					
7. OV	.001	.088	.042	.159**	-.004	0.281	**0.747**				
8. ER	-.041	-.003	-.020	.006	-.080	0.231	0.141	**0.718**			
9. OC	.009	-.061	.057	.120*	.034	0.308	0.457	0.104	**0.708**		
10. OA	-.008	-.021	.055	-.092	-.015	0.266	0.248	0.315	0.218	**0.710**	
11. KM	.032	-.033	.072	.082	.016	0.372	0.361	0.069	0.471	0.171	**0.711**
AVE	-	-	-	-	-	0.845	0.898	0.81	0.801	0.835	0.754
CR	-	-	-	-	-	0.522	0.558	0.516	0.502	0.504	0.506
Mean	-	-	-	-	-	4.035	3.857	3.987	4.035	3.871	3.893
SD	-	-	-	-	-	.549	.585	.551	.549	.570	.600

ED. Education, FS. Firms' size, CC. Creative climate, OV. Organizational value, ER. Employee resilience, OC. Organizational competitiveness, OA. Organizational adaptiveness, KM. Knowledge management, SD. Standard deviation. Scores in bold in the diagonal matrix represents the square root of the AVE of the construct. **. P < 0.01 level (two-tailed). *. P < 0.05 level (two-tailed).

4.2 Global structural model validation and fit analysis

Following the measurement model analysis, we have further evaluated the structured model to ensure the global fitness of it. The estimates on the fit indices,   (χ^2/df =1.378, GFI = 0.907, AGFI = 0.864, CFI = 0.965, TLI = 0.961, NFI=0.911, RMSEA = 0.034),   are found above the threshold limit (Hair Jr et al., 2014a). Hence, the globally accepted fit indices warrant the further analysis to test the preconceived hypotheses. In order to further strengthen the model's predictive relevance, we examined the coefficient of determination (R^2). The result shows that the structural model explains 13.9% (R^2_{KM}), 5.3% (R^2_{ER}), and 45.4% (R^2_{OR}) change in KM, ER, and OR. The magnitude of R^2 ranges from weak to substantial but not insignificant according to the rule of thumb set by Cohen (Cohen, 1988).

5 Results and Discussion

As depicted in table 3 represents the findings in the structural model coefficients' weight. In H1, we hypothesize that knowledge management is not significantly linked with the employees' resilience. The estimated result (β= -0.018, p<0.05) not supported. This result is found inconsistent with the findings of (Stephenson, 2010). The H2 reported that the creative climate reserves a significant influence on employees' resilience. In line with the hypothesis, the calculated results strengthen the proposition (β=0.237, p<0.01). Prior research results also supported the studied findings (Ekvall et al., 1983). The H3 proposes that knowledge management significantly predicts organizational resilience. The observed results unearthed that employees' engagement has a significant influence, β =0.507; p<0.05, on employees' resilience. The current findings are also found similar to the rest of the global findings (Mafabi et al., 2012). Again, H4 showed that creative climate is significant with organizational resilience. This estimated result is not supported (β= 0.244, p>0.05). The H5 and H6 reported that employee resilience and creative climate are also predicting the organizational resilience and knowledge management accordingly. On the same lines, the calculated results (β=0.159, p<0.01 for H4 and (β=0.337, p<0.01 for H5) strengthen the propositions.

Table 3   Path Analysis in a Structured Model

Hypothesis	Path Relations			β	SER	T-Stat.	p. value	Decision
H1	EmR	<---	KnM	-0.018	0.085	0.234	0.815	Not Supported
H2	EmR	<---	CrC	0.237	0.076	3.161	0.002	Supported
H3	OrR	<---	KnM	0.507	1.78	1.993	0.047	Supported
H4	OrR	<---	CrC	0.244	1.012	1.54	0.125	Not Supported
H5	OrR	<---	EmR	0.159	0.141	1.993	0.047	Supported
H6	KnM	<---	CrC	0.373	0.066	5.153	0.000	Supported

6 Conclusion

This study aims at finding the predictor variables of CC and KM in Bangladesh at different organizational units. The result shows that CC, ER, and KM significantly affect OR at different levels. Besides, CC, KM, and ER are also found to be significant predictors of OR. This result has some theoretical, academic and practical significance. Unlike many other studies, this study shows that KM is not significantly affecting ER and CC has an insignificant effect on OR which is a new direction for further research. Studies on CC, KM, and ER are relatively new; however, this study shows that they affect OR significantly. Therefore, professionals and practitioners require committing more resources on the adequate focus on KM and ER. Academics and researchers can do more research on KM practices, ER systems, and OR for further development. One of the limitations of this study is the sample size which is limited to generalize the universe. Also, moderation effect of demographic factors and mediating effects of above-considered variables mentioned in the structured model are apparently absent. Future studies suggested chalking out the mediating effect and moderating effect of third variables on the relationships between employee and organizational resilience.

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Multidimensional Pyramid Model of Knowledge Management Based on Enterprise Benefits

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Abstract: Under the implementation of the "Internet plus initiative", Chinese businesses have realized that "knowledge" is an inexhaustible motivation for economy growth. However, most companies only recognize the advantages, but seldom translate the knowledge into real business profits effectively. In addition to the reason of poor technology, it is more troublesome not to have a sound and complete knowledge management system at the top level. This article will provide a new "pyramid model" of knowledge management based on the purpose of realizing profits. The model starts from three dimensions of Knowledge Formation, Knowledge Application and Knowledge Maintenance, explaining a tight connection between knowledge management and business profits.
Key words: Knowledge management; Business profits; Knowledge formation; Knowledge application; Knowledge maintenance

1 Introduction

In 1983, Professor Paul Romer of University of California came up with "New growth theory", which marked the start of Knowledge Economy. Nowadays, knowledge has turned into essential productive factors and valuable capital. Economy of China has shifted from high-speed growth to high quality development. Therefore, it is imperative to promote the knowledge management.

In western researches, the definition of knowledge management changed from the original "information management technology" to an important bypass occupying a large proportion of business management. P. Quitas considered knowledge management as a continuous process of handling knowledge in order to enhance the performance of the organization. Three major factions appear, including the "technical school" emphasizing technology, the "behavior school" emphasizing people, and the "comprehensive school" which emphasizes technology, people, and knowledge.

Chinesebusinesses have started late and have little experience in knowledge management. Although there are still some theories like IDE-SECI Model and Knowledge Management Values, the system is relatively fragile. Sun Yongbo's propose of the "Jungle Phenomenon" directly points out some existing problems. Young scholars are accustomed to study from their own majors. The grafting behavior makes knowledge management mixed with other structure theories, like HR management and strategic management theories. It fails to highlight the value of knowledge management itself.

According to studies at home and abroad, systematic research on knowledge management is becoming increasingly important. How to realize the role of knowledge management in the production and management of enterprises is a task that each enterprise manager needs to consider. Knowledge management is no longer a static measure, but a dynamic management and operation process.

2 Knowledge Management and Business Benefits

Knowledge management refers to building a comprehensive system, in which the information, technology, or ideas are continuously fed back to the production through processes like acquisition, creation, integration, application, updating, or maintenance, finally realizing the purpose of business' value-added.

Companies with rich knowledge prove to be more competitive in market. Scholars have made investigations to SMEs, high-tech enterprises, private enterprises and manufacturing companies:

1) According to data from the Ministry of Industry and Information Technology in 2012, China's technological SMEs created 65% of invention patents, accounting for 75% of corporate innovation, and covered more than 80% of new product research and development.

2) Through the analysis of relevance, in high-tech companies, the interaction between each step of knowledge management and the performance of technological innovation proves that they complement each other.

<center>Table 1   The Analysis of Relevance</center>

	Knowledge acquisition	Knowledge conversion	Knowledge application	Knowledge protection	Performance
Knowledge acquisition	1				
Knowledge conversion	650**	1			
Knowledge application	529**	534**	1		
Knowledge protection	488**	550**	377**	1	
Performance	702**	734**	654**	684**	1

Note: ** refers to $P < 0.01$

3) Through questionnaires, in manufacturing enterprises, knowledge management is a powerful and effective method for the improvement of innovation capabilities, thus enhancing corporate profits.
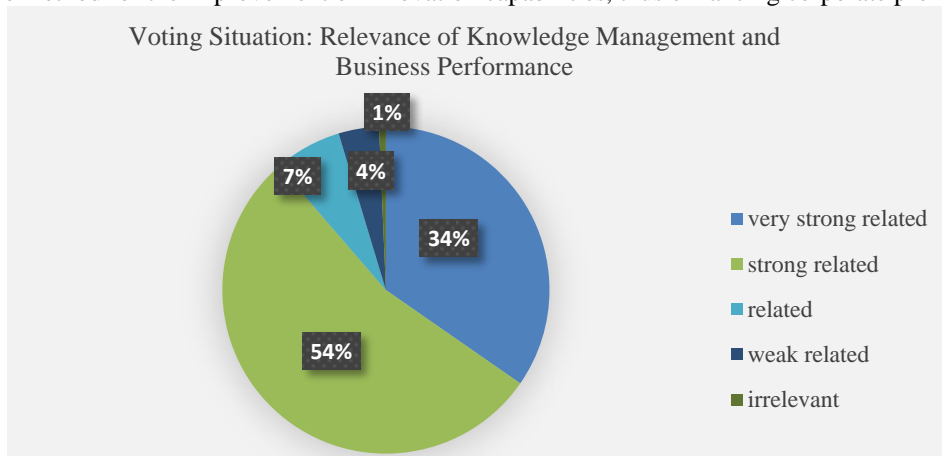
<center>Figure 1   Voting Situation</center>

Sufficient studies indicate that the company's knowledge management will directly affect the economic efficiency. However, there is still a long way to go before we make knowledge productive.

The contemporary knowledge management is not yet mature, and most enterprises in China are in desperate need of transformation. Vague management concepts and little scientific guidance or top-level design will cause lack of knowledge, waste of knowledge, and leakage of knowledge. This paper proposes a systematic "Pyramid Model" of knowledge management based on realizing corporate benefits, and then elaborates the three-dimensional management mode of "Knowledge Formation--Knowledge Application--Knowledge Maintenance".

3 Construction of Pyramid Model
3.1 Dimensions of the model

Dimensions of Knowledge Management are key theoretical foundation supporting the theoretical system of knowledge management.To study the contribution of knowledge management to business efficiency, we must first comprehensively explore its internal dimensions.Thomas H. Davenport believed that the truly significant two aspects of knowledge management are the creation of knowledge and the use of knowledge.Anderson proposed a knowledge management import method, which divided knowledge management into six phases. There are also processes such as knowledge acquisition, knowledge transfer, knowledge storage, and knowledge creation that are known to the general public.

Existing theories elaborate on specific steps of knowledge management. However, in the period of deepening revolution, enterprises should pay attention to the entire system of knowledge management and form a top-level system that can guide enterprises' production and improve their performance. Knowledge management has turned into a dynamic management and operation process.

Therefore, based on previous research, this paper divides various management contents into different levels and dimensions, exploring the relationship between each step and the realization of the

economic benefits of enterprises, finally putting forward three core dimensions of the knowledge management system: Knowledge Formation, Knowledge Application, and Knowledge Maintenance.

3.2 Pyramid model under three dimensions

Three dimensions of knowledge management based on business efficiency are Knowledge Formation, Knowledge Application, and Knowledge Maintenance. The first dimension forms the foundation of the knowledge barn, the second dimension permeates knowledge into production, and the third dimension is both defensive and offensive. Together, these three dimensions form the three pillars of corporate effectiveness. Based on this, the Pyramid Model of knowledge management appears.
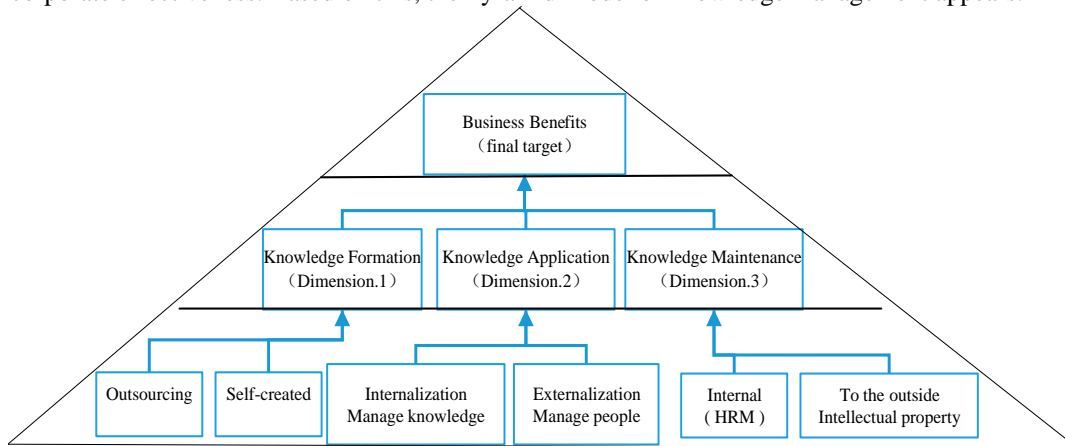
Figure 2   Pyramid Model

From top to bottom, the first level is the ultimate goal of the enterprise, the second level is the support of three dimensions, and the third level is the content anatomy of the three dimensions, forming the basis. This three-level "pyramid" is the core structure of enterprise knowledge management, and it is a brand-new analysis based on the traditional classification of "dominant and recessive". It takes a dialectical view of each behavior, and is both offensive and defensive.

Following sections will specifically analyze the principles of three dimensionsand how the "pyramid model" can relate knowledge management to business efficiency.

4 Model Analysis

4.1 Dimension 1: knowledge formation

Forming a company's unique knowledge is different from the knowledge innovation. Innovation means original knowledge and involves copyright; knowledge formation covers a wider range of methods. Ways to form knowledge can be divided into positive strategies and conservative strategies. The latter focuses on cultivating and protecting the internal knowledge of enterprises. The former emphasizes the "acceptable" attitude to the external environment.

The survival of a company in the social environment will inevitably rely on the information exchange.Therefore, businesses' knowledge mostly come from external material. The senior managers are keen on perceiving advanced knowledge. With excellent PR capabilities, they introduce the knowledge into their own companies. When the society is open and full of vitality, knowledge will flow faster. A passionate, free and open society can accelerate this metabolism.

However, picking up others' wisdom can only ensure the company's basic benefits. If they want to stand out, they must form their own competitive creativity. The origin of knowledge innovation may be inconspicuous. A tiny idea of employees is also likely to cut down costs. The "hidden knowledge" mentioned in most documents is the starting point of knowledge innovation. Therefore, whether managers have good insights or whether they can perceive the growth point within the company has an impact on the efficiency of a company.

From the above, two major foundations supporting the first dimension are "outsourcing" and "self-created". They correspond to learning and innovating behaviors.

4.2 Dimension 2: knowledge application

When enterprises acquire sufficient knowledge, they must apply these results to production, turning knowledge into real motivation.Knowledge Application is the bridge between knowledge and business benefits.

Polishing new knowledge to realize application is vital for business benefits. As mentioned above, many companies understand the advantages, but fail to translate them into actual business benefits. In China, companies are facing this transition crisis.Besides the scarcity of technology, companies should also pay attention to the full use of existing knowledge to avoid the problem of "knowledge waste".

In 1958, Michael Polanyi proposed explicit and tacit knowledge theory from the field of philosophy, providing managers with a new idea. Explicit knowledge is often depicted in written words, diagrams, and mathematical formulas. Unwritten words, similar to tacit, are tacit knowledge.

Something new appears if we put this theory into knowledge application. Knowledge provided by the external environment is explicit, while knowledge generated inside is implicit. This paper proposes a two-way transformation of internal and external knowledge to achieve full use of knowledge.

Japanese knowledge management expert Ikujiro Nonaka once proposed the SECI model of a four-dimensional transformation of explicit and tacit knowledge, mainly based on the management of knowledge itself.

Table 2   SECI Model

	tacit knowledge	Explicit knowledge
tacit knowledge	Socialization	Externalization
Explicit knowledge	Internalization	Combination

This paper proposes a two-way transformation of internal and external knowledge, adding a second element to traditional management human, which emphasizes the staff in managing knowledge.

4.2.1 Internalization: knowledge management

Nowadays, knowledge updates fast and it takes time to cultivate knowledge within the company. Most companies will target at advanced technologies emerging from the outside environment. Internalizing knowledge is compiling "outsourcing" knowledge into a corporate database.

In internalization, coding technology is particularly important. Enterprises can obtain first-hand information through government policies, market trends, customer opinions, etc., and then code them with information management systems or database systems.Through methods like pattern recognition, optimization algorithms and artificial intelligence, thousands of information are classified and stored in memory units, in forms of items.

There are many ways to encode knowledge, possibly in texts: knowledge about facts (Know-what) and knowledge of natural laws (Know-why), such as Google search engine. The ability of Know-how and Know-who is not easy to encode in text, but can be encoded in audio or video, such as "online teaching". Enterprises will eventually develop classification directories and rights control. Some management systems such as QA and EPR are internationally recognized and relatively mature.

Obviously, the coding process of internalization focuses on handling knowledge itself.

4.2.2 Externalization: staff management

The concept of internal knowledge is more than tacit knowledge. Generally, tacit knowledge emphasizes irrationality, culture and arbitrariness. It focuses the natural operational process formed between staff. There have never been clear rules in the text and non-standard tacit knowledge just exists. Internal knowledge is not onlyimplicit knowledge, but also those outsourced and not recognized by the staff. The re-externalization here is not exporting, but actually a behavior of permeating new knowledge into each department, forming corporate consciousness and corporate culture. Then, internal knowledge can enter regulatory documents, guiding the production of businesses.
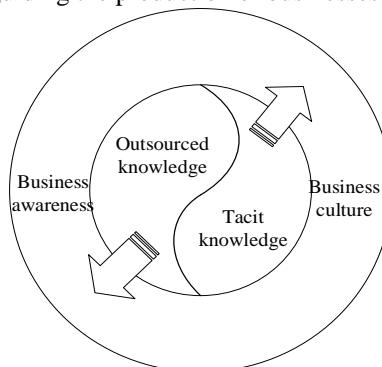
Figure 3   Externalization

To turn outsourced knowledge as part of business consciousness or to promote tacit knowledge as part of corporate culture, we must first give ideological and technical guidance to the staff. In other words, it is the issue about managing people. If knowledge is not accepted, it cannot help the production and management, let alone the economic efficiency. For outsourced knowledge, companies consider employee training and guidance to master emerging technologies. For tacit knowledge, companies should commend the creators, promote academic salons, and hold learning seminars.

In order to encourage more employees to identify with internal knowledge, companies need to improve reward and punishment systems for self-learning, exchange, and discussion. At the same time, cross-functional and departmental communication channels can be established between departments at all levels to prevent the problem of low productivity due to knowledge obstruction or poor exchange.

4.3 Dimension 3: knowledge maintenance

When an enterprise can well conduct a two-way conversion of internal and external knowledge, achieving the purpose of improving corporate performance, the next step should be the struggle for the long-term and stable growth of the interests. As the international environment changes rapidly and market information keeps entering and exiting, companies should guarantee the ownership of knowledge. That is, maintenance of knowledge.

The legal monopoly of knowledge is an intangible property right. According to Michael Porter's competitive advantage theory, the reason why a country is prosperous is that it has a competitive advantage in the international market.

However, there is difference between knowledge maintenance and intellectual property maintenance. Maintaining knowledge not only means the oath of sovereignty to the external environment, but also correct measures within the company. The internal policy mainly reflects in the continuous upgrading of knowledge and the handling of knowledge transfer. From Kodak and Motorola, it is clear that knowledge must follow the trends, adapt to market demands, make corresponding adjustments, and add new elements to stimulate consumers' desire to shop.

The upgrading of knowledge goes with the human resources strategy. People are the most important capital and the carrier of knowledge in an enterprise. HR strategy proves to have significant correlation with corporate performance. With a medium of knowledge management, will this positive effect decrease? Some documents use second-order confirmatory factor analysis, the structural equation model and the statistical software AMOS16.0 to establish a hypothetical model of mediator variables. It shows that HR strategy does not directly affect corporate performance, but through intermediate variables. Knowledge management is just the bridge to connect enterprise human resource management practices and corporate performance.

Table 3　Mediation Role of Knowledge Management Orientation

	Business benefits	Knowledge management	Benefits(Under management)
HR strategy	0.29***	0.52***	0.18***
Knowledge management			0.218*

Note: *** refers to $P < 0.001$

After joining the knowledge management, the regression coefficient between HRs and firm performance became 0.18, and the correlation with corporate performance decreased.

At the same time, the regression coefficient of knowledge management orientation is 0.218, which is statistically related to corporate performance as a general correlation ($0.01 < p < 0.05$).

This shows that after adding knowledge management, the impact of HRs on corporate performance has become significantly lower, and knowledge management has influence on corporate performance. Therefore, knowledge management orientation plays an intermediary role in HRs and corporate performance.

4.4 Evaluation on pyramid model

From the first dimension, two major ways of forming knowledge are outsourcing and self-building. These are important elements, which promote enterprises' knowledge barn. From the second dimension, knowledge application is the key of knowledge management since it determines whether the enterprise can transform the knowledge into interests safe and sound, whether it can permeate knowledge into every process of production and whether it can make full use of knowledge rather than waste it. The two-way transformation is actually a process of precipitation to sublimation. Knowledge was first coded to form a system, and then employees are trained and motivated, thus the potential knowledge can be

developed into corporate consensus. Knowledge maintenance, like logistics, always guard's property rights, guaranteeing the competitive position of the market. It makes knowledge keep in pace, injecting fresh blood into the enterprises through staff management.

The knowledge management "Pyramid Model" put forward in this paper integrates domestic and foreign research results in recent years. After detailed analysis, the paper provides a systematic program for knowledge management, rational and evidential. Three major dimensions are main axis: Knowledge formation, Knowledge operation and Knowledge maintenance.

Nonetheless, the paper still has some shortcomings in modelling. There are few concrete business cases, and the data is still not enough. Furthermore, if supported by some mathematical tools, the paper will be more persuasive. I hope in further studies, the theoretical system can be continuously improved, forming a more systematic and comprehensive knowledge management architecture.

5 Conclusion

Based on the realization of corporate benefits. The paper focuses on researching and exploring the operating principles and methods of the "Pyramid Model" in knowledge management. It deeply analyzes knowledge management from three dimensions as "Knowledge Formation-Knowledge Operation-Knowledge maintenance". The model aims at penetrating knowledge management into each step of production and developing a reference plan for companies to earn more profits.

In 2018, multinational academics reach the consensus that we should promote organized and ecological knowledge management. The Pyramid Model get inspiration from the consensus and tries to be innovative. Some improvements can be realized in the future:

1) Enrich the theoretical basis of major dimensions of "Knowledge Formation-Knowledge Operation-Knowledge maintenance" to form a more solid foundation for knowledge management.

2) Gather more information of all kinds of enterprises, make more complete statistical analysis, collect and summarize information with a certain mathematical model.

3) Find out more about the relationship between the three dimensions and business benefits, provide comprehensive reform programs of knowledge management, and focus on the cultural differences between the East and West.

At home and abroad, it has been widely recognized that knowledge turns into the third capital of the world economy. The 21st century will be an era of knowledge blowout.Enterprises need to face challenges directly and form top-level knowledge management topologies of their own characteristics, making knowledge penetrate into all steps of production. Using knowledge to realize the profits of enterprises is the exact feature of the "Information Age".

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A Research on Value Evaluation of Garbage Incineration Power Generation Project Based on B-S Model

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Abstract: With the development of the economy and the accelerated process of urbanization, the amount of waste, such as domestic waste and industrial waste, is increasing rapidly, and the municipal solid waste is becoming a huge problem that hinders the development of the city. However, in the academia, there is no systematic evaluation method for the garbage incineration power generation project. So if we just simply apply the traditional evaluation method to the project, we would ignore the strategic value and ecological value of the project investment. Therefore, it is an urgent problem to find a new method of project valuation. In this paper, the B-S model of the option pricing model is selected, and on this basis, the market and policy factors that affect the model results are proposed. It is considered that the waste incineration power has the value of evaluation and the possibility of evaluating the results.
Key words: Garbage incineration power generation project; Real option; B-S model; Project evaluation

1 Introduction

Since nineteenth Century, industrial development has caused rapid population concentration in the world and the rapid development of urbanization. Because of this, garbage disposal has been becoming a worldwide problem. In China, the average daily garbage output per person is about 1 kilograms, and is increasing rapidly at the rate of 8%~10% per year, while the rate of innocuous treatment for domestic waste is only 51.7%. Garbage siege has become a huge obstacle to the development of contemporary cities.

So, with the development of the economy, the progress of technology and the spread of the concept of environmental protection, people began to seek a more sustainable way of garbage disposal. In this environment, garbage incineration power generation came into being. It is of great significance to explore a set of methods suitable for the evaluation of the investment value of the garbage incineration power generation project, because of the great market prospect, the large independent expansion space and the high esteem between the government and the people.

Foreign scholars have made some achievements in the study of this issue. For example, in 1987, Trigeorgis and Mason believed that the real value of the project could be evaluated with the value of the basic NPV plus real options[1]; the results of Hantzis and Tanguturi thought that real options theory could be used in some project investment decisions[2]; Schuhmacher considered the risk management of waste incineration projects, The Monte Carlo method can be used to understand what effect the incineration of garbage can have on the human body; in its study, Hertzman believes that enterprises should open garbage incineration technology and improve public acceptance of garbage incineration projects; Corjan B has established a dynamic and computable general equilibrium model to analyze the cost benefit analysis of the carbon emission allowance price adjustment in the EU carbon emission trading system[3]

In recent two years, scholars in China have begun to pay attention to this issue. Kang Zhentong uses the cost - benefit method to analyze the problems that need to be paid attention to in the calculation of the cost, cost and income in the economic evaluation of the BOT project of domestic garbage incineration. Zhu Feng used traditional cost-benefit analysis and sensitivity analysis to conduct an economic evaluation and analysis of a garbage incineration power generation project. Song Jinbo and some one else used the system dynamics model to evaluate the revenue of the BOT project of garbage incineration power generation, constructed the system dynamics model of the revenue of the BOT project of the waste incineration power generation, and simulated the situation with the actual case[4].

2 Analysis of the Characteristics

We generally think that the garbage incineration project is a kind of environmentally friendly, renewable energy generation project, and has been encouraged by the government and the strong support of public opinion[5]. Therefore, the following characteristics can be summed up through the

analysis.

(1) The irreversibility of investment. The development and construction of garbage incineration power generation projects requires specialized equipment such as incinerators, and the amount of investment is huge. Once capital is invested, it will be difficult to recover. And the equipment's specificity is very high. If the decision is to withdraw from the midway, the equipment can not be transferred to other usage. Therefore, once the initial investment is invested, it will become sunk cost and has strong irreversibility.

(2) the uncertainty of the return on investment. First of all, due to the large investment in the construction period of the garbage incineration generation and the imperfect income system of domestic waste, the return on investment of government subsidies is not definite. On the other hand, the electricity price income is also influenced by the state policy, the substitutes of complementary products, and the development of technology, and the return on investment is relatively strong. So, it may have some risks.

(3) the future growth space. In recent years, the shortage of energy resources, the problem of garbage besieging is the focus of attention at home and abroad. Garbage incineration power generation project has great strategic value for enterprises. With the intensification of global climate problems, China must shoulder the responsibility for reducing emission in the future, and the government's policy support for waste incineration will be further strengthened.

To sum up, the garbage incineration power generation project has the irreversibility of investment, the uncertainty of income and the growth of investment, which makes the future cash flow of the project face great uncertainty. The traditional discounted cash flow method (DCF) does not consider such uncertainty and is not applicable to the investment price evaluation of such projects. The real option evaluation method is to use the thinking of financial options to solve the problems existing in the real investment. In the project decision, the option analysis technology is adopted to conceptualize, quantify or model the problem of investment flexibility that the traditional DCF can't deal with[6].

3 The Construction of the Model
3.1 Applicability analysis of model
In the general research, there are three kinds of options pricing methods: B-S pricing model, two fork tree model and Monte Carlo simulation. The most widely used is the B-S model, which has several application preconditions. The price changes of the subject matter are in accordance with the random Brown movement, the subject matter is in a free trading market, the price changes into a continuous state, the price change rate can be measured and kept constant[7]. Next, the rationality of the B-S model applied to garbage incineration power generation project is analyzed first.

Without the influence of external policy or other contingency, the price of the garbage incineration power generation project usually changes in a continuous way, and does not take a large jump, which is in line with the random Brown movement. In addition, it is difficult to meet the requirements of the complete market in the B-S model, and China's carbon market is not perfect. However, this year, the continuous transaction, especially the CCER project of waste incineration, has been developing continuously, and the reasonable market transaction price is gradually forming, so it is now possible to assume the premise of satisfying the B-S model. Therefore, we can think that the B-S model can be used to calculate the theoretical price of options, but our assessors can also improve the adjustment according to the current market conditions.

3.2 Model construction
The classic B-S model is generally:
$$C = S*N(d_1) - L*e^{-rT}N(d_2) \tag{1}$$
$$And, d_1 = \frac{ln\frac{S}{L} + (r + 0.5*\sigma^2)*T}{\sigma*\sqrt{T}},$$
$$d_2 = d_1 - \sigma*\sqrt{T} \tag{2}$$

C—the initial reasonable price of the project,
L—option delivery price
S—the present price of the waste incineration project
T—validity period
R—continuous compound interest rate free interest rate
σ—the volatility of future revenue from waste incineration
This formula can be used as the pricing basis of our project value assessment, that is, the formula

for calculating the real option value of garbage incineration power generation. On this basis, because of the consideration of the enterprises, there are other factors that affect the value of the project, such as the changes in environmental related policies, the development of the related industries, the progress of environmental protection technology and so on. If the above formula is used to evaluate, it will bring value to be overestimated or underestimated. From this point of view, this paper will amend the above models in combination with environmental protection policy and technology development, in order to improve the accuracy of project value assessment.

The return value S of the expected cash flow of a project obeys the stochastic Brown motion law due to the influence of market uncertainties.

$$d_S = \mu * Sd_t + \sigma * Sdz \tag{3}$$

Among them, μ is the expected growth rate of S return, and σ is the volatility of future earnings growth.

In addition, considering the influence of technological progress and policy factors, the future expected earnings will change under the influence of these factors. It is foreseeable that the progress of garbage disposal technology will reduce the expected growth rate of future revenue .And its possible to change from μ to $(\mu-a)$. In addition, changes in the relevant policies will lead to a larger fluctuation of future earnings growth and a change from $(\mu-a)$ to $(\mu-a+b)$, so the expected return S will change to:

$$d_S = (\mu-a+b) * Sd_t + \sigma * Sdz \tag{4}$$

According to Ito lemma, the revised B-S pricing model is:

$$C = S * e^{(b-a)T} * N(d_1) - L * e^{-rT} N(d_2) \tag{5}$$

$$\text{And,} d_1 = \frac{ln\frac{S}{L} + (r+b-a+0.5*\sigma^2)*T}{\sigma*\sqrt{T}},$$

$$d_2 = d_1 - \sigma * \sqrt{T} \tag{6}$$

3.3 The determination of wave rate σ

Commonly, the methods used to determine the wave rate are the approximation method of historical return volatility and the iterative method. However, because the garbage incineration power generation project is still in the emerging stage, and the historical data are limited, and the future development is also faced with many uncertainties, so it is difficult to predict the volatility of future income accurately with the limited historical data. The iterative method is used to measure and calculate the variable speed iteration.

The so-called variable speed iterative method is that each iteration is not an increasing number of Q elements, but the expert determines how many elements each time according to their own decision. Each increment may be certain, perhaps not necessarily, the result of this iteration is more in line with the actual situation, and can also better express the expert opinion.

$$m(u_i) \triangleq \frac{\sum_{j=1}^{n} \sum_{s=1}^{tj} C_{U_S^{(j)}}(u_i)}{\sum_{j=1}^{n} t_j} \tag{7}$$

In order to be more precise, each expert should memorizing m times without memory. After the iteration process is terminated, we also calculate the coverage frequency of u_i, $i=1,2,... k$;

Among them, t_j is the termination step of the iteration process of the j evaluator, and the result is that the arithmetic mean of the m result is obtained.

$$w_A(u_i) = m(u_i)/\sum_{i=1}^{k} m(u_i), \tag{8}$$

and then, the σ obtained.

4 Conclusion

With the development of economy and the increasing number of garbage, the garbage incineration power generation project has become a hot issue in the society. Since the traditional net cash flow method is unable to meet the needs of the project asset evaluation, we combine the other methods of intangible assets assessment, such as real option method, to explore a new way ,using for this kind of value assessment. However, this paper only discusses the factors that affect the results from the market impact and policy impact, but does not pay attention to the social and environmental impacts of such projects, which is still not perfect and needs further research and discussion.

for their kind cooperation. Finally, thanks to ICIM for giving me this opportunity.

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Research on Countermeasures for Efficient Flow of Science and Technology Resources to Small and Micro Technological Enterprises: A Case of Hubei Province

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Abstract: Science and technology resources are critical for fast development of small and micro technological enterprises. In this paper, the possession of science and technology resources by small and micro technological enterprises of Hubei Province is investigated to analyze main problems with the flow of science and technology funds, talents and outcomes to small and micro technological enterprises, in order to find out causes of these problems. At last, pertinent counter measures and suggestions favourable for efficient flow of science and technology resources to small and micro technological enterprises are brought forth.
Key words: Science and technology resources; Small and micro technological E\enterprises; Efficient flow; Transformation of scientific and technological outcomes

1 Introduction

Small and micro scientific and technological enterprises are crucial supporting forces for rapid development of strategic emerging industries in Hubei Province. Science and technology resources are critical for fast development of these enterprises. In particular, quantity and quality of science and technology funds, talents and outcomes are directly associated with development pace and competitive advantages of these small and micro enterprises. Micro and small technological enterprises' improvement of their creativity is directly impacted by efficiency and effectiveness of transfer, cooperation, sharing and transformation during the flow of science and technology funds, talents and outcomes.

Domestic and foreign scholars mostly focus on studying implications, compositions and allocation of science and technology resources. Adam Smith（1766）considered that effective resource allocation can boost the productivity of society.Zhou Jizhong (1999) put forward that science and technology resources, which couldn't be imitated or copied within certain period, could create considerable economic benefits for enterprises, directly or indirectly promote scientific and technological progress, and facilitate sustainable economic development.Kim, Lanus, Dahl man and Carl-J(1992) considered that science and technology resources belonged to a complete dynamic system that was made up of three resource factors, namely human resources, funds, material resources and information in sciences and technologies; they elaborated demand and supply of science and technology resources as well as their connections from the perspective of market mechanisms based on market theories. Fan Decheng and Du Mingyue (2017), who established an index system of resource allocation and evaluation for technological innovations of industries, empirically analyzed the efficiency of resource allocation for technological innovation of high-end equipment manufacturing and corresponding factors. Wang Fan (2018) analyzed features, laws and methods of allocation of science and technology resources in markets. In studies about small and micro technological enterprises, domestic and foreign scholars have mostly focused on exploring status quo and financing of small and micro technological enterprises. For instance, Jian Ya Gu（2014）considered that the financing difficulties of small and medium-sized technology enterprises are the main factors restricting their development.Cai Xiaolin (2016) explored development status of these enterprises and related factors. Han Junhua et al (2017) analyzed problems with inclusive finance in small and micro technological enterprises and corresponding strategies. Above all, domestic and foreign scholars have seldom studied the flow of science and technology resources to small and micro technological enterprises. This paper focuses on investigating countermeasures for facilitating efficient flow of science and technology funds, talents and outcomes to small and micro scientific and technological enterprises in combination with compositions of science and technology resources, so it is of relatively great theoretical and realistic significance.

2 Basic Situation of Existing Science and Technology Resources in Small and

Micro Technological Enterprises of Hubei Province

In Hubei Province, small and micro technological enterprises are mostly in strategic emerging industries and relevant high-techindustries, including biology, medicine, optoelectronic information, new materials, optical-mechanical-electrical integration, resources, environment, new energies, energy efficiency and high-tech services. In Hubei Province, small and micro technological enterprises are mostly in Wuhan (including Wuhan Pioneer Park for small and micro technological enterprises, Pioneer Park for University Students, Wuhan Optics Valley Software Park and Guanggu Bio City), Huangshi, Xiangyang and Yichang, as shown in Table 1. Hence, the respondents and samples investigated in this study are also mostlyin following areas.Questionnaire surveys and interviews were performed. 300 questionnaires were issued and 265 valid questionnaires were recovered at a recovery rate of 88% or so.

Table 1   Industrial and Regional Distribution of Small and Micro Technological Enterprises in Hubei Province

Industries	Regional Distribution
New-generation Information Technologies	National key optoelectronic information industry bases of Wuhan East Lake High-Tech Development Zone; electronic industrial bases of Yichang, Jingzhou and Suizhou
High-end Equipment Manufacturing	Industry bases for smart equipment in Wuhan and Xiangyang, industry bases for ocean-engineering equipment in Jingzhou; aerospace industry bases in Jingmen, Xiangyang, and Huangpi, Wuhan.
New Materials	Wuhan East Lake High-Tech Development Zone; bases of energy storage materials in Yichang and Suizhou; bases of new metallurgical materials in Huangshi and Qingshan, Wuhan; bases of new chemical engineering materials in Yichang, and Yangluo, Wuhan
Biological Medicine	Wuhan National Biological Industry Base; Yichang Biological Industry Park Bio-pharmaceutical industry bases in Tianmen, Yidu, Wuxue and Qichun; bio-pharmaceutical bases in Xiangyang, Jingzhou and Jingmen
Energy-efficient and Environment-friendly	Wuhan East Lake Industry Base for Energy-efficient and Environment-friendly Equipment; large circular economy demonstration areas in Qingshan, Yangluo and Ezhou; industry bases for resource recycling in Yichang, Jingmen and Gucheng
New Energies	Industry bases for nuclear power equipment in Yangluo and Jiangxia, Wuhan; Wuhan East Lake High-Tech Development Zone; PV industry bases in Yichang and Suizhou; Solar Demonstration Base on Huangjin Mountain of Huangshi; Ezhou Solar-thermal Industry Base

2.1 Science and technology funds

As per a survey, small and micro technological enterprises of optical-mechanical-electrical integrated industries have invested as high as RMB6,000,000 in research and development at maximum. In bio-pharmaceutical industries, these small and micro enterprises' investments in research and developmenthave been equivalent to 65.9% of the total sales revenues at most. After their incorporation, thesmall and micro technological enterprises will make more and more investments in research and development. The sources of scientific research funds include government support, private investments, sales revenues, self-financing, financing, declared provincial/municipal projects, free foundations, bank loans, Angel Investment and risk investments. 45.8% scientific research funds of small and micro technological enterprises come from government support, while self-financing occupies 37.5% of these funds.

Table 2   Information about Research & Development Funds of Small and Micro Technological Enterprises in Different Industries

Different Industries	Total Amount of Investments in Research and Development (RMB)	Ratio between the Amount of Investments in Research & Development and Total Sales Revenues (%)	Ratiobetween Government Funds and Total Investments in Research & Development (%)	Ratio of Technical Products to Total Outputs (%)
ElectronicsandInformation (Software Research & DevelopmentandCommunication Networks and so on)	4,336,200.00	56.637	15	69.5
Biology and Medicine	4,289,100.00	65.9	29.5	40.18
New Materials	522,900.00	40.71	32.85	91.42
Optical-mechanical-electrical Integration	6,000,000.00	6	5.8	80
Earth, Space and Ocean Engineering	250,000.00	20	0	100
Others	500,000.00	5	0	70

2.2 Science and technology talents

A survey suggests that 53.8% small and micro technological enterprises have their own research & development institutions and scientific research teams. Each scientific research team is approximately made up of 11.97 members on average, including 1.52 members with Ph.D. Degree, 4.09 members with Master's Degree, 5.2 members with Bachelor's Degree, 0.17 experts enjoying government allowances, 0.52 members with senior titles and 1.03 members with intermediary titles. These three years, 4.15 and 1.55 science and technology talents have annually flown into and out of the small and micro technological enterprises on average. Each talent has been trained for 3.67 times and received continuing education for 1.27 times. The monthly salaries of these talents are RMB24,545.45 per capita, while companies lack 2 science and technology talents a year.

2.3 Outcomes and information about sciences and technologies

Small and micro scientific and technological enterprises have seldom made profitsin sciences and technologies. On average, each small and micro scientific and technological enterprise has cumulatively owned 2.85 patentson average, 3.64 patents at most in the biomedicine industry, and particularly 9 utility patents in photoelectric integration since they were established. In Hubei Province, scientific research institutions, universities and internet are important channels for small and micro technological enterprises to acquire information about sciences and technologies in the early period of their founding and during their development. Those mature enterprises obtain information from leading science and technology conferences, as they have become scientifically and technologically advanced with certain capacity for scientific research. However, deficient circulation of sciences/technologies and lack of trading platforms hinder efficient flow of science and technology outcomes to small and micro technological enterprises.

3 Major Problems with Efficient Flow of Science and Technology Resources to Small and Micro Technological Enterprises

3.1 Poor awareness of preferential supporting policies, small benefits and limited sources of science and technology funds

There is a great shortage of funds for small and micro technological enterprisein the growth stage. According to a survey, 69.8% enterprises have poor awareness of and benefit a little from preferential supporting policies of science and technology funds. In Hubei Province, the funds of small and micro technological enterprises are mainly from self-financing, venture capital funds and innovation funds in the early start-up stage. The proportion of funds from self-financing and banks has increased to 69.6% and 26.1% respectively during the growth of these enterprises, but venture capital funds only occupy less than 1%. University students' entrepreneurship is essential for small and micro technological enterprises in Hubei Province.In the growth stage of these enterprises, 90% funds are obtained from self-financing, whereas less than 10% funds are raised from banks and venture capital funds. In the process of their growth, 78.3% small and micro technological enterprises are short of funds. Thus, it is clear that small and micro technological enterprises don't have many platforms and channels for obtaining funds. It is more difficult for these enterprises to get science and technology funds.

3.2 Inadequate reserves of science and technology talents, great lack of backbone research & development talents, incomplete scientific research teams and brain drain in small and micro technological enterprises

The science and technology reserves are rather scarce in small and micro technological enterprises. A survey suggests that 63.1% small and micro technological enterprises heavily lack science and technology reserves, suffering from a heavy lack of backbone research & development talents. Scientific research teams of 85% small and micro technological enterprises have inadequatecapacity for scientific research, technological integration and titles. These teams are so unstable that they aresubject to great loss of members. In particular, small and micro technological enterprises even become talent training bases for large scientific and technological enterprises. Especially in the early start-up stage ofover 70% small and micro technological enterprises, more than 80% members of scientific research teams are elementary research personnel. With weak capacity for research & development, scientific research teams achieve very few outcomes in scientific research with independent intellectual property rights. In addition, the science and technology outcomes introduced into these enterprises can be hardly industrialized with high efficiency.

3.3 Great lack of self-owned science & technology outcomes, weak roles of science & technology intermediaries and great difficulties in introducing the outcomes

Firstly, small and micro technological enterprises have achieved very few outcomes in sciences and technologies. According to a survey, each small and micro scientific and technological enterprise has only cumulatively possessed 2.85 patents on average. Secondly, it is extremely hard for these enterprises to introduce science and technology outcomes. Only 40% universities and scientific research institutions are willing to transfer science and technology outcomes to small and micro technological enterprises. Relatively few market-oriented approaches are available for the flow of science and technology outcomes to small and micro technological enterprises. 65.2% outcomes flow through platforms of industries, universities and research institutions. About 5.6% outcomes flow by investing in technologies and starting up scientific & technological enterprises. However, other market-oriented approaches for transforming science and technology outcomes only account for 8.7%. Thirdly, science and technology intermediaries play weak roles. Hubei Province is a leading province in sciences and technologies, where there are 16 national demonstration organizations for technology transfer, 16 provincial similar organizations, and several workshop-style technology intermediaries. Hence, the general scale of science and technology intermediaries is small in this province. Owing to weak strengthsof these enterprises, the conversion rate of patented outcomes is low.

4 Countermeasures for Efficient Flow of Science and Technology Resources to Small and Micro Technological Enterprises

4.1 Improving policy guidance, communication and implementation; establishing long-acting sustainable mechanisms for guiding the flow of science and technology funds

First of all, efforts shall be made to develop diverse channels for communicating supporting policies about science and technology funds for small and micro technological enterprises. It is necessary to expand channels for policy communications, diverse the ways for communicating policies and transform one-way communications into two-way coordinated communications. Governments ought to allocate "policy guidelines for small and micro enterprises", create efficient convenient media or carriers for communicating information regarding policy support, develop models for coordinated policy communications with enterprises, select typical enterprises and promote policies in different industrial parks. Secondly, growth funds shall be constructed for small and micro technological enterprises, in order to reinforce extended supporting roles of venture capital funds from governments, make social capitals more attractive and fully accommodate these enterprises' needs for science and technology funds. The appeals of social funds such as finance, venture capitals and funds may be enhanced based on growth funds. Furthermore, platforms may be built for sustainable flow of science and technology funds via concerted efforts of governments, banks and venture capitals. Thirdly, "post-subsidization" policies shall be formulated for small and micro technological enterprises.For enterprises that make outstanding contributions to government-level science and technology programs (including science & technology programs of Hubei Province and special science & technology programs) as project participants and have project achievements industrialized in part, fiscal funds may be allocated to them based on their project achievements upon the completion of projects. At the end of projects, hierarchical rewards may be set and granted for those enterprises which are involved in strategic emerging industries or pillar industries of Hubei Province, achieve technological outcomes with prominent contributions to industry development, or possess domestic or foreign advanced technologies and industrialize them. Fourthly, guide financial institution to establish life cycle and credit evaluation systems for small and micro technological enterprises. Increase non-financial indexes for credit evaluation and establish credit evaluation systems for small and micro technological enterprises with "one guarantee, three items, one certificate and three qualifications" in their start-up stage. "One guarantee" refers to credit guarantee, namely offering guarantee with guarantee contracts or by undertaking national and provincial science and technology programs. "Three items" comprise of "moral standing, products and collaterals". "One certificate" is "rental certificate for corporate officers or property ownership certificate for the offices". "Three qualifications" include "qualifications for production/operations, professional and technical qualifications", which signify the capacity of small and micro technological enterprises in technologies, research and development. Construct internet-style credit recording and evaluation systems for small and micro growing scientific and technological enterprises that aim at both individuals and enterprises. Integrate entrepreneurs' personal credit with credit of enterprises and treat their credit in different banks as basis for subsequently evaluating their credit for loaning from banks.

4.2 Establishing enterprise and market-oriented talent reserve systems for small and micro technological enterprises under the guide of governments

At first, build "two major platforms" for talent development in small and micro technological enterprises for the purpose of increasing market attractiveness. Build a range of supporting, functionally complete and unique industrial development platforms with respective extraordinary characteristics for small and micro technological enterprises by orienting towards small and micro technological enterprises, within parks for small/micro enterprises and aiming at small and micro technological enterprises, so as to make physical environment of these enterprises' talent markets more attractive. Launch policies about housing subsidies for science/technology talents at different levels and improve platforms suitable for living or settling down. Secondly, construct vigorous incentive mechanisms for science and technology talents of small and micro technological enterprises. Execute shareholding plans for core science and technology plans of enterprises and integrate leading science/technology talents with development prospects of enterprises, in order that enterprises and talents share risks and revenues. Allocate revenues from science and technology outcomes and grant more rewards for science/technology innovations. Build different development channels for different types of science and technology talents. Thirdly, expand platforms and channels for small and micro technological enterprises to introduce talents; promote intensive coordination between policy environment and regional construction of talent bases. Build and enrich information bases for leading science and technology talents of small and micro technological enterprises; draft and implement funding plans for talents of these enterprises. Bring the roles of talent pools into play in universities and scientific research institutions through joint efforts of governments, universities and enterprises. Establish small and micro technological enterprises to cooperatively initiate projects by taking advantage of enterprises, universities, research institutions and professional reforms. Encourage experts and professors of universities and scientific research institutions to pay attention to small and micro technological enterprises. Fourthly, introduce models for governments, universities, scientific research institutions, small and micro technological enterprises to jointly build incubation bases or virtual operating organizations for these enterprises. Universities or scientific research institutions provide offices, incentive start-up funds, entrepreneurship advisors and research & development teams (made up of mentors and postgraduates); small and micro scientific   and technological enterprises provide platforms for   practising and make science/technology outcomes market-oriented; governments offer more policy support and guidance; enterprises set up core research & development departments inside universities or scientific research institutions, so that these enterprises may introduce requisite talents efficiently and improve existing scientific research personnel's strengths in research & development.

4.3 Bringing roles of market intermediaries and governments in promoting efficient flow of science and technology outcomes to small and micro technological enterprises

Firstly, build technical alliances for small and micro technological enterprises. These enterprises shall collaborate and complement each other in resources for technological innovations, share resources, centralize their creative resources and technologies, take advantage of their clusters and jointly declare projects of special funds within the industry for increasing the success rate of obtaining special funds. Governments are expected to encourage universities and scientific research institutions to build technical alliances for small and micro technological enterprises, make concerted efforts to explore common key technologies for these enterprises, buildcomplete channels for cooperation, facilitate overall technological breakthroughs of these enterprises, enhance creativity of the enterprises, promote the flow of science/technology outcomes to these enterprises and stimulate transformation of these outcomes. Secondly, build cloud-based information platforms for seamless transfer of science and technology outcomes and bring the dominant roles of commercialized markets into full play. Give the roles of competitive market mechanisms into play. Regulate intermediary markets based on the law about the "survival of the fittest" and support development of private science/technology intermediaries. Governments shall support intermediaries which are entrusted to transform major science and technology outcomes of this province by offering them subsidies for the transformation and purchasing services from them, so as to improve quality of intermediaries in Hubei Province. Improve platforms for exchanging information about science and technology outcomes; build national cloud-based big data platforms for information about sciences and technologies (including patents and technologies) under the lead of industry associations; gradually build information service platforms for efficient flow of science and technology outcomes to small and micro scientific and technological enterprises, integrating services of information retrieval, application, evaluation, examination/approval, trading, investment, financing and evaluation, in order to share information, bring roles of market into play in resource allocation, and promote efficient cooperation between suppliers and demanders of these outcomes through markets.

5 Conclusion

It cost more than a year to issue and collect the survey questionnaires. Although 300 questionnaires were allocated, only 88% valid questionnaires were recovered. Besides, this survey only focused on small and micro technological enterprises of Hubei Province, whereas questionnaires were not issued in other provinces, so empirical research with a larger sample size may be conducted in the future. In this paper, policy suggestions concerning efficient flow of science and technology resources to small and micro scientific and technological enterprises are put forward based on the survey conditions. In the future, attempts may be made to deeply and empirically explore the influence mechanisms of science and technology resources as well as the growth of these enterprises.

Acknowledgement

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An Empirical Study on the Resource Allocation Efficiency of Private Universities Based on DEA: A Case Study of 21 Private Universities in Hubei Province

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Abstract: Principal component analysis is used to screen indicators for the allocation efficiency of compulsory education resources. The DEA analysis method combined with the screening indicators is used to evaluate the input output efficiency of the allocation of educational resources in private universities. This paper makes an empirical analysis of the allocation of educational resources in 21 private universities in Hubei province. The overall efficiency of the input and output of educational resources allocation in private colleges and universities in Hubei is relatively high, but there are some differences because of the different organizers. The causes of non DEA are overinvestment, insufficient investment and backward management. The allocation of educational resources in private colleges and universities should be controlled to increase the efficiency of the scale, promote the balanced and sustainable development of private education, establish the advanced education concept of private colleges and universities, and create a unique college culture.
Key words: DEA; Private university; Resource allocation efficiency; Hubei

1 Introduction

The scarcity of resources makes the efficiency of resource allocation as a measure of the rational degree of resource allocation from the economic field to the field of education, and mainly studies the problem of the investment and output of resources. The research on the efficiency of educational resources allocation in China begins only in the late twentieth Century. Since the reform and opening up, private education has been growing and expanded, effectively increasing the supply of education services, making positive contributions to promoting the modernization of education and promoting the economic and social development, and has become an important part of the socialist educational cause. On 2017 01, 18, the State Council issued several opinions on encouraging social forces to set up education to promote the healthy development of private education.(Wei Quanling,2000)The opinion stressed that encouraging social forces to set up education and promoting the healthy development of private education is an important task that concerns both current and long-term interests. This paper combines the principal component analysis with the DEA method to explore the index selection of the allocation efficiency of education resources. In addition, through the empirical analysis of the investment and output efficiency of the 21 private colleges and universities in Hubei Province, this paper concretely understands the efficiency of the allocation of private education resources and the main problems facing them.(Wei Quanling,1998)

2 Methods, Indexes and Selection of Samples

2.1 Overview and advantages of DEA method

At present, there are many kinds of evaluation methods, such as analytic hierarchy process (AHP), fuzzy comprehensive evaluation method, grey relational grade evaluation method, etc., because the above methods have the limitations of subjectivity in determining the weight of indexes, and the constraints on the correlation among the indexes are not easy to be tested, and the results can not be adjusted. (Wei Quanling, 2012)Therefore, the paper chooses DEA method to comprehensively evaluate the efficiency of education resource allocation.

As a statistical analysis method, the DEA method has an absolute advantage in dealing with multiple target decision problems with multiple transmission and multiple outputs. It is mainly to determine the relative effective production frontiers by means of mathematical programming and statistical data by keeping the transmission or output of the decision unit unchanged. Each decision unit is projected to the DEA. The relative effectiveness of the decision making unit deviating from the DEA frontier is evaluated on the frontier of production. In determining the relative effectiveness of decision making units, each decision unit is optimized, so the relative efficiency is the maximum, and the selection of weight is also optimal, which avoids the subjectivity of the traditional method in the weight

selection. At the same time, the DEA method, aiming at non effective units, will use "projection principle" not only to give the direction of the adjustment of the index, but also to give the accurate quantity of the adjustment of the index, and it has the idea of optimization.(Yu-Chuan Chen, Yung-Ho Chiu,Chin-Wei Huang,ChienHeng Tu,2012)

Using an input-based C2R model with non-Archimedean infinity (1), the overall efficiency can be evaluated. Using the input-based BC2 model with non-Archimedean infinitesimal (2), its technical efficiency can be evaluated. Finally, using the overall efficiency/technical efficiency, that is $s^* = \dfrac{\theta^*}{\sigma^*}$, to achieve economies of scale. As the model shows:

$$
(D_\varepsilon)\left\{
\begin{aligned}
& Min\left[\theta - \varepsilon\left(\hat{e}^T s^- + e^T s^+\right)\right] \\
& \sum_{j=1}^{n} \lambda_j x_j + s^- = \theta_{x0} \\
& \sum_{j=1}^{n} \lambda_j x_j - s^- = y_0 \\
& \lambda_j \geq 0, \quad j = 1, \cdots, n, \\
& s^- \geq 0, s^+ \geq 0.
\end{aligned}
\right\} \tag{1}
$$

$$
(D_\varepsilon)\left\{
\begin{aligned}
& Min\left[\theta - \varepsilon\left(\hat{e}^T s^- + e^T s^+\right)\right] \\
& \sum_{j=1}^{n} \lambda_j x_j + s^- = \sigma_{x0} \\
& \sum_{j=1}^{n} \lambda_j x_j - s^- = y_0 \\
& \sum_{j=1}^{n} \lambda_j x_j = 1 \quad \lambda_j \geq 0, \quad j = 1, \cdots, n, \\
& s^- \geq 0, s^+ \geq 0.
\end{aligned}
\right\} \tag{2}
$$

According to the C2R model and the BC2 model, the result data in the Efficiency Summary and Summary of Output/Input Slacks are entered in the table: DMU is the name of the 21 private universities in turn; θ* is the overall efficiency value, and σ* is the technical efficiency. Use $s^* = \dfrac{\theta^*}{\sigma^*}$ derived S* scale benefit value。 According to the results of the DEA method founders Charnes and Cooper et al., "The necessary and sufficient condition for the decision-making unit DMU to have constant returns to scale is to have a scale return value of 1".

Because of the use of DEA method for efficiency evaluation, we need to test the output variables by correlation, avoid too much correlation and improve the accuracy of evaluation, so the paper first uses the principal component analysis method and the SPSS software to screen the index before the DEA evaluation.

2.2 Selection of indexes and selection of samples

Considering the availability of data, according to the statistical data of the official network of private colleges and universities, 7 variables are selected preliminarily: the area of the school, the area of the building, the number of the colleges, the number of professional, the total number of books in the library, the total number of full-time teachers, the number of teachers with Senior title, and the X1 - X7, respectively. The output of the variable includes two aspects. On the one hand, the number of students is trained by the school. The number of students is taken as a measure of the "number" of the school output. On the other hand, the quantity of the "quality" of the students is trained by the school. Here, the students' first employment rate is taken as a measure of the "quality" of the school output, which is expressed in Y1 - Y2, respectively.(Fan JiXuan,2013)According to the analysis, the contribution rate and extraction rate of each component of the index are obtained. (Table 1)

Table 1   Principal Component Analysis

componet	Initial eigenvalue			Extraction sums of squared loadings			
	total	%of variance	cumulative%	total	%of variance	cumulative%	extraction
1	4.943	70.615	70.615	4.943	70.615	70.615	.601
2	.728	10.395	81.010	.728	10.395	81.010	.736
3	.466	6.660	87.670	.466	6.660	87.670	.401
4	.292	4.170	91.840	.292	4.170	91.840	.756
5	.279	3.991	95.831	.279	3.991	95.831	.815
6	.224	3.197	99.028	.224	3.197	99.028	.895
7	.068	.972	100.000	.068	.972	100.000	.740

3 DEA Analysis Results

3.1 Overall results

Using DEA-SOLVER Pros software, we input data from 21 private colleges and universities, and get results through CCR and BCC model analysis. (Table 2)

Table 2   DEAAnalysis Results (Partial Results)

DUM	Crste	Relative effectiveness	Vrste	Technical effectiveness	Scale	Scale effectiveness
DUM1	0.827	Invalid DEA	0.829	invalid	0.998	drs
DUM2	1.000	DEA is valid	1.000	valid	1.000	-
DUM3	0.936	Invalid DEA	0.961	invalid	0.973	drs
DUM4	1.000	DEA is valid	1.000	valid	1.000	-
DUM5	1.000	DEA is valid	1.000	valid	1.000	-
DUM6	1.000	DEA is valid	1.000	valid	1.000	-
DUM7	1.000	DEA is valid	1.000	valid	1.000	-

Table 3   DEAAnalysis Of Sample Validity Distribution

Total number of samples	DEA effective number of samples	DEA invalid number of samples		The proportion of technical invalidity in DEA invalid sample
21	12	9	DEA technology is effective	2，22%
			Invalid DEA technology	7，78%
	DEA effective sample to total sample proportion	DEA invalid sample to total sample proportion		Invalid proportion of invalid samples in DEA
	57%	43%	Decreasing	5，56%
			Increment	4，44%

3.2 Improvement of Non-DEA Effective Units

For non-DEA-effective units, the adjustment to the investment target is "reduced investment," and the adjustment to the output indicator is "output that should increase." (Table 4)

Table 4   Non-DEA Effective Unit Improvements (Partially)

DUM	Comprehensive efficiency	the area of the school	the area of the building	the number of the colleges	he number of professional	the total number of books in the library	he total number of full-time teachers	the number of teachers with the Senior title	Number of students	employment rate
		S-(1)	S-(2)	S-(3)	S-(4)	S-(5)	S-(6)	S-(7)	S+(1)	S+(2)
DUM1	0.998	62.483	0.000	0.000	18.591	8.586	0.000	0.000	0.000	0.000
DUM2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Continual Table 4

DUM	Comprehensive efficiency	the area of the school	the area of the building	the number of the colleges	he number of professional	the total number of books in the library	he total number of full-time teachers	the number of teachers with the Senior title	Number of students	employment rate
		S-(1)	S-(2)	S-(3)	S-(4)	S-(5)	S-(6)	S-(7)	S+(1)	S+(2)
DUM3	0.973	200.302	0.286	0.000	22.829	26.367	0.000	3.466	0.000	0.000
DUM4	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DUM5	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DUM6	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DUM7	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

According to the abovetable, The amount ofresources that can be reduced by investing resources in the educational resources of private universities in Hubei Province in 2017 is: the average area of each school is reduced by 37.376 mu, the average building area can be reduced by 11 thousand and 700 square meters, and the average professional number is reduced by 4.The volume of paper collections in the library decreased by 26 thousand and 290 copies, the number of full-time teachers decreased by 10, and the number of teachers in sub high schools and above decreased by 4.(Wang Qi,2015)

4 Conclusions
4.1 Control scale and improve efficiency
From the previous analysis, we can see that promoting the balanced and sustainable development of education, the efficiency of the investment and output of 21 private colleges and universities in 21 private colleges and universities is 0.991, and the overall efficiency of the allocation of resources is high, but there is still a certain gap between the different hosts. The reasons for the invalidity of resource allocation in private colleges and universities in Hubei are summarized as follows: first, the irrational or unfair allocation of resources is unreasonable. Most schools have the situation of overinvestment in resources, which is mainly manifested in the blind expansion of campus area in schools to obtain land value-added income. A small number of schools have insufficient investment in resources, which has affected the scale and efficiency of resources input.(Bougnol M-L,Dula J H,2006)Second, the management level and system construction of the resource allocation is not complete, for example, the situation still exists because of the irrational management and utilization of the input resources, which leads to the idle resources or the low rate of resource output. Private colleges and universities have a single source of funds and lack of development potential. Most private universities in China are self -financing schools and adopt the path of "relying on tuition to run schools" and "snowball". The development of the school is subject to the accumulation of tuition, which causes some schools to not coordinate the relationship between the two and the expansion of the investment.(Jeannette Taylor,2001)The input of teaching funds is insufficient and it is difficult to guarantee the quality of teaching. Schools should pay full attention to the scientificity, rationality and effectiveness of the allocation of resources. For schools of too large scale, schools should concentrate their resources on teaching, improve the quality of teaching, improve management level and system construction, improve the efficiency of resource investment and output, and strengthen the schools with insufficient investment and high technical efficiency. On the other hand, it is necessary to increase the investment in resources, on the other hand, to supervise the improvement of the system construction and management level, and to enhance its comprehensive competitive power. (Abbott M, Doucouliagos H, 2004)
4.2 Setting up the advanced education concept of private universities and creating a unique and charming university culture.
Although the private university is only a private profit organization, it is still a member of the social family, so it should not only pursue the economic profit, have the sense of the times, have the time responsibility, and establish the people oriented teaching management idea to take on the social responsibility and use the same storage. Different attitudes encourage the interweaving of different views, optimize the teaching management based on the concept of people-oriented and democratic decision-making, take the historical mission from the perspective of serving the society, and cultivate more outstanding talents for the Chinese dream.Culture is a treasure, a spirit, and a valuable asset. For colleges and universities, culture is the soul and blood of colleges and universities. It is a lighthouse for all teachers and students, guiding all teachers and students not afraid of difficulties and active

struggle.(Abbas Valadkhani,AndrewWorthington,2006) China's private universities started late, and many schools have not yet formed their own university culture. To create a unique campus culture is the only way to realize the connotative development of private universities. Combining its own advantages to create a unique charm of the university culture, to educate people by culture and make the university culture a spiritual home for all teachers and students, it is bound to insert a strong wing for the connotation development of private colleges and universities.

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An Empirical Study on the Evaluation of Efficiency in Running a University within Provinces of China

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Abstract: The promotion of efficiency in running a university in interprovincial universities is an important aspect of supply-side structural reform. The scientific evaluation of the efficiency in running a university in interprovincial universities is the premise of gap analysis in higher education and further seeking ways to reform. This paper employs factor analysis to evaluate the input and output data of talent training in universities of China's 31 provinces (including autonomous regions) in 2013-2015. Meanwhile, the performance factors of the undergraduates and college students through unified entrance exam, performance factors of postgraduates, as well as the scores and rankings of comprehensive performance are obtained. Contrast and characteristic analysis are made based on rankings in combination with such strategies as "One Belt and One Road" and "Made in China 2025", the ways to promote performance of interprovincial universities are proposed for the purpose of further optimizing area arrangement and supply-side structure.
Key words: Interprovincial universities; The evaluation of efficiency in running a university; Factor analysis; Empirical study

1 Introduction

A series of measures have been taken to promote the efficiency of education since the National Medium-and Long-Term Plan for Education Reform and Development (2010-2020) was introduced, higher education has been greatly developed as a result. In 2015, the gross enrollment rate of China's higher education has reached for 40%, signaling the coming of the post-popularization period. However, with the advancement of popularization, there exist many problems of the imbalance between supply side and demand side in current higher education. For example, the imbalance between different regions and the structure of academic discipline, the loss of hierarchical structure and the separation of formal structure. The supply of higher education is closely related to the core elements such as labor (staff and students), land (basic resources), capital (school funds and intangible reputation) within the higher education system. The supply-side structural reform in higher education aims to pursue quality in universities and comprehensively reforms the core elements of higher education. The developmental focus will shift from the scale and quantity to structure, quality, efficiency and innovation（Jin Baohua, Liu Xiaojie，2016）. Under the guidance of national quality improvement and the performance orientation of fund allocation policies, the relevant data from higher education input and output in 31 provinces and cities in China from 2013 to 2015 were selected and the factor analysis was used to objectively evaluate the efficiency in running a university in interprovincial regions and to analyze the differences so as to provide practical guidance for structural reforms in the supply side of regional higher education and ensure the healthy and balanced development of higher education.

2 Evaluative Indexes and Methods

2.1 Factors of affecting the efficiency in running a university and the construction of evaluative index system

From the perspective of economics, the efficiency (or performance) in running a university can be simply understood as "the comparison between input and output in universities", that is, the proportion of input to the university's work output in a certain length of time. As talent cultivation is the core task of universities, the efficiency of talent cultivation is mainly studied in this paper. According to the scientific, comprehensive, and operable principles of index system construction, the actual data with theoretical models are combined, that is, starting from the factors that affect the efficiency of talent cultivation, taking into a full consideration on the reality of talent cultivation in universities. Based on the existing research results and the accuracy and availability of relevant statistic data, the evaluative

index system is constructed by adopting the summary mode in this paper.

According to the key elements of supply side in higher education such as labor, basic resources, school funds and so on, the factors affecting the efficiency of talent training in universities are shown as follows: (1) Educators (the input of teachers), including full-time teachers, administrative staff, assistant and workers; (2)Educatees (students), including the scale, source and employment of students, etc. (3) Financial investment, which currently remains the main channel for educational funding in education; (4) Material input, which refers to school buildings, equipment, books, etc.

To summarize the above analysis, the evaluation of efficiency in running a university consists of three dimensions i.e. scale, input, and output. The scale is the basic index of higher education institutions and students in a certain area, reflecting the capacity of higher education in the region. The investment in human, financial, and material resources is the basic guarantee for the talent training quality while the output is the result and effect of personnel training. Therefore, in accordance with the relevance to personnel training, the availability and importance of data, this paper selects the following main indexes: the number of higher education institutions, the number of students enrolled as general undergraduates and graduates, the investment of teachers, the expenditure on public finances, material inputs such as books, classrooms, fixed assets and so on, the number of undergraduates and college students awarded diplomas, the number of undergraduate and college students awarded degree certification, etc. The specific scale indexes include: X_1 the number of higher education institutions, X_2 the graduate students enrollment, X_3 the undergraduate and college students enrollment, X_4 the number of graduate students, X_5 the number of the undergraduate and college students; input indexes include: X_6 the number of full-time teachers, X_7 the number of administrative staff, X_8 the number of support staff, X_9 the number of workers, X_{10} expenses of public finances education, X_{11} sports venues, X_{12} books, X_{13} the number of computers, X_{14} classrooms, X_{15} fixed assets; output indexes include: X_{16} the number of graduates awarded diplomas, X_{17} the number of graduates awarded degrees certification , X_{18} the number of undergraduate and college student awarded diplomas, X_{19} the number of undergraduates and college students awarded degree certification.

2.2 The method of evaluation
2.2.1 The Selection of Method

Based on 19 variables that can be observed in relation to talent cultivation, the efficiency in running a university in 31 provinces were measured and the correlation between them was analyzed, so that the key factors affecting the differences could be found. The evaluative index system is complex and the workload is rather heavy. The method of factor analysis is one of the multivariate statistical analysis, which explores the internal structure of the correlation coefficient matrix of variables and finds a few random variables that can control all variables to describe the correlation among multiple variables, thereby the observation system is simplified and quantitative evaluation of each sample is ultimately implemented (Xu Qian,2012). It matches the characteristics of the evaluation of efficiency in running a university in interprovincial universities, which in turn greatly reduces the difficulty of evaluation work and improving work efficiency (Costello, A. B., Osborne, J. W., 2009). Therefore, the method of factor analysis is adopted in this paper.

2.2.2 The adaptive test of method

According to 19 evaluative indexes constructed, the basic data of the education statistics in universities in 31 provinces and cities in China published by the Ministry of Education website from 2013 to 2015 were selected to evaluate (Ministry of education of the People's Republic of China,2014, 2015, 2016). Due to the large number of indexes, the original data used here were omitted. At the same time, the data of the 19 sample indexes were all positive, the standardized processing of which was unnecessary. With SPSS software (Zhang Wentong,2002), KMO test statistics and Bartlett's spherical test methods were used to perform factor analysis adaptive test on the samples. The calculative results were as follows: KMO for 2013,2014,2015 was respectively 0.839, 0.858, and 0.844, so KMO has passed the test. At the same time, the companion probability was 0.000, less than the significance level of 0.05, indicating that Bartlett's spherical has passed the test, too. So, factor analysis was applicable to the selected sample data.

3 The Process of Evaluation
3.1 The determination and extraction of common factors
3.1.1 The Determination of Common Factors

The common factors are extracted with principal component analyzed via SPSS software. Taking

2013 as an example, after the decomposition of the total variance, it can be clearly seen that the eigenvalue of two factors is greater than 1after rotating, whose cumulative contribution rate is 96.234%. The specific calculative results are shown in Table 1.

Table 1   The Eigenvalue and the Contribution Rate of Cumulative Variance（2013）

compo nents	the initial eigenvalue			extract square and load			rotation of squares and loads		
	total	variance %	accumul ation %	total	varian ce%	accumula tion%	total	variance %	accumul ation%
1	15.238	80.199	80.199	15.238	80.199	80.199	10.790	56.788	56.788
2	3.047	16.035	96.234	3.047	16.035	96.234	7.495	39.446	96.234

3.1.2 The Analysis of Commonness.

From the calculative results of regeneration commonality in 2013, it can be seen that the commonality of all other variables was above 90% except for x_9 and x_{10}, whose common degrees were respectively 0.848 and 0.846, indicating that these sample variables could be explained by these two common factors, named them as F_1 and F_2.

3.1.3 The Loading Matrix of Factors and the Naming of Common Factors

From the calculation of the un-rotated loading matrix of factors, the factor load is relatively average, especially the common factor F_1 is between 0.740 and 0.982, and the relationship with each factor is not intuitive. In order to observe the sample more clearly, the variance maximizing orthogonal rotation method is used here to rotate the factor to obtain the rotated factor load matrix, which is shown in table 2.

Table 2   The Loading Matrix of Rotated Factors

X	Common Factor F_1	Common Factor F_2
x_{18}	0.972	0.208
x_3	0.970	0.192
x_5	0.967	0.226
x_{11}	0.958	0.240
x_1	0.915	0.338
x_{19}	0.911	0.387
x_{14}	0.910	0.273
x_6	0.900	0.430
x_{10}	0.880	0.267
x_{12}	0.879	0.466
x_{13}	0.726	0.658
x_7	0.670	0.725
x_{15}	0.649	0.727
x_8	0.606	0.783
x_9	0.522	0.759
x_{16}	0.214	0.975
x_{17}	0.214	0.975
x_4	0.190	0.979
x_2	0.187	0.979

From the loading matrix of rotated factors shown in Table 2, it can be known that 11 indexes including x_{18}, x_3, x_5, x_{11}, x_1, x_{19}, x_{14}, x_6, x_{10}, x_{12}, and x_{13} have a high load on the common factor F_1. The 11 indexes mainly reflect the status of input and output directly related to general undergraduates and college students and personnel training. Therefore, F_1 is named as the performance factors of the undergraduates and college students through unified entrance exam; The following 8 indexes, x_7, x_{15}, x_8, x_9, x_{16}, x_{17}, x_4, x_2, etc. have a high load on the common factor F_2. As the above 8 indexes mainly reflect graduate students and the input-output status indirectly relevant to the training of talents, F_2 is consequently named as a graduate performance factor.

3.2 The calculation of factor scores and comprehensive efficiency in running a university

3.2.1 The Calculation of Factor Scores

The factor score coefficient matrix A can be obtained by rotating the factor load matrix, as shown in Table 3. The formula for each factor score F is: F=AX, where A is the factor score coefficient and X is the original data.

Table 3   The coefficient matrix A of factor score in 2013

X	Common Factor F_1	Common Factor F_2
x_1	0.105	-0.037
x_2	-0.094	0.204
x_3	0.132	-0.078
x_4	-0.093	0.204
x_5	0.128	-0.070
x_6	0.091	-0.014
x_7	0.017	0.084
x_8	-0.001	0.106
x_9	-0.012	0.110
x_{10}	0.108	-0.049
x_{11}	0.124	-0.065
x_{12}	0.083	-0.003
x_{13}	0.034	0.061
x_{14}	0.112	-0.052
x_{15}	0.013	0.087
x_{16}	-0.089	0.200
x_{17}	-0.089	0.200
x_{18}	0.131	-0.075
x_{19}	0.098	-0.025

3.2.2 The calculation of comprehensive efficiency in running a university

The calculative formula for talent cultivation efficiency of colleges and universities in 31 provinces and municipalities in 2013 can be expressed as follows: Comprehensive schooling efficiency = $(56.788\% * F_1 + 39.446\% * F_2)/96.234\%$, specific scores of which are shown in table 4.

Table 4   The Scores of the Factors and Comprehensive Efficiency of 31 Provinces   in 2013

Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Liaoning	Jilin	Hei Long jiang
F_1 score -1.3271	-0.6812	0.9687	-0.0956	-0.6206	0.3074	-0.5048	-0.1283
F_2 score 4.2170	-0.0366	-0.4422	-0.5432	-0.6013	0.6674	0.1945	0.2918
total 0.9454	-0.4173	0.3904	-0.2790	-0.6127	0.4550	-0.2181	0.0440

Anhui	Fujian	Jiangxi	Shandong	Henan	Hubei	Hunan	Guangdong
F_1 score 0.6055	0.0032	0.4078	2.0675	1.8867	0.7518	0.7149	1.6889
F_2 score -0.5039	-0.3749	-0.6518	-0.0656	-0.7931	0.9288	-0.1017	0.1242
total 0.1508	-0.1518	-0.0265	1.1931	0.7883	0.8244	0.3802	1.0475

Sichuan	Guizhou	Yunnan	Tibet	Shaanxi	Gansu	Qinghai	Ningxia
F_1 score 0.8264	-0.5487	-0.3587	-1.4821	0.2270	-0.7857	-1.4485	-1.2598
F_2 score 0.2924	-0.7537	-0.4788	-0.7668	0.7194	-0.4540	-0.7315	-0.7648
total 0.6075	-0.6327	-0.4079	-1.1889	0.4288	-0.6498	-1.1546	-1.0569

Shanghai	Jiangsu	Zhejiang	Guangxi	Hainan	Chongqing	Xinjiang	
F_1 score -0.9019	1.7070	0.5046	-0.2102	-1.1679	-0.3851	-0.7607	
F_2 score 1.4696	1.3007	-0.0642	-0.5961	-0.7539	-0.1461	-0.5822	
total 0.0702	1.5405	0.2715	-0.3684	-0.9982	-0.2872	-0.6875	

In the same way, the efficiency in running a university in 31 provinces and cities in 2014 and 2015

was evaluated, and the scores of various factors and comprehensive efficiency of 31 provinces and cities in 2014 and 2015 were also obtained.

4 The Results of Evaluation

In general, the higher the score, the better the school is run. A score of zero or a negative value does not mean that the efficiency in running a university is negative. It merely means the zero point of the average schooling efficiency. The corresponding rankings were obtained according to the scores of various factors and comprehensive efficiency of universities in 31 provinces during 2013-2015.

4.1 The evaluative results and presentation of changing trends

4.1.1 The Ranking of the Performance Factors of the Undergraduates and College Students through Unified Entrance Exam

The rankings of the performance factor F_1 of ordinary undergraduates and college students through unified entrance exam during the 2013-2015 in the 31 provincial colleges and universities were shown in Table 5.

Table 5   The Ranking of the Performance Factor F_1 of Ordinary Undergraduate and College Students through Unified Entrance exam

ranking	1-10	11-20	21-31
2013	Shandong Henan Jiangsu Guangdong Hebei Sichuan Hubei Hunan Anhui Zhejiang	Jiangxi Liaoning Shaanxi Fujian Shanxi Heilongjiang Guangxi Yunnan Chongqing Jilin	Guizhou Inner Mongolia Tianjin Xinjiang Gansu Shanghai Hainan Ningxia Beijing Qinghai Tibet
2014	Shandong Henan Guangdong Jiangsu Hebei Sichuan Hubei Henan Anhui Zhejiang	Jiangxi Liaoning Shaanxi Fujian Heilongjiang Shanxi Guangxi Chongqing Yunnan Jilin	Guizhou Inner Mongolia Tianjin Gansu Xinjiang Shanghai Hainan Beijing Ningxia Qinghai Tibet
2015	Shandong Henan Guangdong Jiangsu Sichuan Hubei Hebei Hunan Anhui Zhejiang	Jiangxi Liaoning Shaanxi Fujian Heilongjiang Shanxi Guangxi Chongqing Yunnan Guizhou	Jilin Inner Mongolia Tianjin Gansu Xinjiang Shanghai Hainan Beijing Ningxia Qinghai Tibet

From Table 5, we can see that the ranking of the performance factor F1 of general undergraduate and college students through unified entrance exam in 3 years: (1)For 3 consecutive years there are16 remaining unchanged, which are ranked as follows: Shandong 1, Henan 2, Hunan 8, Anhui 9, Zhejiang 10， Jiangxi 11, Liaoning 12, Shaanxi 13, Fujian 14, Guangxi 17, Inner Mongolia 22, Tianjin 23, Shanghai 26, Hainan 27, Qinghai 30, Tibet 31. (2) There are 8 rising trends, namely Beijing, Heilongjiang, Hubei, Guangdong, Chongqing, Sichuan, Guizhou and Gansu. In 2015, it increased by 1 compared with 2013. (3) There are 7 declining trends: Hebei, Shanxi, Jilin, Jiangsu, Yunnan, Ningxia and Xinjiang. Compared with 2013, the number of others fell by one with the exception of Hebei, which dropped by two.

4.1.2 The Ranking of Graduate Performance Factors

The ranking of graduate performance factors in interprovincial universities in 2013-2015 were shown in Table 6.

Table 6   The Ranking of Graduate Performance Factor F_2

ranking	1-10	11-20	21-31
2013	Beijing Shanghai Jiangsu Hubei Shaanxi Liaoning Sichuan Heilongjiang Jilin Guangdong	Tianjin Zhejiang Shandong Hunan Chongqing Fujian Hebei Gansu Yunnan Anhui	Shanxi Xinjiang Guangxi Inner Mongolia Jiangxi Qinghai Guizhou Hainan Ningxia Tibet Henan
2014	Beijing Shanghai Jiangsu Hubei Shaanxi Liaoning Heilongjiang Sichuan Guangdong Jilin	Tianjin Zhejiang Hunan Shandong Chongqing Fujian Hebei Gansu Yunnan Anhui	Shanxi Xinjiang Guangxi Inner Mongolia Jiangxi Hainan Ningxia Guizhou Qinghai Henan Xizang

Table 6 shows the ranking of graduate performance factor F_2 for three consecutive years: (1) There

are 11 without change, which are ranked as follows: Beijing 1, Shanghai 2, Jiangsu 3, Hubei 4, Shaanxi 5, Liaoning 6, Chongqing 15, Fujian 16, Hebei 17, Shanxi 21, Jiangxi 25. (2) There are 9 ascending trends: Inner Mongolia, Zhejiang, Anhui, Henan, Hunan, Guangdong, Guangxi, Hainan and Ningxia. In 2015 and 2013, Anhui, Guangdong, Hainan and Ningxia rose by 2 and Inner Mongolia, Zhejiang, Henan, Hunan, and Guangxi increased by one. (3) There are 11 downtrends: Tianjin, Jilin, Heilongjiang, Shandong, Sichuan, Guizhou, Yunnan, Tibet, Gansu, Qinghai and Xinjiang. Among them, Sichuan fell by one in 2014 compared to 2013, and it remained the same in 2015 to 2013; in both 2013 and 2015, Qinghai dropped by three, Xinjiang decreased by two, and the other 8 were all down by one.

4.1.3 The Ranking of Comprehensive Efficiency

The ranking of comprehensive efficiency in interprovincial universities in 2013-2015 was shown in table 7.

From Table 7, we can see that the rankings of the comprehensive benefits for 3 consecutive years are: (1) There are 21 without change, and they are ranked as below: Jiangsu 1, Shandong 2, Guangdong 3, Beijing 4, Sichuan 7, Tianjin 23, Hebei 10, Jilin 18, Zhejiang 12, Anhui 13, Jiangxi 16, Fujian 17, Hunan 11, Guangxi 21, Yunnan 22, Hainan 28, Gansu 26, Xinjiang 27, Ningxia 29, Qinghai 30, Tibet 31. (2) There are 4 increasing trends, namely Henan, Chongqing, Guizhou, and Shaanxi. The rank in 2015 all increased by 1 compared with 2013; Heilongjiang increased by 1 in 2014 and returned to the rank of 2013 in 2015. (3) There are 4 downtrends, namely Shanxi, Inner Mongolia, Liaoning, and Hubei, in 2015 all falling by 1 in comparison with 2013, except for Shanghai, falling by 1 in 2014 and returning to the same rank of 2013 in 2015.

Table 7   The ranking of comprehensive efficiency

ranking	1-10	11-20	- 31
2013	Jiangsu Shandong Guangdong Beijing Hubei Henan Sichuan Liaoning Shaanxi Hebei	Hunan Zhejiang Anhui Shanghai Heilongjiang Jiangxi Fujian Jilin Shanxi Chongqing	Guangxi Yunnan Tianjin 、 Inner Mongolia Guizhou Gansu Xinjiang Hainan Ningxia Qinghai Tibet
2014	Jiangsu Shandong Guangdong Beijing Hubei Henan Sichuan Shanxi Liaoning Hebei	Hunan Zhejiang Anhui Heilongjiang Shanghai Jiangxi Fujian Jilin Chongqing Shanxi	Guangxi Yunnan Tianjin Guizhou Inner Mongolia Gansu Xinjiang Hainan Ningxia Qinghai Tibet
2015	Jiangsu Shandong Guangdong Beijing Henan Hubei Sichuan Shaanxi Liaoning Hebei	Hunan Zhejiang Anhui Shanghai Heilongjiang Jiangxi Fujian Jilin Chongqing Shanxi	Guangxi Yunnan Tianjin Guizhou Inner Mongolia Gansu Xinjiang Hainan Ningxia Qinghai Tibet

4.2 The correlative analysis of the rankings among the comprehensive efficiency, general undergraduates and college students through unified entrance exam f_1 and graduate performance factors F_2

Here, the overall performance of top 10 for three consecutive years and the last 8 are analyzed.

4.2.1 The Comprehensive Performance of Top 10

(1) The following 4 provinces, Jiangsu, Guangdong, Hubei, and Sichuan, whose ranking of performance factors of the undergraduates and college students through unified entrance exam and graduate performance factors are all among the top 10, indicating that they all have comprehensive advantages. (2) Shandong, Henan, and Hebei Provinces ranked among the top 10 in terms of performance factors for general undergraduates and college students, indicating that they are evidently advantageous in the training of general undergraduates and college students. (3) The top 10 performance factors of graduate students in Beijing, Liaoning and Shaanxi provinces indicate that they are obviously superior in graduate students' training.

4.2.2 The provinces in which comprehensive efficiency ranked for three consecutive years

The comprehensive efficiency ranked the last 8 for 3 consecutive years are Guizhou, Inner Mongolia, Gansu, Xinjiang, Hainan, Ningxia, Qinghai, and Tibet. The performance factors of graduate students in Gansu are ranked 18 or 19. In another 7, both the performance factors of undergraduates and college students through unified entrance exam and graduate performance factors are ranked after 20.

5 Conclusion

As mentioned above, it follows that: (1) At present, there are obvious differences as far as the efficiency in running universities in interprovincial regions is concerned. The top 10 provinces and cities

for three consecutive years are those with relatively strong educational strength, while the last 8 provinces and cities are basically the western and remote areas with underdeveloped education. (2) The provincial differences in the efficiency in running a university is difficult to change within three to five years. Ranks have remained mostly unchanged for three consecutive years. While those whose ranks have changed are quite few within small ranges, in most cases increased or decreased by one. (3) The level of comprehensive efficiency is closely related to the rankings of the performance factors of the undergraduates and college students through unified entrance exam and graduate performance factors. In provinces with high comprehensive efficiency, at least one of the two rankings are at the forefront, on the contrary, the two low-ranking factors are definitely lead to lower overall efficiency.

In summary, differences in the efficiency in running a university in interprovincial universities mainly include two factors: the marked regional disparities in the overall strength between the developed provinces and the western, remote areas and the obvious discrepancies in different levels of undergraduates and graduate students in various provinces. Therefore, the following suggestions to improve the efficiency in running a university are presented: one is to optimize the regional structure, promoting balanced and coordinated development of higher education by the opportunity of the "One Belt and One Road" initiative(FengZhijun,2015); the other is to establish a dynamic adjustment mechanism for the type structure, level, discipline of universities that can adapt to the state strategy need of "Made in China 2025" (Hu Bo, Feng Hui, Han Weili, Xu Lei, 2017); what's more, to optimize the supply structure of the interprovincial higher education in order to provide talents for regional economic development (Jin Niu, Chen Chao,2016).

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Impact of Charismatic Leadership of Expatriate Manager on Construction Project Performance

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Abstract: This study aimed at empirically elucidating the impact of charismatic leadership (CL) of expatriate manager on project performance in construction industry in Nepal. Primary data was obtained from international construction project & project in relation to expatriate manager by means of sending questionnaires to 200 employees in Nepal. It was found that there is perfect positive correlation between charismatic leadership and project performance. The results further indicates that the construction industry in Nepal is sensitive to member's need (SMN) and personal risk (PR), hence SMN and PR are more predictive of project performance (PP). In conclusion, expatriate leaders in construction project can boost the probability of project performance by executing CL behavior, and paying particular attention to the Environment, member's need, Strategic vision and articulation, personal Risk and unconventional Behavior.
Key words: Charismatic leadership; Expatriate manager; Project performance; Construction industry

1 Introduction

Project management is observed as the process of making decision, defining strategic plan and executing specific task by applying available human and financial resources. The Performance of Construction project depends on factors such as project nature, location of the project, procurement process, participants relations, competitiveness, quality of project manager and the ability of key project leaders (Baker et al., 2008). Undisputedly, the key Project Leaders are architects, engineers, surveyors and project managers who supervise the execution of the project(Blackbum, 2002).

Expatriate managers are managers who come from different culture, society or country. They have to learn about different culture with bi-lateral environment in a variety of different settings. Good adjusted expatriate managers are comfortable to work and communicate with people with different cultural orientation and this has benefits for project performance in construction industry (Lee et al., 2017). Construction industry is one of the most emerging and important sectors that contributes positively to economic growth in every country, hence, the focus on leadership and project performance of this industry.

Among the Leadership styles, Charismatic leadership uses follower enthusiastic measure to keep moral up with business (Gebert et al., 2016). Charismatic leaders are extraordinary powerful in psychology (Grabo& Van Vugt, 2016), Dispensation (Tumer,2015), idealized influence regarding attribution and behavior, inspirational motivation & vision for Task performance (Banks et al.,2017). Expatriate manager need charismatic leadership for relating project performance. In sort, previous research on charismatic leadership has taken related organizational hierarchy rather than expatriate, also observed more relating with transformational and transnational leadership in construction project (Tabassi et al.,2016).

There are many researches about relationship between leadership style and job satisfaction, safety leader, procurement supply chain. This research focuses on charismatic leadership of expatriate manager and project performance. What is the impact of charismatic leadership of expatriate manager on project performance in construction project and influence of leadership style are main questions in this research.

2 Literature Review and Research Framework

Relevant literature on leadership, charismatic leadership, expatriate manager and project performance have defines in different way. Leadership defined as the individual who establishing a clear vision, sharing vision with team so that they follow willingly, provide information, knowledge, coordinating & solve the conflict within team and with external relate issue (Ortega, 2017). Charismatic leadership always is in controversy even there are some literatures as value based, symbolic, emotions-laden leader signaling. Some of have supported as "go back to the drawing board" (Sy et al., 2018). Charismatic leadership considered personality traits, future investigation, predictor of supervise related

task performance or organizational level performance (Banks et al., 2017). Project performance frameworks maintain by project manager. Project performance have different dimensions to understand, these are Time, cost, Quality, Safety, Client Satisfaction, green environment and human resources (Demirkesen&Ozorhon, 2017).

Most of the researchers have focused on project performance and their attributes to impact. For example, (Eriksson & Westerberg, 2011) study highlighted the procurement process is highly contributed to the construction project performance. Similarly (Xia et al., 2018) research revealed that there is safety performance impact to the project performance and (Wu et al., 2017) study implied that leadership improvement and its impact to workplace safety and its performance.

Wang et al. (Wang et al., 2005) have investigated the impact of charismatic leadership style on team cohesiveness and overall performance. This study indicates that there is strong link between charismatic leadership and project team performance with cohesiveness but they have excluded the different project performance dimension. Their study has not paid attention at all about expatriate manager to the construction project performance. Cross border business consist different employee from different culture & there are more limitation of study for expatiate employee and their contribution to the project.

Fig.1 explain the research framework, as discussed in literature, Charismatic leadership of expatriate manager directly impact to project performance.

Independent Variable   Dependent Variable

- Sensitivity to the Environment (SE)
- Sensitivity to Member's Needs (SMN)
- Strategic Vision & Articulation (SVA)
- Personal Risk (PR)
- Unconventional Behavior (UB)

→ Project Performance (PP)
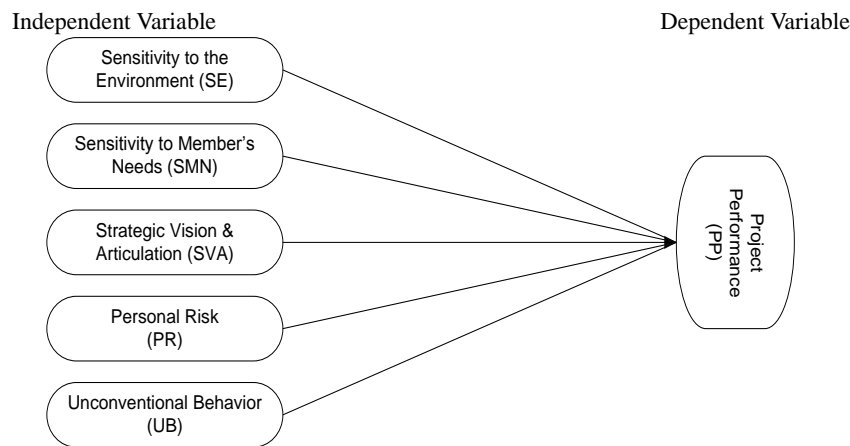
Figure 1   Conceptual Model

There are five dimension of charismatic leadership: Sensitivity to the environment (SE), Sensitivity to members' needs (SMN), Strategic vision and articulation (SVA), Personal risk (PR) and Unconventional behavior (UB) (Rowold et al., 2007) The Sensitivity to the Environment (SE) ensures that the leaders assess the environment for growth opportunities.   The Sensitivity to member's Need (SMN) refers the leader carefully evaluates their need. The Leaders formulate vision for organization which force to followers by inspiring way is defines as Strategic vision and articulations (SVA). For personal risk (PR) self confidence and action taken for achieve vision. Unconventional behavior (UB) refers to the leaders which build trust and commitment to followers and also leaders be as role model for followers. This conceptual model describes all the independent variable varies to the project performance.

3 Research Methodology
3.1 Participants
In this research, participants were Construction Company in Nepal. Total of N=200 employees, 156 responded (78%). These employees are working under team. There is hierarchically system so that middle level project manager (3%) reports to top level senior manager (6%), project team member (42%) & Functional manager (34%) reports to project manager. Procurement manager (Others-15%) reports to project manager and senior manager.   61% employees are 20-30 Years old were 90% are male.
3.2 Research Instrument
To collect data, two instrument used in this research. The variables in Multifactor Leadership questionnaire (MLQ) are the Independent variable and dependent variable which measure the project

performance (Rowold&Heinitz, 2007). 20 statement of MLQ were use for charismatic leadership dimensions. 4 items for Sensitivity to the Environment (SE), 4 items for Sensitivity to Member's Need (SMN), 4 items for strategic vision and articulations (SVA), 4 items for Personal Risk(PR) and   4 items for Unconventional Behavior (UB).

A 5 point Likert scale is used to understand leadership behavior of charismatic leaders and estimate based on 1:2:3:4:5 (Vonglao et al., 2017) The rating scale of leadership items are 1= Not at all, 2= Once in awhile, 3= sometimes, 4= fairly often, 5= frequently.

3.3 Data Analysis

The Statistical package for social science (SPSS) 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.

4 Results and Analysis

4.1 Cronbach alpha test

Cronbach's Alpha measures the internal consistency between items in scale. Most of the items that range between reliability coefficient of 0.6 -0.8 will be retained and used in scale.   Table 1 provides the summary of reliability test.

Table 1   Summary of Cronbach's Alpha (a) Reliability Test for Each Variable

Sr. #	Leadership Style	Cronbach's Alpha
A	Sensitivity to the environment (STE)	0.842
B	Sensitivity to members' needs (SMN)	0.710
C	Strategic vision and articulation (SVA)	0.716
D	Personal risk (PR)	0.715
E	Unconventional behavior (UB)	0.741
P	Project Performance (PP)	0.831

4.2 Factor analysis

Factor analysis used for data reduction to identify a small number of factors that most of the variance observed in a much larger number of manifest variable. The output of factor analysis is a number which represents the measure and factor loading of any variables. In this study any value which is less than 0.3 is suppressed and variable can be exclude. Table 2 represents the summary of the factor for independent variable. In the matrix since all the variables are greater than 0.3 so all items are included in this research. These results clearly show all variables are useful for this research.

Table 2   Summary of Factor and Factor Loading for Each Independent Variable

Sensitivity to the environment (STE)	STE1	STE2	STE3	STE4
Factor Loading	0.731	0.674	0.522	0.787
Sensitivity to members' needs (SMN)	SMN1	SMN2	SMN3	SMN4
Factor Loading	.878	.957	.730	.728
Strategic vision and articulation (SVA)	SVA1	SVA2	SVA3	SVA4
Factor Loading	0.862	0.981	0.733	0.715
Personal risk (PR)	PR1	PR2	PR3	PR4
Factor Loading	0.878	0.944	0.749	0.745
Unconventional behavior (UB)	UB1	UB2	UB3	UB4
Factor Loading	0.897	0.968	0.764	0.778

4.3 Regression analysis

Regression analysis helps to find the relationship among the variables. Basically, regression analysis is used to find how typical values of dependent variables change when any one of the independent variables varied. In this research, stepwise regression is applied among dependent variable, which is project performance, and 5 independent variables which are charismatic leadership dimensions.

Table3   Model Summary for Dependent Variable (Project Performance)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.962[a]	.925	.923	.99875

a. Predictors: (Constant), UB, SVA, STE, SMN, PR

Table 4   ANOVA for Dependent Variable (Project Performance)

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	1851.370	5	370.274	371.205	.000[b]
1	Residual	149.624	150	.997		
	Total	2000.994	155			

a. Dependent Variable: PP
b. Predictors: (Constant), UB, SVA, STE, SMN, PR

The results of Regression model Summary and ANOVA show in the table 3 and table 4. In this analysis show the R=.962 it means there is perfect positive relations between charismatic leadership of expatriate manager and project performance in Nepalese Construction industry. R2=.925 value show 92.5% change in dependent variable just due to independent variable. The standard error of the estimate is too much smaller which confirm regression line is more accurate prediction. F test value is far greater than 1 so its verify regression model is better than mean model and significance (p=.000<.05) means there is significant relationship between project performance and all the independent variable.

Table 5   Regression Analysis and Coefficient for Project Performance

CL Dimension	Project Performance				
STE	1.388				
SMN		1.684			
SVA			1.58		
PR				1.676	
UB					1.639
Constant	10.436	6.002	7.506	6.216	6.818
Observation	156	156	156	156	156
R-Squire	0.882	0.91	0.82	0.923	0.908
St. Error	0.041	0.043	0.06	0.039	0.042
Sig. Value	0.000	0.000	0.000	0.000	0.000

In table 5 all the dimensions of charismatic leadership used in the regression model individually to determine the impact of each project performance. The significant impact (p=.000<.05) on regression model show in all each variable. There is almost same impact to the dependent variable which shows the B value although Sensitivity to members Need (SMN) is the highest predictor with 1.684(B=1.684) and R2=.882 to the project performance by expatriate manager. This is followed by personal Risk (PR), Unconventional Behavior (UB), Strategic Vision and Articulations (SVA) and Sensitivity to the Environment (STE) respectively.

5 Conclusion

This research discovered that all dimension impact to project performance and among them sensitivity to members need and personal risk are more impacted. SMN is about the leader carefully evaluating their followers and PR talks about self confident and believe in potential outcome of vision. These discovered agree with the results of Wang et al. (Wang et al., 2005) on factor to project performance.

The main aim of this research is to scrutinize the impact of leadership style specially five dimension of charismatic leadership which named Sensitivity to the environment, sensitivity to member's need, strategic vision and articulations, personal risk and unconventional behavior on project performance. In this research most of projects target to the international project or either the project which have expatriate leaders.

The impact of charismatic leadership of expatriate managers on project performance in Nepalese construction industry and the dimension of the charismatic leadership influence on project performance are major queries used to achieve the research objectives. For CL of expatriate manager on project performance, empirical analysis show that 96.2% of construction project performance depends on charismatic leadership style (R=.962 and p=.000<.05) and for dimension of CL on project performance, the finding exposed that project performance by expatriate leaders more depends by sensitivity to members need and personal risk. These dimensions are strongly support to the project performance. The research has come out with the idea that project performance in construction industry in Nepal should use sensitivity to the members need and personal risk by expatriate managers.

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Analysis on the Application of Project Time Managementin Construction Development Project

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Abstract: Time is money, and efficiency is life. Whether a project can meet the predetermined time requirement is a key element of project management and performance measurement, and the purpose of the schedule is to save time and save time. So progress control is the primary content of project control and the soul of the project. In a sense, time management determines the success of management. How to manage the project in the construction project management is worthy of our thinking and research.This paper takes the construction and development of a residential building project in Wuhan as an example,conduct in-depth analysis.Finally, some solutions to the problems in project time management are put forward.

Key words: Project management; Project time management; Optimization and control; Construction development project.

1 Introduction

For project management, the biggest constraint is time, time management is an important part of project management, while quality management, cost management, scope management and project management are the four constraints in the implementation process of the project, therefore, effective time control is an important guarantee for the project to be completed on schedule. It is the central task of the project manager to ensure that the construction progress is on time. The quality of the project and the cost objective are both the opportunity and the cost, so whether the project can be completed at the scheduled time is also an important factor in the assessment of a successful project manager (Bai Sijun, 2014). Using Gantt chart and the key path analysis method andestablishing a good project time management systemcan greatly improve the management level of the entire project, and also greatly improve the success rate of the project at the same time.The actual project time management work is based on a research carried out before the project, which can help the project manager to scientifically and rationally analyze the project time management situation, and with the scientific project time management method and the implementation of effective project time management, the project manager can achieve the effective control and optimization of project schedule management.It has a very important significance for the construction unit to better adapt to the new situation development needs, to improve market competitiveness, and to avoid the occurrence of delays, and it also has a reference function for other projects.

2 The Concept and Process of Project Time Management

2.1 The concept of project time management

Project Time Management, also known as project schedule management or project duration management, is to ensure that the project can be completed on time to complete a series of management process. In project management, achieving time and cost control is the key to success, and time management is an important step in ensuring that the entire project is successfully implemented within the expected timeframe(Xu Chengji, 2013). A schedule should be developedto strengthen the project time managementand coordination project construction progress, so that it will not deviate from the track of the project,and the project can be completed according to expected durability.

2.2 The main process of project time management

In the project time management theory, the management process is summarized as five aspects: the definition of project activities, activity sequencing, activity time estimation, time schedule and schedule control.

Activity definition. A project activity is defined as a project time management that identifies and defines the activities that are necessary for a project. It is an important part of project time management, including specific activities such as identification, definition, decomposition and documentation of project activities. Its main basis is the project work breakdown structure (WBS), project scope statement, project activity attributes, and it also needs to refer to various historical information and data. In the

implementation of the project, all the activities are listedin a list of activities, and each member is clearly aware of the need to deal with the work. The list of activities should take the form of a document. As the project activity is broken down and refined, the work breakdown structure may need to be modified, which also affects the rest of the project(Wang Liwen et al, 2013). Once the activity definition is complete, the content of the project's work breakdown structure is updated.

Activity sorting. The sequencing of the project activities is to determine the interrelations and dependencies of the activities in the list of project activities, and accordingly make a reasonable arrangement of project time management in the order of the activities of the project. The main basis is the list of project scope, list of project activities and their attributes and milestone list. In the definition of the relationship between the activities of the project the general usedmethodsare node activity method, arrow chart method, conditional diagram, network template and other project management methods, and finally the network mapis completed. One of the more commonly used methods is the node activity method, also known as the priority diagram or single-code network map method.

Estimation of activity durationrefers to what resources (people, equipment or materials) to use when implementing the project activity, the amount of resource used, and the time spent using the resource. This work should be done by the project team who is familiar with the characteristics of the project activity. Therefore, in the estimation of the duration, the activities of the list, a reasonable resource need, the ability of personnel factors and environmental factors on the project duration should be taken into full consideration(Cao Weijun, 2016). The impact of risk factors on the duration should be fully taken into account in the estimation of the duration of each activity. Duration estimates can be made in the following ways: expert review form, simulation estimates, retention time.

Schedule a schedule. Project time management has two core elements, one is the development of the project schedule, the other is the project schedule control, and all the others are providing information and basis for the two cores. The progress of the schedule should be considered in the light of the project network map, estimated activity duration, resource requirements, resource sharing, project implementation calendar, schedule limit, earliest and latest time, risk management plan, and activity characteristics.

Progress Control. The process of progress control is to monitor the progress of the project implementation, andcompare it with the progress of the benchmark plan, if there is a deviation,measures should be takento correct it. Progress control is the primary content of project control, and the soul of the project is mainly to monitor the progress of the implementation of the situation, timely detect and correctthe bias and error. In the control the factors that affect the progress of the project changes, changes in the progress of the project on other parts of the impact of changes in the schedule should be takeninto consideration when taking the actual measures.

3 Application of Project Time Management in Construction Development Project
3.1 Brief introduction of residential building development project of chaoling village in hongshan district, wuhan

The project is located in Zhilingling Village, Zuoling Town, Hongshan District. The total project includes the new 1 # -6 # residential building with a total construction area of 37,901 square meters. The structure is mixed structure, ground 4/5/6 layers. This article only takes Building 1 as an example to discuss. The project started on December 5, 2016, requiring that it should be completed and delivered on March 20, 2018, with time constraints and more uncertainties. The building of the Building 1 project is divided into basic engineering, the main project and ancillary facilities of the three major projects.The project's basic project is divided into construction survey, earth excavation, cutting equipment construction, and bearing platform beam reinforced concrete. The main project is divided into earth backfill, the main project and the main project acceptance and other sub-projects, ancillary facilities into decorative construction, external construction, water supply and drainage, electrical construction and acceptance and so on.

3.2 Construction decomposition structure of construction development project

Work Breakdown Structure (WBS) is the basic basis for the definition of activities, through the use of activities decomposition technology, the work is further broken down into smaller, more control of specific activities, it is the basis for the development of time plans. In the definition of project activities, it is necessary to take full account of the level of detail of the project work breakdown structure and the impact of different levels of details on the definition of project activities(Zhan Xia, 2016). In the work of a project decomposition, what exactly is the more appropriate level of detail? If the decomposition is too

rough, it may be difficult to reflect the entire content of the project; if thedecomposition is too detailed, itwill increase the amount of work to develop plans. This depends largely on the trade-off between the degree of input of the planned work and the purpose to be achieved. Therefore, the details and levels of the project work breakdown structure on which the project activities are defined depend mainly on the following factors:

(1) The level of work responsibilities of project teams or individuals in the project organization and their level of competency, as well as the level of project management and project budget control requirements and the level of management of specific project teams(Xia Ruifeng, Ning Xuanxi, YuMing, 2015). In general, the smaller the division of responsibilities of the project organization and the higher the level of management and budget control, the work breakdown structure of the project needs to be more detailed and hierarchical.

(2) The role of the projector. Different project participants have different requirements for structural decomposition. If the owner requests the overall decomposition of the project task book, the whole process of the project will be included in the scope of decomposition, but often relatively rough, generally only to grasp the top of the several levels; and the contractor must break down the work specified in the contract or the work contracted by their own (engineering), because the contractor's task is to complete the contract work (engineering).Since the contractor has to implement this work by himself,the decomposition has to be smaller, and sometimes the project task (contract) the contractor should complete is only a sub-project, a task, or even a work packagein the owner of the total project decomposition.

(3) The size and complexity of the project.The decomposition level and the unit of large and complex project should naturally be more; otherwise, the decomposition level and unit of small and simple project should be less. However, this does not have a strict boundary, and different areas or industries have different understanding of the size of the project, so it depends on the specific circumstances and requirements of the project.

(4) The degree of risk.For riskierprojects and project units (Such as subprojects, tasks, etc.), such as projects with the use of new technologies, new processes, or the implementation of special circumstances, it should be broken down more detailed, so that the details of the plan can be a thorough analysis of the risk; and for less risky, conventional, technically mature projects, you can break down relatively rough.

According to the above requirements, the work decomposition of the building development project of Building 1, Chaoling Village, Huliang Village, Hongshan District, Wuhan, is formulated, as shown in Table1.

Table 1　Decomposition Structure of Building Development Project of Building 1, Residential Building, Express Village, Hongshan District, Wuhan

Activity Description	Activity Description
1 Construction preparation	8 Pouring pile
2 Pile foundation	8.1 Construction lofting
2.1 Square pile construction	8.2 Protection tube production
2.2 Construction lofting	8.3 Drilling
2.3 Piling up	8.4 Steel works
3 Beam	8.5 Concrete infusion
3.1 Template construction	8.6 Pile head chisel except
3.2 Steel works	9 Site pouring concrete surface layer
3.3 Concrete engineering	9.1 Template works
4 Longitudinal beam	9.2 Steel works
4.1 Template works	9.3 Concrete engineering
4.2 Steel works	10 Exterior construction
4.3 Concrete engineering	10.1 Support the shelves erection
4.4 Installation of stringer	10.2 Template works
5 Concrete slabs	10.3 Steel works
5.1 Template works	10.4 Concrete engineering
5.2 Steel works	11 Clipping
5.3 Concrete engineering	11.1 Template works

Continual Table 1

Activity Description	Activity Description
5.4 Installation of concrete slabs	11.2 Steel works
6 Concrete surface layer	11.3 Concrete engineering
6.1 Template works	12 Power supply system
6.2 Steel works	12.1 Cable bracket
6.3 Concrete engineering	12.2 Cable laying
7 Exterior construction	12.3 Distribution box
7.1 Template works	13 Water supply and drainage system
7.2 Steel works	13.1 Water supply pipeline laying
7.3 Concrete engineering	14 Acceptance of qualified

3.3 Activity sequencing and time planning for construction development projects

For theconstruction activities of Building 1, Residential Building, Cheong Leng Village, Hongshan District, Wuhan, the activities necessary to complete the project are given in the form of a working breakdown table, and these activities must be carried out in a certain order in actual executionprogress. One of the important reasons is that some of the activities must be carried out after the completion of certain activities, so the next work is to sort the activities of the work.

Activity sorting is to identify the activities of each of the activities in Table1, and the order of the activities is arranged and determined accordingly. It can be seen that the sorting of activities must first identify the dependencies between the activities, which depends on the existence of the unmodifiablelogical relationship between the activities themselves, and some are determined according to the need(Xu Yuan, 2016). In general, to determine the relationship between the activities sequencing and activities, the logical relationship between different work should be analyzed first, and then determine the artificial relationship between activities on the basis of the logical relationship.Among them, the main contents of the activities sequencing are:

3.3.1 Thedetermination of the objective existed logic relationship

This is the basis for the sort of activity. The determination of the objective existed logic relationshipis mainly based on the project process, technology, spatial relations and other factors, so it isclearer, and relatively easy to determine.

3.3.2 The determination of a variable logical relationship

Due to the arbitrariness of such activities, the results will directly affect the overall level of the schedule. The determination of such activities is more difficult and needs to be determined through the process of analysis, research, comparison and optimization. Variable logical relationships are critical to the successful implementation of the project.

3.3.3 Determination of external control relationship

There is usually a certain impact between the project work and the project work, so in the process of project planning, some of the constraints and impact of the external work on the project work should be taken into account, so as to grasp the development of the project.

3.3.4 Restrictions and assumptions in the implementation process

In order to develop a practical schedule, consideration should be given to possible restrictions on project implementation, and take into account the assumptions on which project planning is dependent(LuoXun, Zhang Shuling, Chen Xin, 2015). The logical relationship between the activities of the building development project of the residential building in the project is not clear, but these factors do not affect the order of the activities of the project. The logical relationship between the main activities of the construction project is shown in Table2.

Table 2　Logical relationship between building development project activities of Building 1, Shiling Village, Huliang Village, Hongshan District, Wuhan

Activity number	Activity Description	Immediately work
1	Construction preparation	None
2	Square pile order (prefabricated)	1
3	Piling up	2
4	Measured at present	3
5	Prefabricated longitudinal beam	1
6	Install the stringer	5
7	Panel prefabricated	1

Continual Table 2

Activity number	Activity Description	Immediately work
8	Installation panel	7
9	Cast-in-place	8
10	Exterior construction	1
11	Distribution System	10
12	Water supply and drainage system	11
13	Clipping	9、12
14	Completion acceptance	13

Based on the logical relationship between the above activities, the time plan network of the building development project of Building 1, Building, Chaoling Village, Hongshan District, Wuhan, is shown in Figure 1 and Table 3.
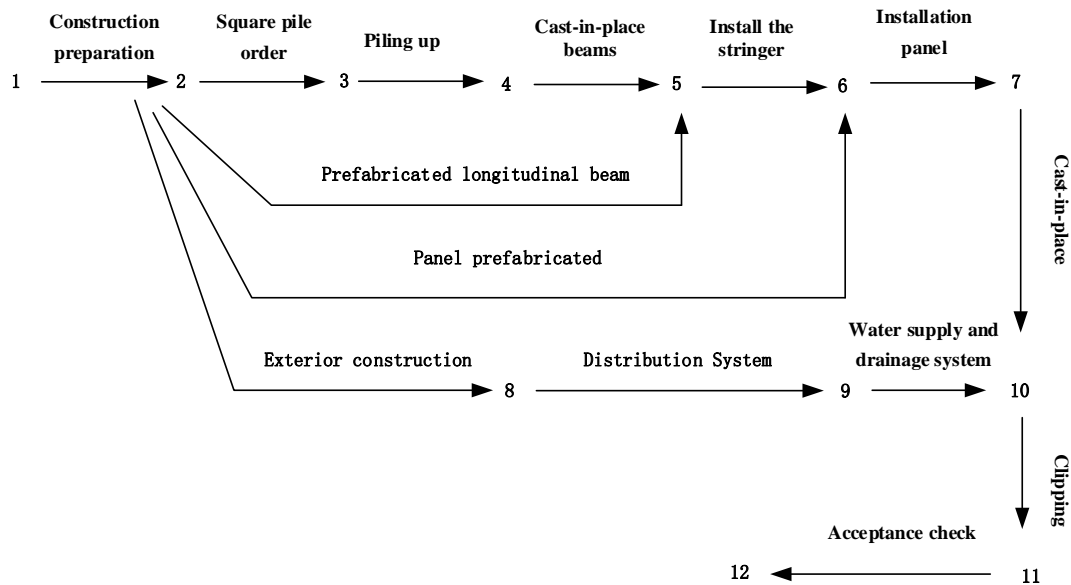
Figure 1   Time Plan of Building Development Project of Block 1, Residential Building, Express Village, Hongshan District, Wuhan

Table 3   Time Plan for Building Development Project of Block 1, Residential Building, Express Village, Hongshan District, Wuhan

Activity number	Activity Description	Expected completion time (days)
1	Construction preparation	12
2	Square pile order (prefabricated)	90
3	Piling up	54
4	Measured at present	90
5	Prefabricated longitudinal beam	105
6	Install the stringer	30
7	Panel prefabricated	90
8	Installation panel	45
9	Cast-in-place	48
10	Exterior construction	135
11	Distribution System	75
12	Water supply and drainage system	30
13	Clipping	9
14	Completion acceptance	3

3.4 Building development project time control

3.4.1 Organization guarantee in construction preparation stage

First of all is to establish and improve the project organization system.

(1) To establish project management agencies suit the project characteristics as soon as possible, so that personnel at all levels can get into the roleas soon as possible to ensure that the decomposition of the construction tasks to be implementedas soon as possible.

(2) To organize constructionaccording to the project law, and give full play to theadvantages ofoptimal allocation of resources and dynamic management.

(3) The main management and technical personnel of the project department are composed of people with rich experience in construction. Project manager, project chief engineer and chief economistform the decision-making layer of the project, and the relevant personnelmaintain stability in the entire construction process from the tender stage to the end(QiaoYuanxing, 2016).

(4) Intensive management is carried out in the construction operation layer to give full play to the technical advantages of each unit and sub-unit.

(5) According to the nature and characteristics of the project, the construction operation layer is the main construction team of the project manager, which has been engaged in the comprehensive municipal engineering, road engineering and basic construction tasks, and given full play to the construction advantages to ensure that the implementation of the construction tasks in a compact and orderly manner.

The second is to carry out and complete the construction work ahead of schedule.

(1) Speed up the deployment of resources to ensure that personnel, machinery, equipment and the necessary materialsare in place in a timely manner.

(2) To complete the temporary facilities in the fastest speed, so as to provide a good conditionfor carrying out of the project.

(3) To Make up the implementation plan of each sub-department and sub-project as soon as possible,and timely submit the plan to the owners and supervision for approval, so that the project can meet the construction condition as soon as possible.

(4) Combined with the actual project, make the specific measures and methods of project management and quality assurance to achieve standardized management and lay the foundation for the smooth implementation of the project.

3.4.2 Organization guarantee during construction process

First is to realizeinformation management, make timely adjustment of the duration plan and resource allocation, and useproject management software to prepare the overall construction schedule. On this basis, make "month and week" construction schedule and the construction schedule of each sub-department and sub-project, in the plan implementation process, timely collect construction information and process and analyze the data with software, timely adjust theschedule and resource allocationaccording to the results to ensure the duration.

Secondly, strengthen the business system responsibilities and strict implementthe job responsibility system. To strengthen the responsibility of the business system, strict implement the post responsibility system, allocate the construction task to each individual toensure that all job responsibilities cover all aspects of project construction, no gaps, no overlap, so as to ensure the realization of the target duration through the quality of human work.

Finally, is to strict implement the site conference system

(1) Daily work meeting of each team will be held to sum up the completion of the plan on that day and arrange the next day's work plan, the work meeting should be hosted by the technical director, and the team captain should be present. According to the situation in the scene, temporary coordinated meeting should be held to strengthen the scene command and dispatch work, so that the project can maintain a normal and orderly construction.

(2) Take the initiative to strengthen therelationship with theowners and supervisors and other relevant departments, hold regularmeeting with the participation of the owners, supervision, design and construction units every week, the meeting will summarize the progress of the project on that week and make next week's work plan, discuss the problems demanding prompt solution and develop appropriate measures to ensure the smooth implementation of the next step.

(3) Timely organizesub-items and sub-project to conduct acceptanceinspection. To organize the acceptance inspection of the completed sub-items and sub-projects, especially the hidden projects in time, to ensure that the next step can start in time.

(4) To develop and strengthen the finished product protection measures.To develop and strengthen the finished product protection measures to ensure that no project delay is caused in the construction

process because of the rework or repair of the damaged finished or semi-finished products cause by human factors.

3.4.3 Construction plan guarantee

First is to prepare the project schedule.

(1) To make the overall construction schedule control plan according to the general principles of construction, and to divide the construction section to form an effective parallel construction and orderly flow of operations in accordance with the project, engineering, construction conditions and the proposed construction technology, the personnel, machinery and equipment to be put into construction, etc.

(2) In the construction schedule control plan, the division plan and the sub-project construction plan must be decomposed, and the logic relationship of each project and each process should be analyzed according to the decomposition plan, the key line construction period should be determined, the resources should be rationally configured and scientifically used, and thus by ensuring the realization of key line duration, to ultimately ensure the realization of the total duration.

Second is the preparation of material purchase plan.

(1) One-time preparation plan: After receiving the construction drawings, immediately organize the technical and relevant personnel to carry out the drawings review, and timely contact with the design unit to clarify the problem of the drawings, make timely preparation of a one-time preparation plan and submit it to material sector, so that the material department can master what are the materials the project required and the time they need to be on the site, only in that way, they can ensure that all kinds of materials can becontacted, ordered and reserved in advance to avoid the time waste of waiting for thematerials in the construction process.

(2) Plans and Pursuit Plans. Based on the monthly construction schedule, it is advisable to provide materials plan to the materials department on a regular basis. At the same time, according to the adjustment of the project plan of that month, a backup plan on the required materials should be made, so that material procurement can be targeted to ensure that the monthly plan to be achieved on schedule.

(3) Prepare the funds use plan. According to the overall construction schedule, the quarterly and monthly funds expense is required to be estimated, and the using plan should be prepared to ensure that the project advance payment and the settlement money of the project can be a reasonably used, to ensure that the overall progress be finished on schedule.

3.4.4 Construction technology assurance

Technically, according to the progress plan requirements, the technical staff should make construction program, technical exchange, and preparation plan as soon as possible, and actively adopt new technique and new technology to improve labor productivity. As for engineering, the work that can be done with machinery should not be constructed by hand and reasonable arrange the process of convergence and insertion, to reduce the intermittent time between processes, realize orderly and reasonable flow construction, control the construction pace, adjust the labor time to prevent the pause in the process to shorten the duration, and to achieve schedule goal.

(1) Earnestly check the maps, make in-depth investigation of the situation on the spot, and make feasible technical disclosure according to the actual situation. As for the focused and difficulties of the project, develop a reasonable construction program, finish the preparatory work in advance, and make effective technical assurance measures.

(2) To determine a reasonable construction process, organize the cross-construction of the process, make full use of the face parallel construction, speed up the construction speed and shorten the effective duration.

(3) Combined with the project schedule, prepare detailed material use plan to ensure that the material supply can meet the construction needs.

(4) Resolutely implement the "three seized" systemin the construction progress, to ensure that the quality of a qualified acceptance, to avoid rework.

4 Conclusion

In short, project management, especially project time management, is critical to the smooth implementation of a project. To ensure the long-term success of the enterprise, and put the essence of project time management and the mode of solving the problem by thinking deeply into the awareness of all employees, a comprehensive project time management system is needed (Zhou Peng, 2016). The promotion of the concept of time management needs the support of high and middle leaders to ensure that sufficient resources can be provided to implement the improvement project to ensure that the project

objectives is in line with the enterprise's development strategy, to ensure the significance and importance of implementation of the project, andto ensure the success of the project.

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Analysis and Implementation of Supermarket Management System

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Abstract: Supermarkets serve a wide range of consumers, satisfy the diversification of individual and family consumption requirements in small quantities. Traditional management methods are inefficient, in the meantime, data cannot be statistically analyzed in a timely manner. Therefore, it is important to associate computers to establish an efficient supermarket business management system.The system helps managers to manage procurement, sales, inventory, coordinate different links as well as improve the utilization of funds. User management, merchandise management, and sales management are essential functions of the supermarket management system.After a thorough analysis of the system requirements, this system is designed with C++ and database technology to achieve the basic functions required for supermarket management, while contains testing and maintaining functions.
Key words: Supermarket; Management; System; C++; Database

1 Introduction

1.1 Background and significance of the research

The knowledge of marketing has been fully applied in the supermarket management system. Successful managers do well in using marketing strategies to direct business operations in a market economy. At the same time, the progress of science and technology has led to the increase of social products, the expansion of the consumption demand, the enhancement of the status of the middleman and the improvement of the awareness of the consumers' rights, which have promoted the progress of marketing. From application to transformation to modernization, marketing is constantly innovating, enriching and enriching.

Supermarkets connect production and consumption, so they play an increasingly significant role in our daily life. With the rapid development of the economy, the types of commodities sold by supermarkets have been continuously enriched, the scale of operations has been constantly expanding, and their operation and management have also become more complicated due to complex and ever-changing market changes. The early forms of labor are gradually being taken place by new technologies (Long Zhenhua, 2015).The management system is the result of these enhancements. It combines the basic hardware and various software of the computer(Zhou Lijuan,2016).It uses the models that can analyze and make decisions to provide information,with which the basic functions of the enterprise such as decision-making, planning and control have been effectively implemented. In addition, it improves the company's management capabilities(Wang Wei, 2015).

1.2 Domestic and foreign research status

The rapid development of PCs has gradually modernized the management system of foreign supermarkets. Under the fierce competition and baptism of foreign supermarkets, small and medium-sized supermarkets have gradually grown and developed, and they have also formed a set of exclusive system operations, which led to a series of formations and high-end information technology during this period, such as Electronic Ordering System (EOS), Electronic Funds Transfer System (EF), Electronic Data Interchange (EDD), Barcode Identification System and Point of Sale Management (POS).

Information management has been widely used in various industries in the United States and European countries (N Avouris,A Dimitracopoulou,V Komis,2003).The development of the industry is very rapid, and the pace of informatization is getting faster and faster (RichardJ. Burkhard, TimothyR. Hill, Shailaja Venkatsubramanyan, 2011). Today's technology has the capacity to develop corresponding software for different needs and make these independent modules easily related to each other(Gerald Post, Albert Kagan, 2001). Because of these important modules, which are independent and can serve the whole system, cover various aspects of the operation of supermarkets, they provide practical, systematic and integrated services for daily management and normal operation of supermarkets,also they effectively help to achieve effective management tools and supply a convenient platform(G Al-Hudhud,2015).

Although the development of supermarkets in China lags behind the developed countries.As the rapid economic development, continuous innovation in science and technology, various means of

payment become more and more convenient, and the combination of artificial and intelligent management models is particularly important recently. Different supermarkets concentrate to design a management system that meets its own conditions now.

2 Systems Analysis

System analysis is the leading link in system design. System analysis starts from requirements and feasibility. After analysis, it will summarize what specific functions and the system will eventually achieve system design.

2.1 System requirement analysis

In the development process of the management information system, the core link is to analyze the requirements of the designed system. This requires some preparatory activities. After a detailed, comprehensive and complete system investigation, the analysis was started, and then the basic logic design of the system was completed on this basis.On the basis of the previous work, the strategic objectives and the established requirements after the analysis are first identified in the system, and the problems that may exist in the system will be studied thoroughly and thoroughly, and the necessity of these objectives and requirements should be clearly defined.The main content of the system investigation is the system management business and the internal data flow of the system. The ultimate goal of the analysis is to propose a logical design scheme for the system.

2.2 Analysis of the basic function of the system

After a detailed understanding of the current system organization structure and work tasks, the overall planning of the supermarket management system is combined.Finally, the system should satisfy the entire department store business information flow, and computer management and meet the requirements of social development. The system is divided into four modules, which need the functions that the system can achieve. The specific requirements should include six aspects as follows:

(1) Setting up the landing interface (which can be registered). Different users have different permissions and can manage users.(2) Purchase of goods and daily settlement can be done.(3)Managers can view sales and basic information about goods.(4)When you manage goods, you can check the quantity and price. In addition, it can also add and delete operations and check the date of purchase.(5)The inventory can be checked, so the manager can make the next stage plan accordingly.(6)For purchasing operations, you can check the supplier and purchase date.

3 Technical Foundation of System Development

The Visual Studio is developed by Microsoft Corp covers a variety of development tools. Among them, the UML tools and related code control tools are applied to the whole software life cycle.

SQL Serve:The SQL Server database management system is relational, with good scalability, and a high degree of integration with related programming or other software (Li Xinlan, Gu Hongen,2011).

4 Detailed Design of the System

4.1 Overall design of the system

The overall structure diagram is shown in Figure 1.
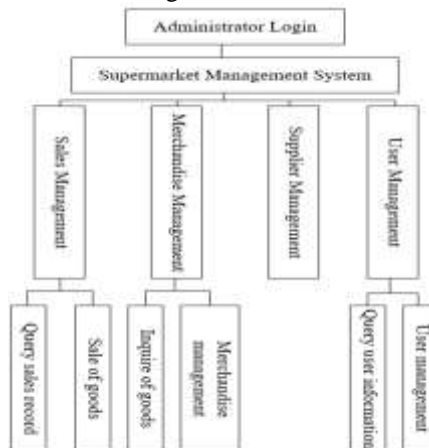
Figure 1   Overall Structure Block Diagram of The System

4.2 Database design

According to the data analysis obtained by system analysis, the conceptual design of database is carried out. Based on the top-down analysis of DB demand in department store system, this paper gradually describes the conceptual structure from the bottom up with the E-R model(Li Tao,Yang Zhouli,2015). E-R is entity link, which effectively describes the links between real world databases, but more importantly, it transforms E-R into relational framework(Shi Yufang, Luo Rong, 2015).

According to the needs of department store management system, this paper has set up information records about supermarket business, sales, commodities, suppliers and orders.Take Commodity information record table for example.

Table 1   Commodity Information Record Table

Field Name	Data Type	Primary/Foreign key	Allow to be empty	Remarks
Name	VARCHAR	Primary	NO	
Price	Float		NO	
Discount	VARCHAR		NO	
Num	Int		NO	

4.3 Each module design

After the design of the overall structure of the system and the interface of the system, it is the detailed program design for the different small modules after the system is divided.

The sale of goods is mainly used for users to purchase existing commodities. The sale of goods is the key to the whole procedure. It involves calling between different data tables and accumulating total sales volume by function. The basic program flow chart of the purchase of goods is as shown in Figure2.
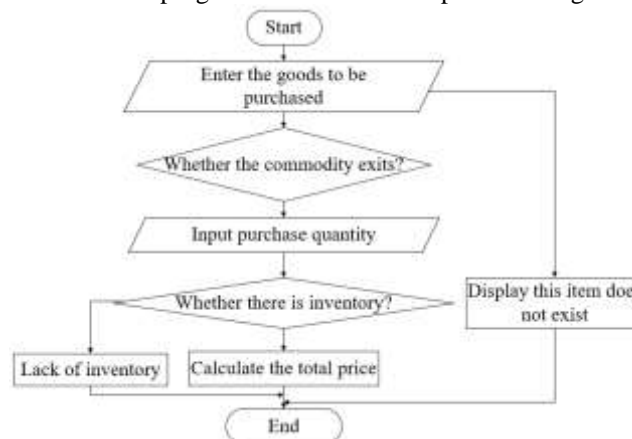
Figure 2   Product Sales Flow Diagram

4.4 Key program design

After the logical and physical model is clarified, the system design is to use MFC and combine the previously designed database to achieve each specific function.

How to use ADO objects for programming is described in detail below.

(1)The first is to introduce ADO library files.

(2)Initialize the ADO environment.

(3)Interface Introduction.

There are some interfaces in ADO: _ConnectionPtr, _CommandPtr, and _RecordsetPtr.

In order to conveniently return the recordset or null pointer directly, the _ConnectionPtr interface is used.There are some methods in the recordset of the _CommandPtr interface to execute the returned stored procedures and SQL statements. _RecordsetPtr provides some control functions for the recordset.

(4) Use ADO to access the database.

The ConnectionPtr interface is used to connect. First, it creates a working instance of the ConnectionPtr interface and then points to and opens an ODBC data source or OLE DB data provider.

5 Conclusion

Through the comprehensive analysis of the current market and technology, it is of great significance to design a universally applicable supermarket management system. Before designing, it is

necessary to have a basic understanding of the principles of management in order to have the correct logic, especially to have a comprehensive understanding of the basic operations of the supermarket.

Programming is the key to this design of the system. The supermarket must not only have a friendly user interface, but also have a strong database. The C++ is used in program design. The related technologies of MFC have a deep understanding of its message mechanism, which helps to design a system interface that is easy to manage. At the same time, the connection between the database and the application program is the key to the system design because the system It is the effective processing of unused data.

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Analysis and Optimization of Service Cashier System Based on Queuing Theory

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Abstract: How to decide the numbers of opening cashier desks based on the numbers of consumers and the capacities of cashiers is a big problem needed to be solved in retailing industries. Taking the queuing system of a supermarket service industry as the research object, the theory of queuing theory has been used to study the queuing phenomenon, $M/M/1/\infty/\infty$ model for different periods of time to meet different waiting time optimization have also been adopted, then the optimization model of the cashier queuing system has been established, the problem of cost and opportunity has been solved preferably.
Key words: Service cashier; Queuing theory; Queuing model; Analysis and optimization

1 Introduction

Queuing phenomenon is that the members which need to be severed are more than the service agency can hold in line. This phenomenon can often be seen in supermarket, shopping mall, hospital, cinema, canteen and so on. One of them, supermarket is not only a typical serve retailing industry, but also a place where shopping is gathered. Queuing phenomenon sometimes results from lots of consumers and absence of opening cashier desks. And a small amount of consumers in some time make ample cashier desks become idle. So how to decide the numbers of opening cashier desks based on the numbers of consumers and the capacities of cashiers is a big problem needed to be solved in retailing industries. Therefore, studying this problem by using queuing theory takes on some practical significance.

2 Queuing Model

Queuing theory which is an important branch of Operations Research is a scientific way of mainly researching the crowding phenomenon resulted from random factors. Queuing theory can be applied into these areas of the nature of public serve arising crowding phenomenon. The queuing process model is shown in Figure1:
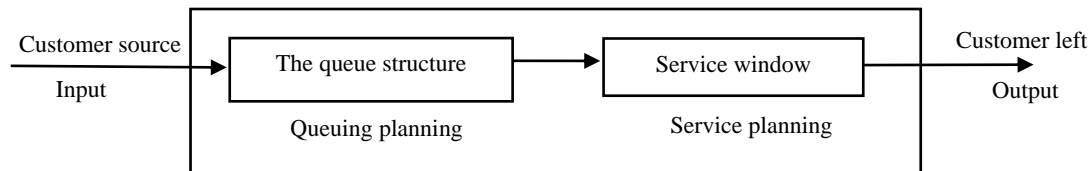
Figure 1   Queuing Process Model

According to the amount of ashier desks and arriving distribution of consumers, common queuing can be classified into single-serve and muti-serve Poisson arriving, negative index service time, random service time and fixed service time models[Liu Liwen,2006].

In classical queuing system, using 3 or 5 English alphabet partitioned by "/" to define some queuing system. For example, in $A/B/C/D/E$, A is the type of input distribution, B is the distribution type of service time, C is the number of service desks, D is the system capacity, and E is the amount of customers. $M/M/1/\infty/\infty$ is a queuing system whose input process is Poisson flow, time is negative index distribution, C service desks are in parallel service, the system capacity and the numbers of customers is innumerable.

There are six performance index to describe queuing system (1) load level of system ρ ; (2) idle probability of system P_0 ; (3) the length of line: L_s is average value; (4) the length of queue: L_g is average value; (5) sojourn time: the time of a consumer staying in line, its average value marked as W_s ; (6) waiting time: its average value marked as W_g .

3 Analysis of Cash Register System

　　Queuing system of service industry including supermarket and shopping mall is extremely different from queuing phenomenon of production process, because its face to customer directly. Its quality have very close relationship with the satisfaction of customers and has decisive impact on economic benefits of supermarket and shopping mall.

　　The problem of queuing for server is how to control the cost of operating including the number of service desks and staffs. The more service desks are the bigger operating cost is. However, the less service desks are, the longer time consumers wait. There is an extremely close relationship between satisfaction of customers and their shopping degree. Above all make up opportunity cost.

　　Therefore, supermarket and shopping mall should try their best to shorten the consumers' waiting time and the length of queuing, improve satisfaction of consumers. Only this, supermarket and shopping mall can attract more consumers.

4 Example of Queuing System

　　This research takes a supermarket as an example and analyses its queuing system of cashier desks except on festivals.

4.1 Distribution of cashier desks

　　This supermarket has 40 cashier desks: number 1-5, number 7-20, number 6 and number 21-40, which are shown in figure 2. Number 6 is the path of mobile payment. Others paths have same function which can be paid in cash, bank card and shopping card.
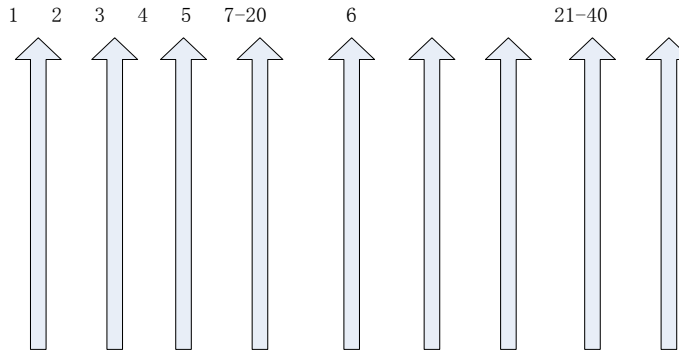
Figure 2　Cashier Layout

4.2 Data Processing

　　There are two scheduling for arraigning the work of cashier: morning shift (7:30-14:30) and afternoon shift (14:30-21:30). According to the three segments of morning, afternoon and evening, the data can be handled by three time segments(9:00—11:00，14:00—16:00，18:00—20:00).

4.2.1 Arrival situation of consumers

　　Due to random coming of customers, so a continuous statistic is made for consumers arriving at one random cashier at each of 3 periods when counting the arrival time of consumers in the cashier desk in one hour. One of them, the data of consumers' arrival time in one continuous hour in 9:00-11:00 shown in Table 1:

Table 1　Customer Arrival Data Sheet

Customer code	Arrival time	Arrival interval	Customer code	Arrival time	Arrival interval
1	00:00:00	76	28	00:30:02	71
2	00:01:16	71	29	00:31:13	74
3	00:02:27	77	30	00:32:27	70
4	00:03:44	72	31	00:33:27	62
5	00:04:57	77	32	00:34:39	66
6	00:06:14	67	33	00:35:45	73
7	00:07:21	74	34	00:36:58	75

Customer code	Arrival time	Arrival interval	Customer code	Arrival time	Arrival interval
8	00:08:35	73	35	00:38:13	68
9	00:09:48	64	36	00:39:21	69
10	00:10:52	66	37	00:40:30	70
11	00:11:58	68	38	00:41:40	66
12	00:13:06	74	39	00:42:46	60
13	00:14:20	77	40	00:43:46	75
14	00:15:37	76	41	00:45:01	66
15	00:16:53	70	42	00:46:07	71
16	00:18:03	56	43	00:47:18	77
17	00:18:59	79	44	00:48:35	72
18	00:20:18	44	45	00:49:47	73
19	00:21:02	45	46	00:51:00	70
20	00:21:47	73	47	00:52:10	69
21	00:23:00	48	48	00:53:19	72
22	00:23:48	43	49	00:54:31	79
23	00:24:31	55	50	00:55:50	72
24	00:25:26	67	51	00:57:02	76
25	00:26:33	69	52	00:58:56	70
26	00:27:42	66	53	01:00:06	73
27	00:28:48	74			

By this way, consumers, arrival rate in three time segments of one cashier desk can be counted, which is shown in Table 2:

Table 2   Customer Arrival Rate Sheet

Time periods	Average arrival rate λ（Person / hour）	Checkout counter
9:00—11:00	52.912	14
14:00—16:00	58.797	14
18:00—20:00	55.984	14

4.2.2 Service time of consumers

Due to the full experience of cashiers, the difference of their service speed can be neglected when counting their service time. The length of service time depends on consumers because different consumers have different taste on the number of products, mode of payment and package[Cai Wenjing,2013]. Therefore, 24 groups, 24 groups and 30 groups data of consumers' service hours were calculated respectively in the morning, afternoon and evening.

The results are as follows：

Average service rate of each cashier desk in first time period： $\mu_1 = 61.121$ （person/hour）

Average service rate of each cashier desk in second time period： $\mu_2 = 60.742$ （person/hour）

Average service rate of each cashier desk in third time period： $\mu_3 = 59.178$ （person/hour）

Average service rate of each cashier desk ： $\mu = 60.714$ （person/hour）

4.2.3 Waiting time accepted by consumers

Consumers will lose patience and decrease their degree of satisfaction if waiting time is much too long. So the waiting time and the length of line which can be accepted by consumers should be learned. In this paper, the result about this question is attained after randomly interviewing for 60 consumers,

shown in Table 3:

Table 3   Customer Acceptable Waiting Schedule

Waiting time	5 minutes or less	5-8 minutes	8-10 minutes	10 minutes or more
Number of people	18	32	8	2
The length of the queue	5 people or less	5-10 people	10 people or more	
Number of people	21	34	5	

According to table 3, we can conclude that the average waiting time which can be accepted by consumers excepted on festivals is 6.5 minutes and the average waiting length of line accepted by consumers is 7.0003.

5 Determining Model of Cashier Queuing System

Throughout above analyzing, we can know that cashier queuing system in supermarket is a random service system because of random nature of consumers' arrival time and cashiers' service.

A queuing model about cashier system in supermarket can be defined by analyzing its input process, queuing rules and service agency.

Passenger origin can be viewed continuous because consumer's arriving is random and mutually independent. The reason why consumer's arriving is random and mutually independent is that the probability of two consumers synchronously arrive same cashier desk is very low.

The rule in supermarket's queuing system is First-Come-First-Served. When one consumer arrive at one free cashier desk, he or she will be served right now. Once there are no free cashier desks, consumer will look for the shortest line which also is the nearest line from oneself.

The system's service for consumer is one by one. Assuming that the service capabilities of every cashier desk in one period is fixed.

Assuming that the arrival situation of consumer is Poisson flow and service time is presenting negative -index distribution. The system can be regarded as n $M/M/1/\infty/\infty$ single service desks' queuing system because consumer may not move into the shortest line and merely change this shorter line once they make their decision.

In $M/M/1/\infty/\infty$ queuing model, all indexes are as follows:

(1)Service intensity in this system: $\rho = \lambda / \mu$

(2)Average number of consumers in queuing: $L_q = \lambda^2 / \mu(\mu - \lambda)$

(3)Average number of consumers in system: $L_s = \lambda / (\mu - \lambda)$

(4)Average waiting time of consumers in queuing: $W_q = \lambda / \mu(\mu - \lambda)$

(5)Average waiting time of consumers in system: $W_s = 1 / (\mu - \lambda)$

(6)The probability of n consumers in system: $P_n = (\lambda / \mu)^n P_0; P_0 = 1 - \lambda / \mu$

6 Analysis and Optimization of Queuing System

6.1 Analyzing indexes in system

According to each index in $M/M/1/\infty/\infty$ queuing model, data of index in three periods have been calculated, which is shown in Table 4:

Table 4   Various Index Table

Time periods	Service intensity (ρ)	The average number of queuing (L_q)	Average number of customers (L_s)	Average waiting time(W_q)	Average length of stay(W_s)
9:00—11:00	0.8657	5.5800	6.4456	6.3273	7.3091
14:00—16:00	0.9680	29.2618	30.2298	29.8605	30.8483
18:00—20:00	0.9460	16.5818	17.5279	17.7713	18.7852

According to above data, service intensity of this system is less than 1. As a whole, this system is

stable. In addition, the average consumers and average waiting time can satisfy consumers' demands in first period. But largish service intensity results in largish average consumers and waiting time in the second and third period, which is more than average consumers and waiting time, beyond the average waiting time 6.5 minutes and average waiting length 7.003 which is accepted by consumers expect on holidays. The best numbers of cashier desk should have following characteristics:

(1)System is in a state of statistical balance；

(2)Customer waiting time is less than the longest time which consumers can accept；

(3)Customer waiting length is less than the longest waiting length which consumers can accept.

6.2 Optimizing of queuing system

First, adding cashier desks one by one in 14:00-16:00, then calculating indexes, showed in Table 5:

When n=15

Average arrive rate of every cashier desk: $\lambda = 58.797 \times 14 / 15 = 54.877$ （person/hour）

When n=16

Average arrive rate of every cashier desk: $\lambda = 58.797 \times 14 / 16 = 51.447$ （person/hour）

When n=17

Average arrive rate of every cashier desk: $\lambda = 58.797 \times 14 / 17 = 48.421$ （person/hour）

Average service rate of every cashier desk：$\mu = 61.121$ （person/hour）

Table 5　Optimized Various Index Table

Number of service stations	Service intensity (ρ)	The average number of queuing (L_q)	Average number of customers (L_s)	Average waiting time(W_q)	Average length of stay(W_s)
15	0.8978	7.8912	8.7891	8.6279	9.6095
16	0.8417	4.4766	5.3183	5.2208	6.2024
17	0.7922	3.0205	3.8127	3.7428	4.7244

According to table 5, all five indexes including the length, waiting time, service intensity and so on are decreasing. This means that the free rate of system$(P_0 = 1 - \rho)$ is increasing. Service industry should down its cost when ensuring the satisfaction degree of consumers. Therefore, choosing open 16 cashier desk is reasonable in this time period.

Similarly, adding cashier desks one by one in 18:00-20:00, calculating each index, which shown in table 6:

Table 6　Optimized Various Index Table

Number of service stations	Service intensity (ρ)	The average number of queuing (L_q)	Average number of customers (L_s)	Average waiting time(W_q)	Average length of stay(W_s)
15	0.8830	6.6614	7.5440	7.6488	8.6627
16	0.8278	3.9785	4.8063	4.8731	5.8870

Therefore, choosing open 16 cashier desks is reasonable in this time period.

According above analysis, data deviations and optimized results in this paper can be acquired as follows:

(1)Data deviations: data collected randomly exists on some deviations when applied into all cashier desks. What's more, this model is not absolutely $M / M / 1 / \infty / \infty$ queuing model which has some deviations. In fact, the number of queuing in supermarket is not more than 10 people when 14 cashier desks are available. However, the results calculated are more than 10, so there are some deviations in the data processing.

(2)Optimized results: the final optimized results are that 14,16,16 cashier desks opened respectively in the three period are reasonable. However, considering the two scheduling for arraiging the work of cashier in current supermarket, the number of cashier desks should arrange 14 in morning and 16 in afternoon expect on holidays.

7 Conclusion

This paper handling a single-to-many queuing system in cashier desks based on some assumptions.

Through focusing on three indexes such as system balance, consumers' waiting time and waiting length, an optimized queuing system of cashier about one supermarket has been built. Finally, a queuing system which can not only make consumers achieving satisfaction but also make supermarket reducing its service cost by optimizing all indexes has been gotten. Furthermore, classifying consumers into different groups based on the number of goods and the way of payment will make the function of cashier desks more diversified when designing cashier desks.

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University Library User Knowledge Management and Service Innovation under the Network Environment

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Abstract: Innovation is an eternal theme of library service, and users are the final determinants of service innovation. University library under the network environment has a huge number of tacit knowledge about users. This user knowledge can be effectively managed and systematically accessed and by mining users demand rule and trend, habits and preferences, user behavior characteristics and patterns of user knowledge, modern network technology can provide strong support for library network initiative push service, library network service cross-border cooperation, library network dynamic tracking services and other innovation service modes.
Key words: Network; User knowledge management; University library; Knowledge services; Innovation

1 Introduction

At present, university library is still in its primary stage at user knowledge management, although the library has made a great effort in the management of user knowledge, but due to lack of user-oriented positioning and related research, user knowledge has not been fully utilized in university libraries. On the other hand, users of university library are mainly teachers and students. They are carrying out knowledge dissemination and innovation activities every day, their demands for library resources and utilizations are much higher than the average users. In the process of using library knowledge information, many unique insights will be formed and new valuable knowledge will be created. This knowledge becomes the external knowledge resource foundation of university library user knowledge management. The large capacity knowledge database formed by the combination of internal and external knowledge resources provides a rich content foundation for university library user knowledge management and innovative service based on user knowledge management.

2 Basic of Knowledge Management in Network Environment

Library user knowledge management refers to starting from the user requirements, effectively manage the source, features and use value of user knowledge, integrating user knowledge and internal university library knowledge, provide efficient information products and services to improve library management efficiency and realize user satisfaction. User knowledge includes explicit knowledge and tacit knowledge, while explicit knowledge includes proactive requirements information, user browsing behavior, and logs access, etc. Tacit knowledge is the potential demand that users do not express and do not realize. User knowledge analysis is a process of analyzing the inferred users' potential needs through the mining of existing user demand information and access behaviors. Then the trend of user demand change is predicted and at the same time user association analysis and user clustering are realized through user knowledge mining.This process not only requires advanced mining techniques, but also the subjective experience and judgment of subject librarians and user analysis librarians.

Information network technology provides technical support for university library user knowledge management. The user knowledge management of university library knowledge involves collection, organization, development, storage and transmission, and other management activities, which requires use of a series of advanced information network technology and tools, such as data warehouse technology, intelligent learning techniques, knowledge mining, knowledge navigation technology, etc. With the support and cooperation of these technologies, user knowledge management can be realized.

2.1 Network knowledge service and interactive system

Network knowledge service and the interactive system is one of the important means of knowledge management and It reflects the library's ability to utilize and transfer knowledge to users by using the information network platform, as well as the efficiency and effect of transferring knowledge. The realization of knowledge service is that users interacts with the system and with functional modules within the system to improve and provide knowledge service products in real time. It's essentially an interactive process consisting of multiple interaction steps, including multi-step interaction, single-step interaction and other forms. User can use knowledge service and interactive system to retrieve

knowledge, conduct BBS, discuss and communicate with community, and obtain online answers from librarians. The comprehensive, systematic, authoritative, responsive speed and humanized interface of the knowledge reflect the effect of the knowledge service and interaction system.

2.2 Intelligent user knowledge management system

The intelligent user knowledge management system uses the user-centered database decision support system, takes the intelligent user knowledge base system as the support and bridge, and integrates multiple channels and users to conduct extensive exchanges, learning and cooperation, so as to achieve the common development with users. Intelligent user knowledge management system can recognize the user's personalized needs of knowledge, send the required knowledge to the user actively and timely, realize the library and user interaction and knowledge in the best matching between individuals. A large amount of user knowledge stored in the knowledge database can be deeply analyzed through summarization, classification, clustering, association and other ways. On the basis of this analysis, we can perform a user demand forecast, put forward scheme of trend analysis and services, generate the library work plans, proposals, and even automatically contact between librarians and users, intelligently coordinate operation of each section of the library business process.
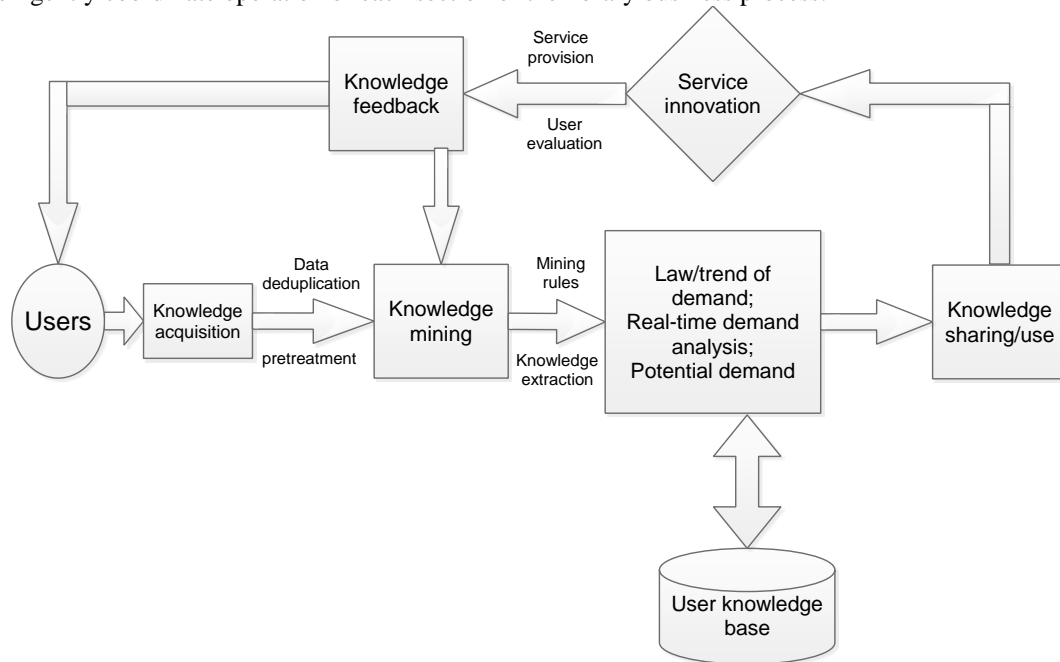
Figure 1   User Knowledge Management Process for Service-oriented Innovation

3 Analysis of User Knowledge Management Process

Knowledge management of users in university libraries is a continuous process. From userknowledge acquisition, knowledge sharing to knowledge feedback and evaluation, a complete operation mode of management system has been formed. The process is shown in figure 1.

The knowledge acquisition of university library users under the network environment is the premise of knowledge mining analysis and sharing. This precondition includes the knowledge and history of user needs, basic user information, location and time, current activity tasks, information behavior records, and user reviews, comments, and feedback on used services, etc. Knowledge mining is a pretreatment such as cleaning, de-weighting and integration for the user data which obtained via a variety of ways. It extracts of the user's demand rule and trend, predicts the potential requirements that users are not aware of and finally forms the knowledge stored in the user knowledge base which can be used directly.Knowledge sharing and utilization shares within the library by analysis demand for knowledge mining extraction rules and trend, customer demand patterns. Based on the library innovation service university library can better meet the user's dynamic demand. Knowledge feedback is the last step of knowledge management. By understanding whether knowledge mining extraction of user information demand is true and accurate, whether service innovation based on this knowledge is really meet the demand of users, and how the user evaluates service innovation, knowledge feedback can provide improvement Suggestions for the next round of user knowledge mining and service innovation.

4 University Library Service Innovative Mode of Knowledge Management Base on Network Users

The service innovative of university library is a kind of user-oriented innovation, whose innovation direction and mode are different according to different needs of users. Users are the starting point of innovation, and the innovative ideas and directions can be provided for library services through the management and mining analysis of user knowledge.

4.1 Network active push service mode

Push service is to actively push the library services to the environment where users are located. Integrating the library services into users' scientific research and learning process, the push service creates a new equilibrium state in organically integrating of library service with user space, which provides a service to your side, to the desktop, anytime and anywhere for users. Embedded services emphasize the seamless links with users, which extends the service to all places where users exist. Users can make full use of library resources and services without visiting the library and even visiting the library website.

Push service can be realized by physical push and virtual push modes. Physical push is a shift from providing services in library buildings to service in the physical space where users are located. Virtual push refers to provide targeted services in the virtual space where users are located, including the services of embedding library services into user desktop systems, user browser, the network community and visited websites of users. Libraries can create library toolbar, library widget and other ways to embed library services into user space environment, which provides the personalized services for users.

Push service is a new concept of library user service, which is committed to break through the physical and spatial concepts in the library and establish new cooperative and interactive relations with users. User knowledge management provides the guidance for library to implement push-type service. Users can acquire their physical situation through user knowledge management. Combining with the requirements and trends of users, the appropriate services are embedded into the user workflow to realize personalized services. In addition, the installation of client software on mobile devices provides the possibility to push library services to the desktop of users' mobile devices. Librarians can also interact with users in the network community through online communication tools to improve the awareness of library resources and services, which brings a greater convenience for users to make use of library services.

4.2 Network cross-border cooperation service mode

University libraries should consider to penetrate into users' learning and scientific research life in various ways, and mobile phones or other intelligent terminals can be used to carry out mobile services. It is necessary to strengthen the cross-border cooperation with internet service providers, database providers, professional information service sites and other information service institutions. Cross-border cooperation is the seamless integration of data resources and services from different sources, which creates the composite service with new contents to provide a consistent user experience. In an open mobile network environment, it is difficult for university libraries to meet the increasingly complex and diverse dynamic information needs of users by establishing information services based on collection resources. Therefore, the integrated utilization of resources from the third-party information service institutions, organizations and individuals has become a new trend in the development of user services.

The goal of cross-border cooperative service in university libraries is to make full use of existing resources and services, which creates new services through integration and meets the diversified information needs of users. The cross-border cooperation services between libraries and search engines or other websites can be started from data cooperation, functional cooperation, channels and brand sharing. In the network of cross-border cooperation, the library is no longer the starting point of information, but a node. Library information service is no longer a process in which librarians interact with users independently relying on information resources, but serves users together with other information service providers. It is only accepted by users in such a sustainable information service.

4.3 Network dynamic tracking service mode

Compared with other users, the information demands caused by information behaviors of college users are mainly to meet their own teaching, scientific research and learning needs due to its particularity. Users in college hope to achieve their own re-creation of knowledge through the absorption and utilization of information. As the learning happens in extremely different and enriched environments, the behavior of users is more complicated, diverse and dynamic. Therefore, the mode of integrating contextual information about users in the service process and providing context-sensitive

information services has become the new direction of service innovation in university libraries at present.

Based on the user as the center, the network dynamic tracking service mode integrates the library information space with the users' physical space. In the process of embedding library services into users' active tasks, the automatic perception of real-time situational knowledge is realized through the system. Combining user knowledge management system and technology intelligence to judge users' activity behavior and purpose, the service behavior of the system is adjusted adaptively to meet the dynamic requirements of users.

Network dynamic tracking service has the characteristics of intelligence, initiative and dynamic adaptability. According to the dynamic situation information of users, the corresponding learning and knowledge resources in library is provided, which supports effectively to carry out the ubiquitous learning for teachers and students in colleges. Most of the smart terminal devices held by users in the mobile internet era are for personal use only, which creates the favorable conditions for understanding users' information habits accurately and provides more sophisticated services. For example, a more detailed and accurate location can be achieved by means of GPS navigation system. The information service is established based on location situation and dynamic information service is provided with the correct identification based on situational information. The dynamic behavior knowledge of users is acquired accurately by using the technologies such as sensor, mobile device, wireless network and context awareness. The key problem to carry out this service is to reason the users' dynamic demand preference by combining users' knowledge base.

5 Conclusion

The development of network technology has shortened the distance between libraries and users and blurred the boundaries, which has gradually realized the barrier-free communication between libraries and users. Through modern network technology, the university libraries can establish network databases and network knowledge forums to realize the link with other online search engines and expand the resource base of library external knowledge, which will build a large platform for knowledge access, knowledge exchange and knowledge creation. In such platform, libraries can know the needs of users in time, and users can put forward updated suggestions to the libraries as soon as possible. Knowledge management of users in university libraries under the network environment is a kind of management method of conforming to the development of the times, which marks that university libraries are constantly expanding their professional services by using the network technology and network platform.

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Disparitiesin Open Data Efforts among Japanese Local Governments

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Abstract: Opendata efforts have now become a global movement, and Japan intends to keep up with this global trend. Measures concerning open data have been undertaken since the Open Government Data Strategy was adopted in July 2012. As a result, all 47 Japanese prefectures had developed Web pages for their own open data by March in 2018. However, only 18.3% of municipalities had their open data released on the Internet. In this paper, we investigate how deeply opendata efforts have penetrated into local municipalities, not just the national average in Japan. By analyzing the opendata disparities, we then infer the factors that have facilitated opendata initiatives in local governments. We introduce an "opendata penetration rate"for each prefecture, calculating it by using the number of municipalities that have already published their own open data, and we find that there is a regional disparity in the opendata efforts. By adding qualitative information to this quantitative research, we have found that there are three types of collaborations among the local governments that have already published open data. On the basis of these findings, we discuss which type of collaboration is the most promising for small-sized municipalities.
Key words: Open data; Local government; Municipality; Regional revitalization

1 Introduction

Open data is that which is freely available for everyone to use and republish as they wish, without restrictions imposed by copyrights, patents, or other mechanisms of control (Auer, S., et al., 2007). Officially, open data is defined as public- or private-sector data held by the national government, local governments, or companies and that is published in a form to which all of the following apply: (1) The data are published under a rule allowing secondary use, whether or not for commercial purposes; (2) the data are published in a machine-readable format; and (3) the data can be used free of charge(Basic Principles on Open Data, 2017).

Opendata efforts are a global movement that was initially led by the US and UK governments, but which is rapidly spreading to many countries in Europe, Asia, and also the Americas (Takagi, S., 2014). In 2013, the Open Data Charter was agreed to by the leaders of the countries at the G8 Summit, with the aim of proactively addressing open data in the participating countries (G8 Open Data Charter, 2013).

Naturally, Japan has followed this trend. Measures concerning open data have been undertaken in Japan since the Open Government Data Strategy was adopted in July 2012 (Japan Open Data Charter Action Plan, 2013). This strategy outlined the significance and objectives of promoting the use of public data, as itemized below (Open Government Data Strategy, 2012).

- Enhance Transparency and Confidence
- Promote Public Participation and Collaboration between the Public and Private Sectors
- Economic Stimulus and Higher Efficiency in Government

Today, Japan has many problems, such as a declining birth rate and an aging population, the concentration of the population in large cities, and the sluggishness of the economy. Especially in local areas, these problems are critical, and the revitalization of such regions is an urgent matter. Opendata initiatives may be of some help for such problems.

Various positive effects are expected for Open Government Data. Making government information available to the public as machine-readable open data can facilitate government transparency and lead to increased government accountability. Also, open data can support technological innovation and economic growth by enabling third parties or private companies to develop new kinds of digital products and services. A trivial example is that statistical data released by the government can be used to determine regional differences, which may lead to the development of more effective strategies for some products or services.

The aforementioned "Open Government Data Strategy" states that both the national government and local governments are expected to drive opendata efforts forward. In reality, however, opendata

efforts have progressed mainly because of the initiative of the national government, and we question how deeply these efforts have penetrated into local municipalities.

This research therefore aims to clarify the opendata initiative ratio for each prefecture, rather than considering just the national average in Japan. By analyzing the open data disparities, we can then determine the factors that hamper or facilitate the opendata initiatives by local governments. These results can contribute to the development of a strategy to further the progress of such opendata efforts in the near future.

2 Data and Methodology

The website of IT Strategic Headquarters, "Government CIOs' Portal, Japan" contains many kinds of decision documents and statistical data on the current government-wide open data initiatives of the Japanese government (Government CIOs' Portal, Japan). This site also contains not only the national government's data concerning opendata efforts but also local municipalities' data. It includes a "list of open data sites by local governments" that is periodically updated by IT Strategic Headquarters. We took advantage of these municipal-related data, published on April 30, 2018, for our research purposes.

First, on the basis of the list of municipalities on this site, we calculated an "open-data penetration rate" for each prefecture. Since the area of a prefecture includes the cities or towns in it, we obtained the penetration rate by dividing the number of cities or towns that have already published their own open data by the total number of cities or towns existing in that individual prefecture. On the basis of the ranking of the penetration rates so-obtained, we then selected advanced local governments and scrutinized those governments' opendata efforts to determine the factors that have facilitated their opendata initiatives. Finally, we investigated duplications between a prefecture's Web site and a municipality's Web site, as well as those among different municipalities' Web sites. We did this to determine the effects of joint operations on a local government's opendata site.

3 Results and Discussions

3.1 Open data penetration rate by prefecture

All 47 Japanese prefectures had Web pages for their own open data by March 2018, according to the government's Web page (Government CIOs' Portal, Japan)(Kashihara, H.,2018). We assume that this occurred because the national government put pressure on the prefectures to follow the opendata movement. On the other hand, only 319 municipalities had their open data released on the Internet, although there were 1741 municipalities in total. In short, the opendata penetration rate for municipalities was only 18.3% on average.

Apart from the national average value, we were interested in regional gaps among opendata efforts. Since a prefecture contains many municipalities, we decided to compare the penetration rates of the opendata initiatives among prefectures. In this paper, we define the opendata penetration rate for a prefecture as the ratio of the number of municipalities with their own open data on the Internet to the number of all municipalities existing in the prefecture. On the basis of the list on the government's Web page (Government CIOs' Portal, Japan), we calculated the opendata penetration rate for each prefecture, as shown in Table 1. The geographical distribution of penetration rates for all 47 prefectures is shown in Figure 1.

Table 1 Open Data Penetration Rates by Prefecture

Ranking	Prefecture	# of Contained Municipalities	Open Data Penetration Rate	Ranking	Prefecture	# of Contained Municipalities	Open Data Penetration Rate
1	Fukui	17	94.1%	25	Fukuoka	60	11.7%
2	Shizuoka	35	77.1%	26	Shimane	19	10.5%
3	Kanagawa	33	66.7%	27	Fukushima	59	10.2%
4	Okayama	27	48.1%	28	Aomori	40	10.0%
5	Saitama	63	44.4%	29	Gifu	42	9.5%
6	Ishikawa	19	42.1%	30	Nagano	77	9.1%
7	Aichi	54	40.7%	31	Miyagi	35	8.6%
8	Tokyo	62	38.7%	32	Akita	25	8.0%
9	Tokushima	24	37.5%	33	Kyoto	26	7.7%
10	Toyama	15	33.3%	34	Ibaraki	44	6.8%
11	Tochigi	25	32.0%	35	Wakayama	30	6.7%
12	Yamaguchi	19	26.3%	36	Oita	18	5.6%
13	Niigata	30	23.3%	37	Tottori	19	5.3%
14	Chiba	54	22.2%	38	Okinawa	41	4.9%
15	Hyogo	41	22.0%	39	Nagasaki	21	4.8%
16	Hiroshima	23	21.7%	40	Kumamoto	45	4.4%
17	Shiga	19	21.1%	41	Hokkaido	179	3.9%
18	Osaka	43	20.9%	42	Yamanashi	27	3.7%
19	Mie	29	20.7%	43	Iwate	33	3.0%
20	Kagawa	17	17.6%	44	Yamagata	35	2.9%
21	Nara	39	15.4%	45	Gumma	35	2.9%
22	Miyazaki	26	15.4%	46	Kagoshima	43	2.3%
23	Ehime	20	15.0%	47	Kochi	34	0.0%
24	Saga	20	15.0%				
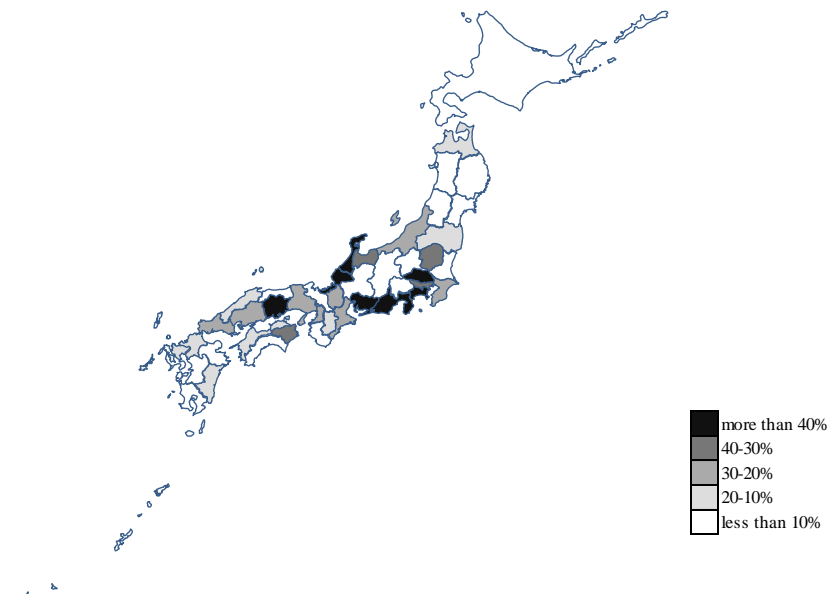
Figure 1 Geographical Distribution of Prefectures' OpenData Penetration Rates

As shown in Table 1, the highest and lowest values were recorded by Fukui (94.1%) and Kochi (0%), respectively. We found that there is no correlation between a prefecture's opendata penetration rate and the number of municipalities existing in the prefecture; Pearson's correlation coefficient between the two is −0.143. In addition, there were no specific regional biases regarding the prefecture's penetration rate, according to Figure 1. Then, the frequency distribution of penetration rates for all 47 prefectures is shown in Figure 2. As indicated in Figure 2, the opendata penetration rates for most prefectures turned

out to be less than 50%.
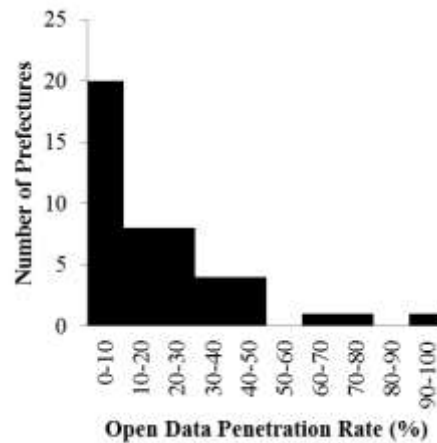
Figure 2   Histogram of Prefectures' OpenData Penetration Rates

We then wondered if the penetration rate might be affected by the fiscal size (revenue), population, or population density of a prefecture. We therefore calculated correlation and partial-correlation matrices between these variables (Tables 2 and 3). As shown in Tables 2 and 3, out of these three variables, the opendata penetration rate had the strongest correlation with population size, although the correlation coefficient was only 0.33. Figure 3 is a scatter plot showing the relationship between the open-data penetration rate and the populations of the prefectures, where each dot represents an individual prefecture. Figure 3 suggests that there is only a weak relationship between these two variables.

To determine what the important factors that have facilitated prefectures' opendata efforts are, we focused on the top five prefectures: Fukui, Shizuoka, Kanagawa, Okayama, and Saitama, and we then investigated qualitatively how each had performed its opendata initiative. We examined the Web sites of these prefectures and reviewed the interview logs that we had previously conducted with the person in charge of the opendata initiatives in each of these prefectures.

Table 2   Correlation Matrix between Variables

	Revenue	Population	Population Density	Open Data penetration Rate
Revenue	1.000	0.889	0.838	0.182
Population		1.000	0.894	0.331
Population Density			1.000	0.315
Open Data penetration Rate				1.000

Table 3   Partial-Correlation Matrix between Variables

	Revenue	Population	Population Density	Open Data penetration Rate
Revenue	1.000	0.602	0.230	-0.275
Population		1.000	0.546	0.256
Population Density			1.000	0.104
Open Data penetration Rate				1.000
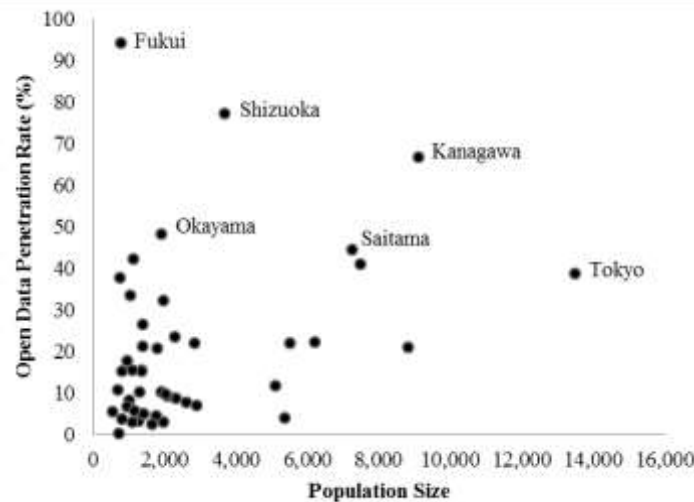
Figure 3   ScatterPlot of Prefectures' OpenData Penetration Rate*vs*. Population

3.2 Details of the top five prefectures' opendata efforts

We examined the opendata sites on the Internet for the top five prefectures—Fukui, Shizuoka, Kanagawa, Okayama, and Saitama—in June 2018, and we also performed a literature survey of their opendata efforts. In addition, we reviewed in detail the logs of interviews that we had conducted in 2015 with the person in charge of the opendata initiatives in each of these prefectures. The main results were as follows:

(1)Fukui Prefecture

There were various types of information on this prefecture's open-data site.Typical examples were the following, which were released as "Open data jointly published by Fukui Prefecture and all 17 municipalities existing in Fukui:"(1)A list of evacuation sites for all municipalities, (2) information about public facilities possessed by Fukui Prefecture and/or by the municipalities, (3) a list of garbage-collection datesfor all municipalities, and (4) guidelines for trash separation ineach municipality. Fukui includes Sabae City, which has been quite advanced in its opendata efforts; in January 2012, Sabae City became the first to publish its open data (Seto, T., et al., 2015).

Generally speaking, open data may differ in machine readability, depending upon the file format.Tim Berners-Lee, who is an inventor of the Web and Linked Data, has proposed a "5-star deployment scheme" as a guide to machine readability, as shown in Figure 4. It has been widely used all over the world for judging how well opendata initiatives have progressed (Shadbolt, N., et al., 2012).

From: http://5stardata.info/en/
Figure 4   5-Star Deployment Scheme

Fukui Prefecture's opendata sites contained various files in from CSV format (3-star rating) to Linked-RDF format (5-star rating). Because most prefectures provide open data in formats of 4 stars or less, Fukui Prefecture has been highly rated by the authorities.
According to the interview we conducted in 2015, Fukui Prefecture had allocated a dedicated staff member in the information system division to driveforward this effort. He was trained to handle open

data and to promote uniformity in the datatypes of files to be uploaded.

(2)Shizuoka Prefecture

The opendata sites managed by Shizuoka Prefecture contained open data for most of the municipalities it contains. A few municipalities in this prefecture—like Mishima City—published open data in the 5-star rating file format. In August 2013, Shizuoka Prefecture published the "Open Data Catalog Shizuoka" as the first prefectural opendata portal site in Japan (White Paper 2014, 2015).

Through the interview we conducted in 2015, we found that two staff members belonging to the information system department had been assigned in charge of overseeing an open data system. Those members started to develop the open data system without outsourcing by using open-source software (OSS). This is a type of computer software for which the source code is released under a license in which the copyright holder grants users the rights to study, change, and distribute the software to anyone and for any purpose. Those staff members had tackled the opendata issue from their own perspective alone. Because of such in-house software development, there were pros and cons to this approach. An advantage is that the developers can flexibly modify the system as they want. In contrast, a disadvantage is that the performance of the system depends greatly on the ability of a limited number of developers, and no one else can operate the system without them.

(3)Kanagawa Prefecture

Kanagawa Prefecture consolidated the following data for all 33 municipalities it contains and published them on the prefecture's opendata site. The data included (1) information about the locations and services of libraries and children's halls, (2) information on the locations of parks and play equipment, and (3) information about evacuation sites for all municipalities and locations of automated external defibrillators.

(4)Okayama Prefecture

Like Shizuoka Prefecture, the opendata sites managed by Okayama Prefecture contained open data for many of the municipalities it contains. Municipalities in OkayamaPrefecture seemed to be able to publish their own data using the upload function on the Okayama portal site. The data-upload system had been built using CKAN[1], which is a type of OSS. Apart from the main opendata site, seven cities and three towns jointly run a site named "data eye: data portal of the watershed areas of Takahashi-gawa River."

(5)Saitama Prefecture

Like Shizuoka Prefecture, the opendata sites managed by Saitama Prefecture contained open data for most of the municipalities it contains. Municipalities in SaitamaPrefecture also seemed to be able to publish their own data using the upload function on the Saitama portal site. The data-upload system had been built using CKAN, like Okayama Prefecture. Some kinds of data for Saitama Prefecture were published in a 5-star-rating file format.

3.3System sharing for publishing open data

From the details of the top five prefectures' opendata efforts, we found that several prefectures had organized a collaborative opendata project with their municipalities. This collaboration seemed very important in facilitating the opendata initiatives. We therefore investigated the duplication between a prefecture's Web site and a municipality's Web site and also those among the different municipalities' Web sites. We browsed duplicate sites and inquired into the situation directly.

Eventually, we found that there are three types of collaborations between local governments for publishing open data, which are expressed in Web-site duplication or in the sharing of a site's function. These include (1) a type of collaboration in which a prefecture compiles data to be opened from its municipalities and the prefecture uploads them; (2) a type of collaboration in which a prefecture provides to its municipalities an opendata release function on a portal site, and the municipalities then use this function themselves; and (3) a type of collaboration in which several neighboring municipalities collaborate together to build a common opendata release site. In this paper, these three types of collaborations are called Types A, B, and C, respectively. We investigated which types of collaborations were used in an individual prefecture, and the results are presented in Table 4.

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[1]CKAN: https://ckan.org/

Table 4　System Sharing Situation for Publishing Open Data

Ranking of ODPR	Prefecture	Type A	Type B	Type C	Ranking of ODPR	Prefecture	Type A	Type B	Type C
1	Fukui	✓			25	Fukuoka			✓
2	Shizuoka		✓		26	Shimane			
3	Kanagawa	✓			27	Fukushima	✓		
4	Okayama		✓	✓	28	Aomori			
5	Saitama		✓		29	Gifu			
6	Ishikawa				30	Nagano			
7	Aichi				31	Miyagi			
8	Tokyo				32	Akita			
9	Tokushima		✓		33	Kyoto			
10	Toyama				34	Ibaraki			
11	Tochigi			✓	35	Wakayama			
12	Yamaguchi				36	Oita			
13	Niigata				37	Tottori			
14	Chiba				38	Okinawa			
15	Hyogo				39	Nagasaki			
16	Hiroshima				40	Kumamoto			
17	Shiga				41	Hokkaido			
18	Osaka				42	Yamanashi			
19	Mie				43	Iwate			
20	Kagawa				44	Yamagata			
21	Nara				45	Gumma			
22	Miyazaki		✓		46	Kagoshima			
23	Ehime				47	Kochi			
24	Saga								

ODPR: Open Data Penetration Rate

Collaborations of Type A were used in Fukui, Kanagawa, and Fukushima. Type A has the problem that it forces a large administrative burden on an individual in the prefecture who then takes responsibility for publishing the data. In the case of Fukui Prefecture, a full-time staff member was assigned to the section for such a job. However, it is likely to be difficult for other municipalities to do the same thing as Fukui Prefecture, since cost reductions and personnel reductions have recently been required in most municipalities.

Type B was used in Shizuoka, Okayama, Saitama, Tokushima, and Miyazaki. As described above, Shizuoka, Okayama, and Saitama used OSS for incorporating the opendata release function on a portal site. The advantages of using OSS not only increase the flexibility of the system design but also decrease the system-development costs. In particular, CKAN, which was adopted by Okayama Prefecture and Saitama Prefecture, is customized for publishing open data, with a unique feature that enables tagging. By using this feature, CKAN easily deals with tagged open data. For example, if a different tag is set for the data from each different municipality, these tagged data are easily handled in a prefecture's portal site without confusion. Since the cost of OSS such as CKAN is inexpensive, a small-scale municipality would benefit from using this approach.

Type C was used in Okayama, Tochigi, and Fukuoka. Unlike Types A and B, Type C is a collaboration in which several municipalities cooperate to construct a common opendata release site. Since a prefecture—which has wide-ranging influence on its many municipalities—does not take part in the cooperation, it is necessary for one or another municipality to take the role of a core municipality, demonstrating leadership and coordinating ability, to facilitate the collaborative work.

In summary, judging both from the number of prefectures that have already implemented each type of collaboration and from the opendata content that has already been published, Type B seems to be the most promising approach for collaboration among local governments.

4 Conclusion

In this paper, we found that opendata efforts have progressed in some municipalities in Japan, although the efforts have not yet been introduced sufficiently in many other municipalities. We calculated the opendata penetration rate for each prefecture by using the number of municipalities that had already published their own open data, and we found that there is a regional disparity in the opendata efforts. By adding qualitative information to this quantitative research, we found that there are

three types of collaborations among local governments that facilitate the publishing of open data. Type A is a collaboration type in which a prefecture compiles data to be opened from its constituent municipalities and the prefecture uploads them. In Type B, a prefecture provides an opendata release function on a portal site to its constituent municipalities, and they upload open data by themselves using this function. In Type C, several neighboring municipalities collaborate together to build a common opendata release site. Out of these three types, Type B seems to be the most promising way for local governments to collaborate.

Third parties or private companies may develop new kinds of digital products and/or services if it is possible to invent new uses by combining different kinds of open data. This is potentially capable of leading to technological innovation and economic growth.

In the future, we plan to conduct additional interviews with key persons in charge of the opendata efforts in municipalities. In addition, we intend to conduct research to find out how open data can contribute to regional revitalization.

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Internet of Things (IoT) Opportunities and Impacts of Well-being on Citizens and Society

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Abstract: It is in the interest of all to know and anticipate the transformations that are underway and those that will be probable in the future, capturing the spirit of accelerated change that is around us, to prevent impacts, to draw personal strategies to seize opportunities and to avoid serious ruptures in our work and in our personal lives. This paper deals with questions regarding accelerated and disruptive high-tech transformations, in order to be strategically prepared and to deal with challenges ahead. In this article we present a general scenario on the theme of Internet of Things - IoT, aiming to discuss the opportunities, the impacts and the associated risks, highlighting them under the sight of well-being in our lives and society in general. The contribution for other studies is to allow ongoing discussions regarding the possible changes of behaviors coming from this new environment that will be possible by the use of the IoT. Some of these behaviors are already on its way. Still, others are to be perceived and developed. The article presents, in the first topic, the new environment of the Fourth Industrial Revolution, where it is inserted the concept of IoT. It advances, in the second topic, with the discussion of the extension of the usage of the new technology, its impact and its applications. And it ends discussing the behavioral changes that the massive use of this application may bring us regarding well-being.
Key words: IoT-Internet of things; Fourth industrial revolution; Well-being; Opportunities; Risks

1 Introduction

What are we dealing with here? The perception of what is changing around us, in the light of new scientific advances and new technologies. Of which precepts, postures and attitudes may be changing without becoming aware and how it can change our reality or the way in which we perceive it. And how this may affect citizens and a society well-being.

Our powers of observation and the way in which we understand the changes underway, give us the power to adapt, to choose the paths to go and the decisions to be taken in our personal lives or in our professions. These are the opportunities.

All around the world in which we live, we come across social, political, economic, environmental and technological turmoil that change our relations and our scale of values. Even if we wanted to keep us unrelated to this, it is not possible. The changes around us can carry us together, we can perceive them and walk beside or can participate and take advantage of this new scenario, using or discovering new applications. These are the risks.

We will discuss in this article about this scenario, called by many as the Fourth Industrial Revolution and pretentiously called by us, *"The New Digital Age"*, only with the intention of putting on paper a general design, as an initial reference base, to comment, research, analyze, develop our own opinions and propose new visions.

2 A Look Ahead to the Challenge

This is an exploratory analysis, using the vision of academics and researchers as Klaus Schwab, Alvin Toffler, Hamish McRae, Samuel Greengard and the researches of the authors regarding the disruptive technologies and changing behaviors of our society.

We are experiencing a world in constant integration. The famous researcher and entrepreneur Klaus Schwab, World Economic Forum founder and author of the book "The Fourth Industrial Revolution" (Schwab, 2016) presents us with a first vision in which shows the integration of Technological, Biological and Physical worlds. This is not just a forced and artificial joint, but the natural development of paths that started apart and slowly approached. Science, as it is known in its essence, searches for answers fully based on logic, in mathematics, in applied research and in the hypotheses proposed to explain the existing realities and build new theses. However, the barriers of technology advance and increasingly cover our relationships, our financial commitments, medicine, entertainment, production of consumer goods and services, shortening paths and allowing new behaviors. Society adapts, invents new fads or follow trends. If you look at the last years of the last century, Hamish McRae (HSM Management, 1999) has pointed out

the five forces that they were redesigning the world, focusing his look to the year 2020, now close to us:

- Technological advancement
- The process of globalization
- The changing demographic structures
- The concern with the environment
- The impact of Government actions on society

All pointed forces remain present and the trends of technological advancement are indicated, without exception, in all Megatrends studies presented by the currently main consulting companies in the world. The well-being of citizens and society in general are completely dependent on these trends. We See, in intense fashion, the impacts relating to global conflict, focused on trade, immigration and religions surpass all possible frontiers.

In the case of Klaus Schwab, strengthening the concept of technological advancement, he presents an interconnection between technological skills, which decades ago displayed a certain degree of separation, but that are now very close.
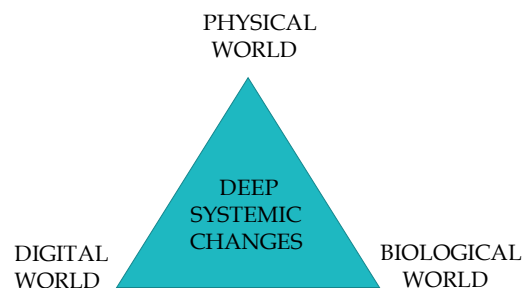
Figure 1   Fusion between Digital, Physical and Biological Worlds

The extension of this interconnection challenges us and shows us the composition of a new world, active, moving towards mergers between them and changing before our eyes.

PHYSICAL WORLD: Technologies like autonomous vehicles, 3D and 4D printing, Advanced Robotics and new materials represent this category. This environment is more palpable, and we can see its connotations closer to us. Having a 3D printer at home and being able to "print" small tools, decorative or support item won't take long. And this technology changes the basic parameter of production assembling objects through agglutination of raw material rather than material loss on its traditional production. Replicas of human organs are being tested for simulations, studies and future transplants. In the case of autonomous vehicles already have several cases reported of tests on Amazon, Google, Tesla and Uber with, unfortunately, the first case of a fatal accident, occurred in this year.

BIOLOGICAL WORLD: In this sector we include extraordinary genetic innovations, with sequencing, activations and editing genes recently made that was only possible by the computational increase. There is now the synthetic biology. Although there are serious ethical discussions involved, it has the ability to create custom bodies, applicable in agriculture, medicine or fuel, besides the possibility of specialized and personalized treatment for each individual. Let us not forget that in Brazil, we have advanced research at Embrapa, with creation of specialized seeds and adaptable to a variety of soils and climates, as well as resistant to various crop pests. In the future, considering the other developments, its scheduled the deployment of artificial memories in the brain of a human being. As well as considering the 3D printing combined with the editing of genes, will allow production, repair and regeneration of living tissue. This possibility is already being used to evaluate the creation of skin, bones, and muscle tissue in advanced medical centers of the planet.

DIGITAL WORLD: We indicate in this group, fundamental developments in progress, as the focus of this article, IoT-Internet of Things, the Blockchain, technology behind the cryptocurrency, the shared economy, the creation of new business models, social networks, with its astronomical dissemination of information and new digital platforms. Especially accentuated for the evolution of AI – Artificial Intelligence.

We emphasize the interrelationship with other categories and well-being in health, since the monitoring the human body, through sensors installed inside our body will allow the monitoring of symptoms, reactions, changes of heart rate, emergency calls or triggering the application of doses of drugs implanted under the skin. More from other interactions in the following topics.

THE NEW DIGITAL AGE: Why do we frame here, supposedly, as we said, a new concept, calling

this period *"The New Digital Age"?* Because the scope is much deeper than we have experienced before. As quoted by Klaus Schwab, "changes, in terms of size, speed and scope, are historical" (Schwab, The Fourth Industrial Revolution, pg. 12).

The second half of the 20th Century until now had an extraordinary development of technology, from a purely analog world to a digital world, more intuitive and with great interaction of people with machines, with computers and with the digital interfaces. In the history of the last 5,000 years, we're talking about only 50 years or 1% this period.

FROM COLLECTOR TO AGRICUTURE AND LIVESTOCK	**13.000 to 10.000 a.C.**
URBANIZATION AND EMERGENCE OF CITIES	**3.500 to 3.000 a.C. (Mesopotamia / Egypt)**
1ST INDUSTRIAL REVOLUTION- MECHANICAL ENERGY	**1.760 to 1.840**
2ND INDUSTRIAL REVOLUTION –ELETRICITY AND ASSEMBLY LINE	**1.890 to 1.930**
3RD INDUSTRIAL REVOLUTION – COMPUTERS AND INTERNET	**1.960 to 1.990**
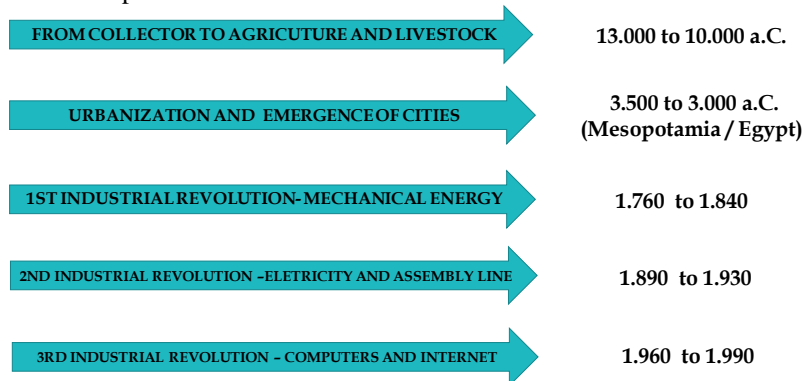
Figure 2   Up to The Third Industrial Revolution

From 1990 the working tools and interaction with the reality changed gigantically. The visionary Alvin Toffler, author of "The Third Wave" and "Future Shock", he predicted, in the 70s and 80s, the so-called Knowledge Society, predicting a computer on the desk of every person. And emphasized the need for mastering knowledge, informing, in summary, that the illiterate of the 21st century would not be the one who cannot read and write, but that you couldn't learn, unlearn and relearn. He warned that we would have the knowledge revolution. The main means of production would be the brain and not the brawn. And this new era would lead us to a world with new beliefs, attitudes, ethics and jobs (Toffler, 1980).

TREND ANALYSIS ON DIGITAL CONNECTIVITY IN BRAZIL: The technological innovation as a whole, the accelerated digitization, the internet and mobile telephony with their smartphones are fundamental tools of transformation developed from the 90s. Today we have more than 7 billion mobile devices worldwide and more than 200 million in Brazil, according to data from the Brazilian site Teleco.com [1]., Cepal and ITU. This gives a capacity of connectivity and access to information, immediately and digitally, and in a unprecedented manner in the history of humanity, allowing access from most of humanity to the bases of knowledge.

As an example of this reality in Brazil, we conducted a study of trends, with the Minitab tool, to evaluate the evolution of residences and connectivity of mobile devices in the country, considering data from the last 20 years and designing them for the next ten years (till 2028). We had the following results:
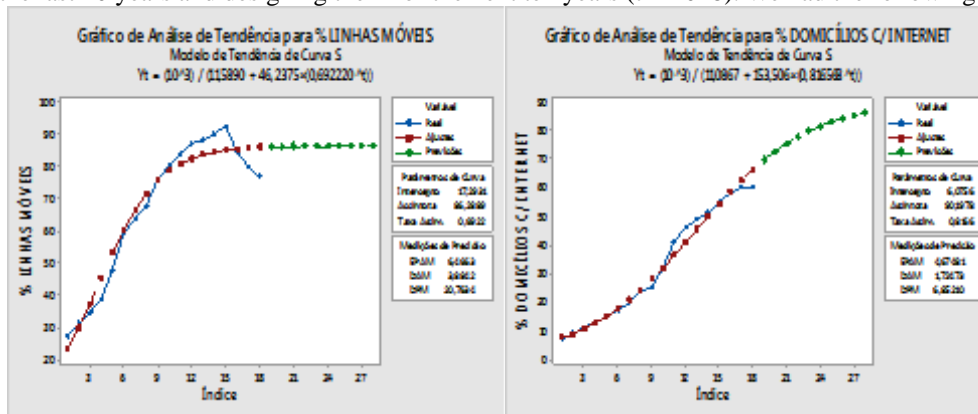
Figure 3 and 4   Trends of Digital Access in Brazil for 2028

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We note that we have constant reductions in the fixed lines, access practically to the whole population of Brazil for mobile access and almost 80 million households with internet access. The basis for the digital society is given in our country.

Although a part of the world's population still does not have access to electricity or the Internet, in part of the globe, in the last 30 years we have prepared the basis for what you see now, with deep transformations in the way in which we communicate, act, work, study and have fun. In Africa, the continent with the highest global growth delay, displays accelerated digitization growth rates. This does not mean that we will make the best use, but that reality is present.

As shown by Schwab, the current changes were never experienced before. The Speed, Breadth, Depth and the Systemic Impact are immense, and these new technologies generate for themselves new solutions, exponentially. The modifications alter the way we live and can change who we are, the productive chains and entire economic systems (Schwab, 2016)

3 Disruptive Technologies and New Trends

The disruptive technologies are those capable of radically changing aspects of the economy, of society or of our personal lives. Open spaces and opportunities that would not be possible or that were not seen previously, change habits, needs and desires. Let's check some of them briefly, highlights in the world and that give us the context for evaluation of IoT, focus of this work.

ARTIFICIAL INTELLIGENCE (AI): We speak here of one of the greatest advances of our time. The ability of cybernetic brains making decisions. Yes, that's the point. Don't we talk about the stratospheric processing capacity today already present in our businesses and our research centers. The novelty lies in the fact that the processing power increases in geometric scale and, because of this, the most advanced processors traveled paths that enable building sceneries and making decisions. Cognitive functions of a human being. You can see that we have some real indications in our world, as common examples that serve as samples of these advances. The uses are made in legal offices, to select and classify processes, in medical diagnoses and evaluation of dosage of medicines, on education and on accelerated learning, in the simulation of nature, events in process automation care and in decisions of financial investments, for example.

These advances occurred with known developments. For example, the *Deep Blue*, computer mounted by IBM, which, in 1997, in London, won a match of six chess matches against world champion and grandmaster Garry Kasparov, getting the first image of the machine winning the man. Passed by 2011, the so-called Cognitive Computing feat of known *Watson*[1], who won in a fierce dispute, in the most famous game of questions and answers of the USA, Jeopardy[2] (CBS), the two most prominent previous champions in amount of questions answered and in awards, Ken Jennings and Brad Rutter. By 2015, 2016 and 2107, by the company AlphaGo, later acquired by Google, who beat world champions in the strategy game GO, the Chinese Fan Hui, South Korean Lee Sedol and the Chinese champion KeJie, respectively.

In this way, establish new behaviors or new diagnoses, answering scripting or advanced troubleshooting, without specific programming becomes a real possibility. The Machine Learning are learning with new situations and can make decisions of production, or medications for patients. Its evolution will be direct communication with other machines.

INTERNET OF THINGS (IoT): The term Internet of things emerged based on the recognition that we are dealing with two different worlds, the digital world from the natural evolution of equipment and networks and the world unplugged, that already existed, and which would not require control and real time connection. It is formed by any of the equipment, element or supervised activities we can check in our society. The concept evolved once the needs and desires have expanded, as life became more dynamic and required greater control by people in general. What we present here is the possibility of interconnection of trillions of sensors around the world, passing data in real time to the digital world on the operation of equipment and things without direct connection to the Internet (using interfaces analog-to-digital), such as appliances, cameras, cars, houses, clothes, pipelines, toys and entire cities. We'll cover this in more detail on the second part of this article.

BIG DATA: We have to mention Big Data. If it isn't disruptive, once is continuity of processes developed for a long time, it is complementary to the two technologies mentioned earlier. We can

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[1] Site Gizmodo: Watson. Available in: http://Gizmodo.Uol.Com.Br/Computador-Da-Ibm-Vence-De-Lavada-Dois -Cerebros-Humanos-Em-Jogo-De-Conhecimentos-Gerais/
[2] Site Tech Republic.Com: Watson. Available in: https://Www.Techrepublic.Com/Article/Ibm-Watson-The -Inside-Story-Of-How-The-Jeopardy-Winning-Supercomputer-Was-Born-And-What-It-Wants-To-Do-Next/

consider these as a basic tripod for the analysis of behavior and social scenarios drawing, today called analytical techniques or "analytics". The vision of a world controlled by the information is so big that surprising what we can accomplish today. All our behaviors feed huge databases, supplied to the extent we do purchase operations, watched movies, travel, we browsed the Internet, fill out surveys or registers or communicate with others. Previously known as Datawarehouse's, these tools worked with Structured Data, existing in pre-formatted databases in companies. Today the use of the name Big Data is required, because the new databases are powered by Unstructured Data from Social networks, Electronic media and pure Internet navigation. This information becomes Knowledge, enabling the decision making. IoT, Big Data and Artificial Intelligence will be the basis for Decision Makers or Automatized Actions in Smart Cities and Autonomous Cars, among other applications.

BLOCKCHAIN: Blockchain is a technology seen today as one of the greatest technological breaks. It is regarded as the new Digital Notary, able to record transactions of any kind, with security and traceability. It is the technology created as the basis for the cryptocurrencies, as the Bitcoin, the most popular of this universe. It was developed by the programmer of pseudonym Satoshi Nakamoto, in 2008, putting the program code available directly on the Internet. Ensures the private control and various applications such as the cataloguing of works of art, weapons or transactions with diamonds, allow and certify Authenticity and Registration of trade. There are Governments with early works for tax collection with Blockchain technology and financial banks working with end-to-end transactions. And even, in drafting laws to ban the use of cryptocurrencies in their territories, for the risk of loss of control it can represent.

QUANTUM COMPUTATION: This area of science promises to revolutionize the future of humanity, ensuring that we will have the possibility of creating processors with higher current capabilities in speed and processing power. This is because the process of development of microelectronics has its limitations. The capacity of a traditional computer chip double every 18 months, was broken recently, indicating the limits of this border. The creation of quantum processors would lead the process of performing calculations for a kind of parallel processing, in which multiple possibilities would be calculated at the same time or multiple scenarios would be handled together. However, these processors work in extremely low temperatures, bringing great challenges for your swift implementation. The attention here is because a superior capacity to process would influence all other trends discussed up to here, the performance of each one of them. And could create scenarios in which the Artificial Intelligence could reach your peak, enabling highly complex decisions.

NANOTECHNOLOGY: One of the most able developments of our times are those applied by Nanotechnology. Machinery, chemical systems, medical and pharmaceutical medicines with cell dimension, acting and performing microscopic changes, either within the human body, in agriculture or in the physical world. Some of the experiments already running, produce molecular structures working in toxic environments, which invade cells, acting on evil difficult or almost impossible to be treated with high precision, with fewer side effects. Here is one of the links between the world of technology and biology, because the existing potential extrapolate traditional treatments. Pharmaceutical nanotechnology, for example, is used for the treatment, diagnosis, monitoring and control of biological systems and has recently been named "Nanomedicine" by the National Institute of Health in the United States (Moghimi et al., 2005). In Brazil, we have the example of the pharmaceutical laboratory at State of São Paulo, which is using this technology to manufacture a pill, still in approval by ANVISA, with the antimalarial artemether, a semisynthetic substance encapsulated in microscopic doses and very intense, to get the highest efficiency and be less aggressive for the human organism.

NEW MATERIALS: In the industry we have available the development of new materials that promise to revolutionize the way of producing and transporting energy. Some of these materials are lighter, stronger and recyclable, and allow self-repair and self-cleaning applications, with resilience and return to their original forms or transducers that turn pressure into energy, a huge advantage. Others, as plastics, allow reuse parts of products that are difficult to recycle, like those used in cell phones or parts for space industry, for example. One of the greatest exponents of the moment is Graphene, one of the crystalline forms of carbon, as well as diamond or graphite. This material is considered so revolutionary as that silicon, essential to the development of semiconductors and the evolution of computers. Of high quality, is 200 times stronger than steel, lightweight, almost transparent, much thinner than a hair, an excellent conductor of heat and electricity. Is one of the strongest materials ever found, but also extremely expensive. The combination of extraordinary properties and surprising ease of isolation allowed an explosion in research about Graphene and their use in recent years. The Nobel Prize in physics of 2010 was awarded to Andre Geim and Konstantin Novoselov of the University of Manchester by innovative

experiences regarding this material.

4 IoT: Internet of Things

When we talk about the fact that we can connect things to the Internet, we are talking about our ability to receive information and make decisions from the recognition of reality. And this represents a cultural and behavioral change without dimension. When it comes to personal well-being, we become "owners" of decision making, which may be under our control. Or we can "delegate" this control to third parties or to the network that will have the power to take decisions on our place. Seems a simple situation, but it is not. In this reality we can be carried by currents or interact with it consciously. The researcher Samuel Greengard tell us that IoT is at the epicenter of one innovation shock wave that it is just getting started and it is in the way between the innovator and early adopter phases. It will someday serve as the practical framework for life and for business (Greengard, 2015).

All digital equipment that we know as smartphones, laptops, personal computers, smart-tv's, cameras, and other resources are already connected to the digital world. The world of "things not yet digital" can be connected to the network by geolocation features or interfaces that can send information. For example, RFID adhesives (radio frequency identification) for the location of a container or objects of any size inside of them. Or by monitoring mobile or satellite communication with remote sensors in aqueducts, oil pipelines, POSs (Point of Sail), cars, planes or drones. This allows a capacity of above-normal control as to the physical world that we know today and in which we live.

Combining this new connectivity to a high capacity of processing we have the opportunity to automatize processes until now unthinkable. And, main point of view, change the way how to take decision, with the possibility of automatic decisions. At the end, changing our mindset about how to live or manage our lives.

Since control the dose of a medicine inserted under the skin and monitored by IoT, remotely trigger a call and send an ambulance for heart attack, without human intervention, control traffic lights automatically at any time of day, monitor constantly the increase of cholesterol in the human body, supply our refrigerators and layoffs by the supermarket without prior request, to trigger the lights in our house and an oven to heat up our food before we get home.
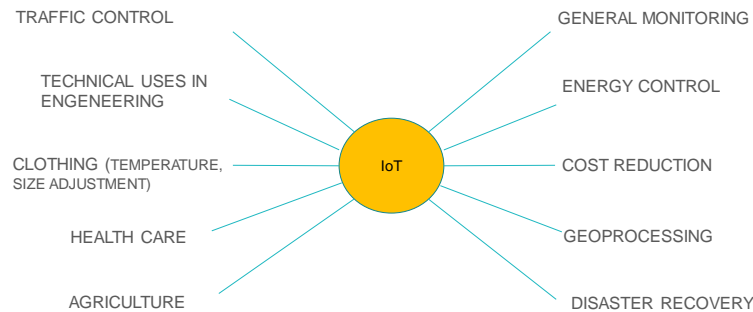
Figure 5   IoT Applications

GEOPROCESSING AND SMART CITIES: One of the most fantastic tools available to dealings of the well-being and quality of life, if well used the geo-processing and geo-location. It is the possibility of using the knowledge of the society in which we are living. Opportunities for improvement of public administration are immense. Since sensing works for garbage collection, monitoring of slopes and risks of collapse in rains, sewer, water leaks through the security assessment in areas of risk for displacement of police forces, automatic sensing of the population present in certain neighborhoods to installation of health centers, schools and police stations, offset daily assessment of people and their interests. The use of APPs (applications) on mobile phones already allow currently these automatic withdrawals.

The process itself, allows the accelerated evolution of the so-called Smart Cities. We speak about cities that have intelligence to decide about the movement of people, public facilities, autonomous vehicles, garbage collection, public transport, sustainability, control flow and use of water, energy, telecommunications and fuels. Without the IoT, we will not be able for this implementation. The geolocation is an essential tool in this subject, allowing the scope of the entire physical area and/or of all its inhabitants. Automatic interaction with "public facilities", its parks, its educational institutions, its citizens, their vehicles, shops and services, possibly favor the health demands, safety and well-being in a

way never have seen before.

SMART HOMES: One of the biggest behavioral change that have already begun and directly impacts our lives is our condition to "control" remotely the environment in which we live, interacting automatically with the objects around us. Already are common and possible the Ip (Internet Protocol) cameras, connected to the Internet for remote monitoring from our homes or monitoring of babies, our elderly relatives or our PETs. With sensors placed around the House, we can control the lighting, fire alarms or emergency care without even being present. Interact with our environment allows you to plan to purchase foods that end up in our homes, with automatic requests to supermarkets. Behavioral changes. For this monitoring, sensors of IoT would need to be in the fridge, in pots or boxes of food.

Avatars began to invade our familiar surroundings in all its possibilities, since applications like Google Play, which aids in the automatic search of anything we want like electronic helpers such as the smart-TVs, seeking to turn into platform only for images, sounds and Internet access. In other words, we have new "interfaces" that will facilitate the integration of the physical and technological worlds.

HEALTH MONITORING: The possibilities are now practically limitless regarding health monitoring via sensors of IoT, stuck in our bodies or the pills we take. We already have the basic conditions for training and races that track our heartbeat or the burning of calories. However, we can easily to inject body sensors that measure our levels of adrenaline and insulin, for example, ensuring that medicines implemented under the skin can release controlled doses. Pills for schizophrenia are being tested in the USA for this purpose, for example.

Of course, this new world will not bring only advantages. With evolution, we have and we're going to have high risks associated with Cyber-attacks, exposition and control about our behaviors. The control over the citizen's life, your likes and desires, your displacement, the knowledge of their habits and your entertainment should not be conducted steadily and indiscriminately. It's a risk and requires extreme care. There are studies in some countries, projecting controls of "score" for remarkable citizens, for which would offer greater access to housing or access to credit, according a behavior considered appropriate by the standards set. The IoT would enter here with millions of cameras, sensors and APPs installation, which could provide instantly information about ongoing actions. As has been highlighted before, is not technology that presents a risk, but the way which we make use of that.

This extraordinary knowledge is also available to be exploited by hackers or crackers that use technological failures as livelihood and profit. In this way, products that needs to be developed, will need provide reliability and safety, that should be created together and provided as a basic requirement of their supply.
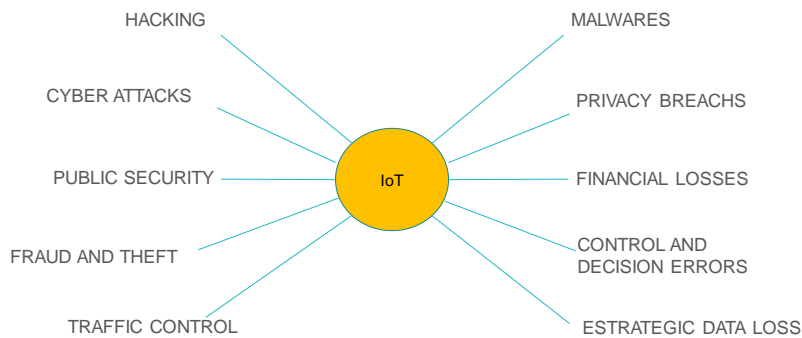
Figure 6　IoT Risks

5 Results: Behavior Changes

EMPLOYABILITY: In the current process of digital transformation, it is estimated that around 2025, until 47% of jobs in the USA, related to occupations with high automation potential, should disappear (Frey, Osbornet, 2010 Oxford Martin School University). This means that, with new aspirations, there will be opportunities to create jobs and get back to higher-value activities. We are able to construct them by knowledge of the environment in which we operate. So, with advanced connection will enable new possibilities of interaction with our jobs. And the IoT will enable remote workers monitor, as if they were present at the regular jobs and also will allow control of resources remotely. We will have "Employability" and no more "Formal Jobs". Data scientists, for example, already are a new career in course and currently are not required to be present to act and they can offer your work for different customers.

NEW BUSINESS MODELS: The structures that have evolved in recent years, with new concepts, challenged established views and ways to realize the contact with customers and consumers. The intermediations, considered to be part of the negotiating game, either by the infrastructure or by existing expertise, have been overcome. We have new business around the world like AirBnb, Amazon, Uber, Netflix or Brazilian companies like 99Taxi, Nubank and Ifood. Al of them need of internet and mobile devices, working as an IoT components.

Direct contact with the customers became more effective and have been forcefully changed. Today, Contact-Centers have more complete with various communication alternatives, such as chatbots, IVRs, AI, voice, e-mail, regular chats, collaboration with support of an attendant image online, or the presence of avatars, created digitally to accomplish this interaction, via voice or with the image on screen.

The Shared Economy has been the subject of opportunities that use these applications to connect consumers directly to the suppliers, without shops or promotions contrived. The APPs and sensors locate the client automatically and offer him the best experience or solutions of locomotion, as we see today, in home delivery, taxi ordering, orders monitoring, movement in the cities with Waze or Google, for example. The called Fintech's, Aggrotech's or Insurtech's, financial, agribusiness and insurance segments respectively, are using IoT to facilitate their business and increased efficiency. We have had 36% of growing of Fintechs companies at Brazil in 2017, for example. Each of these areas requires sensors installed or mobile devices such as "location providers", for carried out their tasks.

NEW BEHAVIORS: IoT sensors will spread across our clothes, during exercise, in our medical or measure the level of performance of the services consumed, automatic reading of electricity consumption, the water used, or the calories consumed, bringing us to willingness to change our decisions and not rely on what is reported by the media or by our suppliers.

The developments also reached the applications that can read the same data directly, what have done before only by companies. Apps in mobile phones, chatbots (conversations with robots), avatars and robots mounted based on AI (via automated software systems), evaluate the available data and inform directly the user of his situation. Soon, medical applications will make diagnoses based on sensors installed in your body, without the direct participation of a doctor. It is expected that the first robotic pharmacist, would be available in 2025.

The buying process itself is changing. In shops, grocery stores or arenas are offered products by simple passage or presence of the consumer, monitored by your mobile device, by your clothes or your watches, as elements of IoT.

The buying process by proximity with NFC (Near Field Communication), boarding with read code QRC (Quick Response Code), monitoring objects in stores, activation of cars by proximity, passing through tolls for vehicles on roads automatically, automatic reading of shows or programs congresses are a reality of IoT and AI.

The incorporation of new practices will lead to changes in behavior and consumer profile, as well as flexibility in the way we introduce ourselves in front of our customers, family and friends, in dress and communicate. Will we monitor each step of them by IoT and take decisions from this? Today we monitor the purchases we make, as well we are monitored by security centers that assess our shopping patterns to avoid fraud. Our personal task and professional is get necessary consciousness and decide how we can adapt.

6 Conclusion

The new technologies are undoubtedly shaping the 21st century. IoT is the open door to be connected with this new digital world. The cell phone itself is the largest "IoT personal sensor" already available. Consider the evolutions allowed by several developments cited here for IoT and other technologies that complement its use and application, since it is not possible to talk of IoT separately.

With digitized access extrapolated to a significant number of people in the world, abundant access to information, mobility, the facilities brought by social networks and the constant connectivity, we have new opportunities and possibilities opened for the exploitation of society in general. At work, we can do our tasks remotely, send our productions over the network or access solutions that are available worldwide.

Ancient books of fiction and visionaries of the past have explored these possibilities. George Orwell, in your "1984", which created the Big Brother figure, feared to be controlled by pain, by a culture contained and with fully targeted information. Aldous Huxley, in your "brave new world", understood that we would be flooded with an endless amount of information, pleasure and controlled by a trivial culture,

based in ordinary situations and distractions. In this way, we reached a point where new generations of consumers are undergoing a change in which possession is not the most important, but rather the use and experimentation. The natural status of ownership comes to be disputed in some cases.

In addition, we will pass through a discussion on the future worker, with changes in current professions and the emergence of new occupations, both formal and informal. We will carry the discussion on lasting careers in midsize and large enterprises or on the ability of employability focuses on knowledge and skill of each professional. When, what will matter will be the experiences and achievements accumulated and that will be employed and offered in different environments throughout their lives.

Staying connected and aware of the changes, participating in them becomes our best alternative and our main demand, if we want to be part of this transformation. Learning to use the technology and its potential will put us in a different situation. Evaluating the social impacts of change, proposing viable alternatives in our designs to include people and professionals and avoiding the chaos of transformation is an additional challenge of society, enterprises and a requirement of each one of us. Information, knowledge, choice and adaptability are the key weapons of this participation.   Regarding our well-being, there will be no choice but to learn more and more about the world in which we operate, where new technologies are leading us, about what can be our alternatives and how can we collaborate with society. In other words, in the opinion of these authors, the human being in the new digital society, need to carry out your role in an integrated manner, conscious and participatory. The directions here explored, in particular to the extraordinary advancement of technology and the economy. The use of durable, formal education, knowledge sharing and integration of less able will have to be a common goal of society.

These are the challenges that will require of us, academics and professionals from all areas, adaptability and constant efforts to track and discover new paths, behaviors and opportunities in these times of IoT, of the Fourth Industrial Revolution and The New Digital Age, that may help fostering a more Humane Development and the Global Well-Being.

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Interlinkage of Use of Technologies for Women Empowermentin SDGs

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Abstract: Closing gender gap has been one of the most esoteric problems in Japan. Technology seems to be a keyword to solve the problem. Various technologies including IoT, artificial intelligence, big data has been producing many successful cases. Gender equality was designated as Goal 5 of Sustainable Development Goals (SDGs). This research examined a utilization of an interlinkage visualization tool for SDGs targets. Especially we focused on the target 5.B "Use of technologies for women empowerment" in Goal5 and compared with linkage of China and Viet Nam in order to optimize relations of gender gap in technology and other targets and to find out the difference of linkage in each country.
Key words: Gender; Technology; SDGs; Gender gap; Interlinkage

1Introduction and Background

1.1 History and characters of SDGs

In September 2015, the 2030 Agenda, the "implementation of 17 Sustainable Development Goals (SDGs)," was agreed upon by the world community in the United Nations. There are17goals and 169targets in SDGs (ICSU, 2017).

Remarkable characters of SDGs make all countries including developed countries to pursue them with hard works and the obligations although each goal is difficult to achieve.

First, prior to SDGS, MDGs (Millennium Developing Goals) were enacted year 2000 to solve world concerns mainly poverty and hunger of developing countries.The due was 2015, but most of them did not reach the goals. Idea of SDGs was proposed by Columbia in 2011 before the Rio +20 conference (UN sustainable development conference) insisting that these problems were not only for developing counties, but for developed countries. Guatemala and other countries supported the idea. Consequently, in SDGs, every country becomes stake holders to achieve goals.

Second, SDGs creates common indicators in need to achieve global ambitions and goals in integrated and fusional ways. Index are now shared and developed. And this helps find best practices and connect stakeholders even in far countries.

Thirdly, SDGs activities are done by autonomous, distributed, and cooperative manners rather than by rules. They are not controlled by the United Nations or other organizations. So the activities may seem free and chaotic at first glance. However, thanks to the Internet and SNS, communication and exchange of detailed information in a distant country became possible. These result in greater efficiency and positive integrated actions for many stake holders.

Lastly, there is an imminent goal by 2050 that the biosphere must support 9 billion people. There are problems of global warming, water, air and soil pollution, decreasing biodiversity, population increase, food shortage, energy problems etc.

1.2 Current situation of gender equality in Japan

Gender Equality was designated as Goal 5 among 17 goals. Goal 5 is aiming to achieve "gender equality and empower all women and girls". Japan ranked 11th (80.2) in total SDGs Index score, however, its achievement of SDG5 is the lowest (60.7) among top 20 countries of SDG Index score. Hungary is the second lowest (66.1) and Czech Republic is the third (69.9) in the score. Comparing to relative values which is SDG5/SDG Index, Only Japan is scored below 80 (75.7), followed by Hungary (84.7) and Czech Republic (85.3).

According to World Economic Forum, Japan's global ranking in gender gap is 114th among 144 countries in 2017 and Japan ranked 114 in EconomicParticipationandOpportunity, 123 in political empowerment. The gender gap in Japan is larger than other developed countries and has not been improved yet. As for technology point of view, the rank of number of professional and technical workers is low (101th)(World Economic Forum, 2017).

In Japan, various policy for gender equality has been pursued. However, ranking of Japan's Gender Equality has not been improved yet.
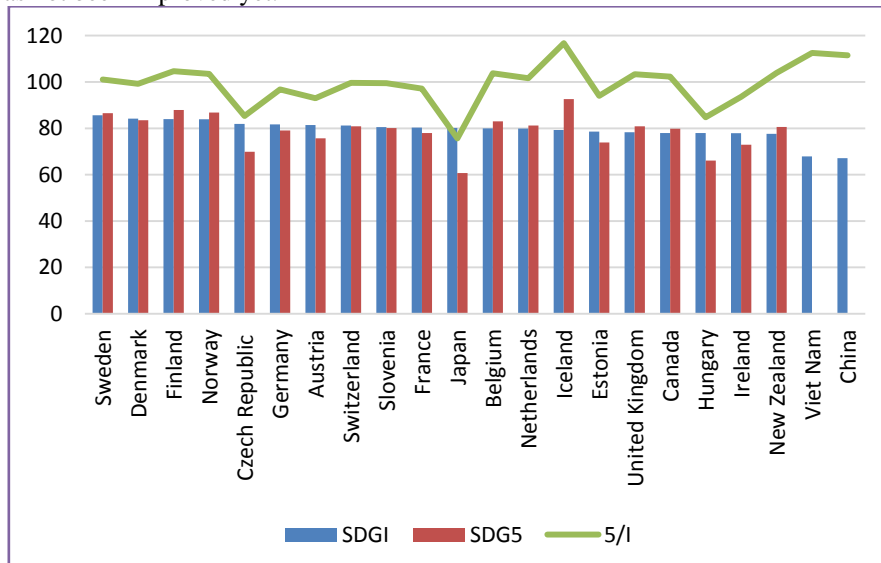
Figure 1　Top 20 Countries' scores by SDGI and SDG5

1.3 Technology for gender equality

Nowadays, the progress of technology is making greater impact on society than ever before, causing discontinuous paradigm shift as a whole, as sharing economy and virtual currency for example.

Positive using the platform of AI, IoT, and big data might solve complicated systems, and consequently the possibilities for contribution to a sustainable society, that balances economic development and solving of social issues, could increase.Under these conditions, gender quality in technology related issues and technological approaches to attain gender equality will be crucial in order to achieve SDGS. Therefore, the question is "Can technology eliminates gender gap?", "How extent?", "How fast?", "What is impact on society"

So far, technologies have had influence on gender gap in various ways. Using ICT such as mobile phones and internet has been providing information at reasonable price and been effective on information literacy and opportunity of education, especially in less developed countries.

In Japan, gender gap in technology related issues still large. A focus group analysis on an ICT enterprise showed conventional behaviors and perceptions by both men and women pertaining to marriage, childbirth and childrearing prevented promotion of female engineers. As a result, female engineers became passive and had less chance to get technical capabilities and management skill in their work after joining a company(S. Hirata and Y. Hayashi and,2017).

Teleworking by using ICT has increased flexible working styles. Our previous research using scenario planning indicated that new working style brought by teleworking has a possibility to overcome obstacles of gender gap in leadership position and professional position in companies. Three obstacles, "expertise", "minority" and "evaluation" which prevented women's promotion showed the research above, were identified to be overcame by teleworking using ICT, big data, and data visualization (Y. Hayashi and S. Hirata,2018).

After "the Act on Promotion of Women's Participation andAdvancement in the Workplace" was enacted in August 2015, Japanese government established a database for empowering women in enterprises by visualization of gender gap index in February 2016. It obliged large companies with more than 301 workers to formulate and notify general employer action plan and publish one or more out of 14 items on the current values relating to empowerment of women. Visualization of data such as female employment ratio, gender differences of employment years, status of working hours, ratio of female managerial positions, etc. enables improvement of comparability of companies by index and ranking, evidence-based approach, and ESG investment. 9,506 out of about 12,000 obliged companies have registered the database. However, data visualization of gender gap is not enough in many areas.

2 Analytical Methods

2.1 Hypothesis

As mention above, ICT plays important role in achieving gender equality. We would like to investigate targets which have influence on gender equality by technology.

Therefore, we set up a hypothesis, that is "although gender gap tends to be diminishing with the development of technology such as ICT, some targets with strong positive or strong negative influence on the targets in Goal 5 exist," and analyze it.

2.2 Analytical tool

In this research, we used "SDG Interlinkages Analysis & Visualization Tool (V2.0)[1]" developed by IGES. This tool identifies interrelationships of 108 targets among 169 based on literature review and knowledge of international consultations such as the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) and Sustainable Development Solutions Network (SDSN) on SDG indicators. This tool is aiming at 1) integrated approach forSDG implementation; 2)Network analysis of the general structure of SDG interlinkages and identification oftop SDG targets; 3)Quantification and the structural analysis of the networks of SDG interlinkages atthe national level; 4) providing country-specific dashboards; 5)A web tool on SDG Interlinkages and Data Visualization (X. Zhou and M. Moinuddin, 2017). Base on chronological data collected from 2001 through 2014 in nine Asian countries including Bangladesh, Cambodia, China, India, Indonesia, Japan, Korea, the Philippines, and Vietnam, the tool makes it possible to provide statistical data, the regression analysis of the series data, the mutual linkage of the quantified SDG targets, visualization of mutual linkage and identify strategic targets by applying social network analysis.

Among nine countries in the dataset of "SDG Interlinkages Analysis & Visualization Tool," we chose Viet Nam with the highest gender equality and China with the highest GDP to comparing with Japan.

SDGs' indicators are set to be globally universal indicators that have taken over some of MDGs' index. Adding to IAEG-SDGs and SDSN mentioned above, the Bertelsmann Stiftung collaborate to define and revise those indexes after discussion. Credibility of data is classified three tiers;Tier1[2],Tier2[3],Tier3[4] and Tier document contains all past updates after tier is revised based on discussion (United Nations, 2017).

2.3 Target to be analyzed

Goal5 "Gender equality" has 9 targets from 5.1 to 5.6 and 5.a to 5.c. Among 9 targets, we chose target 5.b, that is "Enhance the use of enabling technology, inparticular information and communications technology, to promote the empowerment of women," which is the only target that relates to ICT technology issue directly[5].

An indicator of 5.b, "5.b.1 Proportion of individuals who own a mobile telephone, by sex," was proposed as Tier2 initially and became Tier1 at the third meeting of IAEG-SDG saying "there is broad,global data coverage for this indicator (United Nations, 2017)." International Telecommunication Union (ITU) indicated that "discrepancies exist between the proportion of men and women that access, own, use, and benefit from ICTs and this indicator is important to track the gender digital divide", and stressed the importance of mobilephone ownership as opposed to shared ownership, for a person'sindependence and autonomy (ITU, 2015).

2.4 Limitation

Only 46 countries' index data "5.b.1 Proportion of individuals who own a mobile telephone, by sex," are available at SDG Indicators of Global Database beta 0.2.52 and 7 counties out of 46 is missing data by sex.[6] "SDG Interlinkages Analysis & Visualization Tool (V2.0)" uses "Mobile cellular subscription rate" instead. This will be difficult to know linkage with technological gender gap in this analysis.

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[1] https://sdginterlinkages.iges.jp/

[2] Tier 1: Indicator is conceptually clear, has an internationally established methodology and standards are available, and data are regularly produced by countries for at least 50 per cent of countries and of the population in every region where the indicator is relevant.

[3] Tier 2: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.

[4] Tier 3: No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested.

[5] 5.1 to 5.4 are about violence, discrimination, forced work economically, politically, and because of weak position. 5.5 is about equal opportunities for leadership at all levels ofdecision-making. 5.6 is reproductive health and reproductive rights. 5.a is rights to economic resources. 5.c is legislation for the promotion of gender equality.

[6] https://unstats.un.org/sdgs/indicators/database/

However, most of the countries in the Database, gender gap of proportion of mobile telephone is not so big especially in high proportion countries. Therefore, a country with a high proportion considers gender gap to be small. These problems of aggregated data were pointed out in SDG Index and Dashboards Report 2018 (Bertelsmann Stiftung, 2018).

It has been a longstanding problem that data did not exist or not being disclosed in Japan, as well. As mention above, the database for empowering women was established to disclose data by sex.

3 Results and Discussion

We conducted an analysis on interlinkage of 5.b with data of Japan, China and Viet Nam.

Figure1,2,3 show interlinkage of target 5.b with other targets in Japan, China, and Vietnam. A solid line means positive linkages of each target, a red line indicates negative linkage, and dotted line indicates that data do not exist but a linkage was recognized through expert group's discussion.

Table1 shows Comparison of linkages of targets among Japan, China and Viet Nam. There is some remarkable difference among three countries.

Figure 2   Japan's Interlinkage

Figure 3   China's Interlinkage

Figure 4   Vietnam's Interlinkage

Table 1　Comparison of Linkages of Targets among Japan, China and Viet Nam

	index of UN	Tier Classification	possible custodian agency	index of IGES tool	Japan	China	Viet Nam
2.1	2.1.1 Prevalence of undernourishment	Tier I	FAO	Proportion of population below minimum level of dietary energy consumption	0	0.86	0.77
	2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)	Tier I	FAO				
2.2	2.2.1 Prevalence of stunting (height for age <−2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age	Tier I	UNICEF	Prevalence of wasting in children under 5 years of age, weight for height	N/A	0.8	0.72
	2.2.2 Prevalence of malnutrition (weight for height >+2 or <−2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 by tipe (wasting and overweight)	Tier I	UNICEF				
2.A	2.a.1 The agriculture orientation index for government expenditure	Tier I	FAO		N/A	−0.1	0.73
	2.a.2 Total official flows (official development assistance plus other official flows) to the agriculture sector	Tier I	OECD				
2.C	2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	Tier II	FAO		−0.67	−0.9	−0.87
4.3	4.3.1 Participation rate of youth and adults in formal and non−formal education and training in the previous 12 months, by sex	Tier II	UNESCO-UIS	Goss enrolment ratio, tertiary	0.98	0.97	0.91
4.4	4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill Tier	Tier II	NESCO-UIS IT	Lower secondary completion rate, total	N/A	0.93	N/A
6.2	6.2.1 Proportion of population using safely managed sanitation services, including a hand−washing facility with soap and water	Tier I	UNICEF, WHO	Percentage of population with access to improved sanitation facilities	N/A	0.92	0.72
8.2	8.2.1 Annual growth rate of real GDP per employed person	Tier I	ILO		−0.7	0.12	−0.16
9.C	9.c.1 Proportion of population covered by a mobile network, by technology	Tier I	ITU		0.93	0.87	0.9
11.2	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	Tier I	UN Habitat		N/A	0.98	0.84
13.1	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population	Tier II	UNISDR		0.01	−0.3	−0.32
	13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction2015−2030	Tier II	UNISDR				
	13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	Tier III	UNISDR				
16.10	16.10.1 Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human	Tier III	OHCHR		0	0.71	0
	16.10.2 Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information	Tier II	UNESCO-UIS				
17.6	17.6.1 Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation	Tier III	UNESCO-UIS	Researchers in R&D (per million people)	0.93	0.99	0.97
	17.6.2 Fixed Internet broadband subscriptions per 100 inhabitants, by speed	Tier I	ITU				
17.8	17.8.1 Proportion of individuals using the Internet	Tier I	ITU		0.97	0.99	0.97

3.1 Case of N/A

In 2.2[1], 2.A[2], 6.2[3], 11.2[4], there are data in China and Vietnam, but data is N/A in Japan. In 2.2, For example, "Prevalence of stunting" and "Prevalence of malnutrition" were surveyed by UNICEF while Japan was out of target because children's health condition seemed to be good. As for "Prevalence of

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[1] By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.

[2] Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries

[3] By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations

[4] By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

stunting", data of Japan exist in World Bank[1] in 1980 and 2010, and in 2010, the rate is the same range as China from 5% to 10%[2] as figure 5 shows. In both China and Vietnam, a number of stunting has been decreasing greatly. In Japan, percentage of stunning has been the same since 1980. In particular cases, some children's stunting stemmed from parents' neglect or child abuse[3].
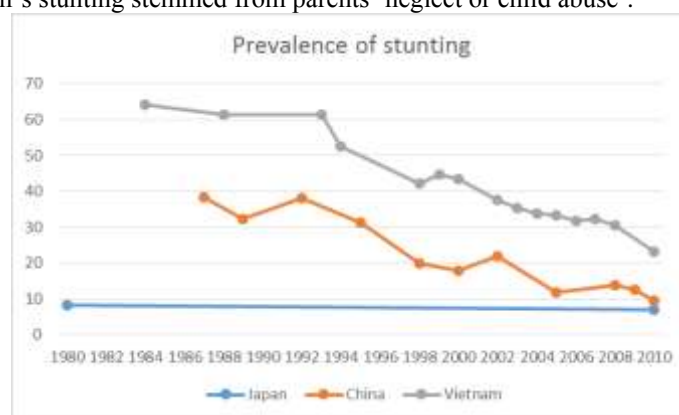
Figure 5   Prevalence of Stunting
Source: World Bank

In the case of 6.2 as well which is "Proportion of population using safely managed sanitation services," Japan was out of target.

In 2.2, 6.2, 11.2, China and Vietnam have strong linkage with 5.b.

3.2 Difference between positive and negative

The index of 2. A, that is "The agriculture orientation index for government expenditure (AOI)", has negative linkage with 5.b of China while positive linkage with 5.b of Vietnam. According to FAO, AOI "provides a way to assess whethergovernment expenditures on agriculturereflect the economicimportance of thesector. This index iscalculated as the share of agriculture intotal government expenditure divided bythe share of agriculture in total GDP. It isan indicator of the degree to which theshare of agriculture in public expenditure iscommensurate with the weight of the sectorin GDP[10] (FAO, 2012)."

The importance of agriculture is lower in China than in the case of ICT growth, and in Vietnam the possibility is that ICT and agriculture grew as economy has grown.

3.3 Negative correlation in Japan

In index of 2.C, that is "Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility," negative correlation with 5.b is smaller in Japan than in the two countries.

Japan has a strong negative correlation to Target 8.2, that is "Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors," while China have weak positive correlation and Vietnam has a weak negative correlation. An index of 8.2 is "Annual growth rate of real GDP per employed person," it is difficult to reflect an objective of target.

3.4 Strong correlations in three countries

The correlations to 4.3[4], 9. c[5], 17.6[6], 17.8[1] are high in all three countries. Each target without 4.3

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[1] data-catalog/world-development-indicators

[2] https://ourworldindata.org/hunger-and-undernourishment

[3] Nikkei: March 5th 2010; September 6th, 2010; July 25th 2013

[4] By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

[5] Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

[6] Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology

has relation with technology dissemination issues. Therefore, when the proportion of mobile phones increase, there is a possibility to have positive relation with each target.

3.4 Strong correlations in China

The correlation with 16.10, that is "ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements" with the index "Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human rights advocates in the previous 12months" and the index "Number of countries that adopt and implement constitutional, statutory and/or policy guarantees for public access to information" is high only in China.

It is inferred that public access to information and protecting fundamental freedoms has been improved as development of ICT.

4.4, that is "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship, "has data only in China with high correlation, too.

4 Conclusion

Finally, we concluded as follows.

-This tool helped to visualize interlinkage among targets, and it turned out that international comparison is also possible to some extent.

- As the hypothesis, there was a difference in positive or negative correlation depending on the country, even for the same target. By knowing the data being used and knowing definition of data, you can investigate the relationship of the target further more.

- At this stage, there is a limit to the data that can be acquired, and it does not necessarily reflect the contents of the targets. Problems of aggregated data are remarkable especially in gender difference. Index of 5.b did not have data by sex and UN started to collect.

As more effective indexes can be specified by selecting and analyzing, it is desirable to define and accumulate data for the indexes for future comparison.

- Just by looking at the correlation result of the data, we did not realize the essential part of correlations, but it gave us hints to learn the candidate of the problem within achieving goals. More discussion of experts will be necessary for analyzing these results.

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facilitation mechanism

[1] Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology

Application of Enterprise Business Intelligence in the Background of Big Data

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Abstract: With the advent of the 21st century, the application of advanced technologies, such as big data, cloud computing and artificial intelligence, in enterprises forms the concept of "business intelligence", which brings new methods and means to enterprise information processing. This paper uses literature review and contrast method to study and analyze the situation and trend of business intelligence application in enterprise management in China, Japan and other countries, and proposes that the application of business intelligence can greatly benefit the business operation and development. If business intelligence tools are well used in enterprise management, it will promote the decision-making capacity of enterprises. At the same time, combining their actual development situation and market changes, enterprises can flexibly use business intelligence to establish a good enterprise information management system, which can help the enterprises fully control their work and promote their sustainable development.
Key words: Big data; Business intelligence; Enterprise management

1 Introduction

In today's world, with the acceleration of information construction of most enterprises, the information construction has been greatly improved, and the amount of business data that can be stored in enterprises is also increasing. However, with the speeding-up of enterprise information construction process, it is urgent to establish a complete business management system in enterprises. If a complete business intelligence system can be introduced and established and the system and related tools can be better applied in enterprise development process, the enterprise management will get assistance to manage the company more efficiently (JinYihong, 2014). Meanwhile, it is also beneficial for the leadership to make scientific and reasonable decisions, and ultimately the competitiveness of the enterprise will be improved. Hence, the application of business intelligence system and the related tools is of great practical significance for better development of the company.

2 Overview of Domestic and Foreign Research

At present, scholars at home and abroad have made great efforts to study the business intelligence of enterprises in the context of big data. As for foreign countries, developed countries such as the United States have entered big data era earlier, and for Asian countries, Japan also has a rapid development in big data and owns a lot of research literature on big data and enterprise informatization. In addition, many foreign scholars have made further studies on business intelligence in recent years. Corinne Jeannet, a Japanese scholar, put forward the application of enterprise business intelligence system based on cloud computing in 2017. He said that it is necessary to establish and improve a business intelligence system in enterprises, and through the application of the system, companies will have an all-round development (ManelBrichni et al, 2017). At present, Japan enjoys high-level technology, and its big data and cloud computing technologies rank among the top in the world. However, in order to cope with possible risks in the future, the Japanese government has also formulated a series of policies to greatly develop IT industry, especially big data and cloud computing. In June 2013, Abe's cabinet announced "The Declaration of Creating the Most Advanced IT Country" that comprehensively described Japan's new IT strategy which put the development of public data and big data at its core from 2013 to 2020 and proposed to build Japan as the society applying information technology widely and with highest standard. In recent years, Chinese scholars have published a number of papers on business intelligence and big data research. For example, Huo Zhijin clearly pointed out in the article "The Application of Business Intelligence in Enterprise Information Construction" in 2016 that the current development of big data technology facilitates the development of enterprise information construction. Furthermore, business intelligence tools used in enterprises have also been derived, and the growth of enterprises is driven by the tools (Huo Zhijin, 2016). In his article "The Application of Cloud Computing in Business Intelligence and Its Influence on the Core Competitiveness of Enterprises" published in 2013, Zhu

Zhangxiang believed that cloud computing has brought great vitality to the development of global economy, enabling enterprises to target globalization (Zhu Zhangxiang, 2013). At the same time, business intelligence technology based on big data and cloud computing has also developed rapidly and its application model in enterprises tends to be mature. The core market competitiveness of enterprises is increasing day by day, which fosters the realization of enterprise economic construction and strategic objectives to a certain extent.

However, with relatively backward research on big data technology, China lacks sufficient understanding of business intelligence, so it needs to actively study the advanced concepts from developed countries to provide more theoretical guidance for the development of Chinese enterprises' business intelligence (Liang Ting-Peng, 2018).The application of business intelligence is beneficial to the operation and development of enterprises. In addition to effectively promoting their decision-making ability, enterprises can also flexibly apply business intelligence according to their own development and market changes to build a good enterprise information management system which can help enterprises to manage comprehensively and promote their sustainable development (Peng Yu, 2014).

3 Overview of Big Data and Business Intelligence

With entering the 21st century, big data technology emerged on the basis of the rapid development of the Internet industry. At the same time, business intelligence has developed rapidly because of e-commerce development. Hence, there is a very close relationship between big data and business intelligence. The development of big data technology has laid a solid foundation for the development of business intelligence (Wang Zhongyu, 2014).

3.1 Big data and its development

Generally speaking, big data refers to the huge flow of information, which is larger than traditional data. However, in theory, big data refers to the data sets that can't be captured, managed, and processed by conventional software tools within a certain time range, and it is the mass and diversified information assets with high growth rate that need new processing mode to obtain stronger decision-making ability, insight and process optimization capability. First, according to the latest survey, the current data magnitude has been developed to PB and even EB and ZB levels, which is beyond human imagination. Secondly, there are many types of big data, including structured, semi-structured and unstructured data. The third is that though with huge capacity, big data enjoys fast processing ability with high efficiency and accuracy. Finally, big data has a low density. Due to its low value coverage density, people need to extract valuable information from vast amounts of data. It can be seen that the rapid development and innovation of big data technology has laid a solid technical foundation for the development of business intelligence.

At present, MapReduce is the mainstream tool used by enterprises and national institutions for data calculation and processing. However, with the continuous increase of data and the growing difficulty of data processing, MapReduce can't fully meet the needs of big data anymore, so new big data computing models are being studied. At this time, batch computing, stream processing calculation, iterative calculation, graph calculation and other calculation modes emerge to calculate big data from various dimensions according to different structures of it. In addition, the application of big data in enterprises is relatively good. Big data is actively used in most enterprises to improve their operational efficiency, helping enterprises to control more data resources. The utilization of big data drives the development of business intelligence which can benefit enterprises to target globalization and promote enterprise competitiveness in the same industry (Wang Wancheng, 2015).

3.2 Business intelligence and its development

Howard Dresner, an analyst of a market R&D company Gartner, is the earliest person who put forward the concept of business intelligence. In 1996, he proposed business intelligence that could describe a series of concepts and methods and benefit commercial decision-making by a data-based analysis system. Business intelligence provides enterprises with the technology and methods to quickly collect and analyze data, and it can transform data into useful information to improve the quality of business decision-making. After more than two decades of development, its theoretical research is relatively mature. In concept, business intelligence refers to using data warehouse and data mining technology to systematically store and manage customer data, and then analyzing customer data through various statistical analysis tools, and getting various analysis reports, such as customer value evaluation, customer satisfaction evaluation, service quality appraisal, marketing effect evaluation, as well as future market demands, which offers decision-making information for enterprises in various business activities

(Pall Rikhardsson and OganYigitbasioglu, 2018). Enterprises can use modern big data technology to collect and organize information and data. Meanwhile the technology can be used to process effective information inside and outside enterprises to provide reference for the upper level decision-making (Xue Yun, 2014).

Currently, business intelligence is quite frequently applied to enterprises. Most companies in Japan have built complete business intelligence system by using a series of business intelligence tools to process information, which provides great guidance for work. Obviously, business intelligence is very crucial to economic and sustainable development of enterprises.

4 The Development of Enterprise Business Intelligence in the Background of Big Data

Business intelligence (BI) in the background of big data covers many information technologies, mainly including CRM, ERP, database and data mining. Integrating these technologies helps information construction of enterprises. Besides, the present business intelligence technology applied to enterprises has more advantages over the traditional technologies such as EIS and DSS, and it also has greater influence on corporation production, operation and even the entire industrial chain. With the advent of big data era, in most enterprises, the BI system has been set up and BI technology has been widely used, which boosts companies not only in management and decision-making but also in transformation, so the application of business intelligence is of great significance to the realization of corporate strategic goals. Although most companies are now using BI to promote their development, many of them are still not able to master it. In the circumstances, they need to actively use big data and cloud computing to improve BI technology. For instance, companies can integrate big data with search engine technology to strengthen the application of transaction-driven BI, enhance the real-time data processing capabilities of enterprise business intelligence system to provide more personalized services and demand configuration for users (Zhang Yuanxin, 2013). Over time, the informatization construction and sustainable development of enterprises can be promoted.

5 The Application of Enterprise Business Intelligence in the Background of Big Data

5.1 In enterprise e-commerce website construction

As the window of an enterprise to the Internet, e-commerce website plays a basic role in enterprise information construction. In the era of big data, the construction of e-commerce website in enterprises has been accelerated, which mainly results from the application of enterprise business intelligence technology. Firstly, the application of BI can help enterprises better process data and give them more excellent technology for high-efficiency and high-quality construction of e-commerce websites, through which more users can be served. Secondly, BI has great significance for data warehouse, on-line analysis and data mining technologies to accelerate the process of enterprise informatization. Traditional data analysis methods and data mining technology are not sufficient to support the construction of new e-commerce websites, but the business intelligence can change the situation. Thus it can be seen that BI has a relatively wide application in the construction of enterprise e-commerce websites, and it plays an important role in corporate globalization.

5.2 In enterprise information management system

Every large enterprise has its information management system, but most of them are not perfect. It is an indispensable system for enterprise information construction, and this system is of great importance for business decision-making. Moreover, the application of BI furthers enterprise information management system. With the development of big data technology and the continuous improvement of the Internet, the market has higher requirements on information processing and enterprise management, therefore generates BI, a kind of high-tech product. BI is mainly to integrate new information technology into an enterprise information management system, helping the collection, filtration, arrangement and utilization of data more efficiently for the good reliability of enterprise informatization.

For example, Japanese Panasonic Corporation and Toyota Motor has applied BI in a large scale to enterprise management, which has obtained excellent economic benefits in recent years. Panasonic Corporation's operation revenue reached US$ 68.221 billion in 2017, ranking 128th in the world's top 500; Toyota Motor's operation revenue in 2017 reached US$260.06 billion, ranking 36th in the world's top 500. These large Japanese companies all use BI system, and its application improves the enterprise

information management and information construction level of Japan. In addition, according to "2017 National Innovation Quality Report" published by "The Economist", Japan's national innovation index was 94.4, ranking third in the world in 2017, while China's innovation index was only 69.8 as they are shown in chart 1 below. It can be seen that enterprise innovation development and economic development determine national innovation index. Hence, it is quite necessary to strengthen the application of business intelligence in the construction of enterprise information management system in China and continuously innovate business intelligence and enterprise information construction for comprehensive enterprise innovation.
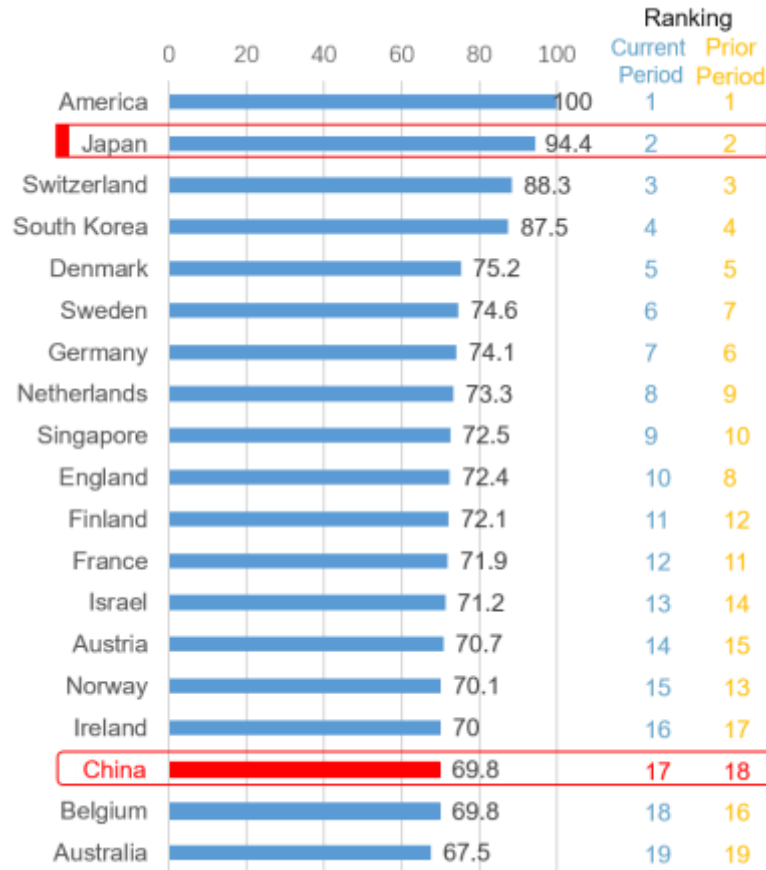
Figure 1   2017 National Innovation Quality Report Published in Economist

Therefore, business intelligence in the context of big data plays a vital role in enterprise information construction and sustainable development. In addition, the further application BI in the construction of enterprise information management system enables the company's leadership to make decisions more scientifically and rationally, which comprehensively promotes the enterprise's information construction and sustainable development.

6 Conclusion

To sum up, in the background of big data, enterprise management can't develop without business intelligence. The reasonable application of business intelligence tools can help enterprises effectively integrate and provide internal and external data quickly and accurately for decision-making. As a result, dynamic decision-making ability of the management can be greatly improved. In addition, by discovering the problems existing in the process of information construction, BI can help enterprises to perfect information construction with the combination of CRM, ERP, database, data mining and other technologies. In the meantime, many factors such as organization structure, management process, data supervision and continuous data improvement, data access and user support methods, information security and availability, and the application of system construction model and planning upgrade shall also be considered in information construction to help enterprises to perfect information management

system and e-commerce websites, improve corporate profits and operational efficiency and enhance business transparency for business development with a virtuous circle.

Acknowledgement

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Digital Transformation in Healthcare Services Sector of Bangladesh: Current Status, Challenges and Future Direction

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Abstract: Digital transformation in healthcare services has massive potential to ensure healthcare quality, accessibility, equality & affordability in developing countries. Bangladesh is not exception to this trend for digitalization of healthcare sector as a part of vision 2021 of digital Bangladesh. This paper aims to explore the current standing of the digital transformation in healthcare services sector of the public, private & NGOs, as well as the managerial and technical challenges facing the digitalization of healthcare projects in Bangladesh. The digital transformation in healthcare is at the introductory stage in Bangladesh. Studies explored that although digitalization of this sector remains somewhat problematic, the difficulties and challenges could be overcome. Due to lack of technological knowhow, literacy, poverty, trust, attitudes, resistance to change and infrastructural facilities, this project does not work effectively and efficiently. Based on the assessment of this sector, the scope of some fields requires further improvement. The findings will help government agencies, policymakers, healthcare providers and mobile phone companies to make effective decisions regarding the digitalization of Healthcare services.
Key words: Digital transformation; Healthcare; Challenges; Bangladesh etc

1 Introduction

As a result of rapid globalization and the exponential advancement in information and communication technology (ICT), healthcare sector has been changed dramatically over the past decade in many countries of the world. The diffusion rate of digital technologies in this sector has quickly progressed over the past ten years (Ivatury et. al., 2016). Digital transformation of healthcare could be the keystone of a successful reform of healthcare systems for improved efficiency and effectiveness for the benefit of the people. Recently, Information and communication technologies have transformed all sectors of society. The health sector is no exception to this trend. Digital transformation of healthcare creates an exciting, new realm of possibilities for medical services in rural areas that are simultaneously experiencing growth and renewal (Alami, 2017). Healthcare is a critical part of the economy of Bangladesh and improving the healthcare sector is one of the sustainable development goals. In addition, Health performance and economic performance are interlinked. But problems such as excessive costs, insufficient resources, uneven quality levels and inequalities in terms of access to healthcare plague the current healthcare industry. As a part of vision 2021 of digital Bangladesh, the application of ICT to healthcare, especially digital services are explosively advancing. Research on the adoption of e-Health which is the part of digitalization in developing countries, has shown that e-Health/mHealth can be potential solutions to provide better access to healthcare facilities for patients, physician, nurses and other healthcare staffs, increase care quality and improve collaboration (Khalifehsoltani & Gerami, 2010).

Like other developed and developing countries, healthcare sector has become the blessing of ICT in Bangladesh which has been recognized as one of 57 countries in the world with a critical shortage in health workforces (hospitals, doctors, nurses and midwives number below 2.28 per 1000 population) and number of beds (4 per 10,000) in hospitals (Mostafa R., 2016). Bangladesh has an extreme scarcity of well trained nurses, physicians and healthcare resources in comparison to the international standard (i.e. the nurse-patient ratio is 1:4 for general care, and 1:1 for intensive care). In Bangladesh, these ratios are 1:13 for general patients and physicians outnumber nurses with a ratio of 1.3:1 (Ministry of Planning, BD, 2017). So, effective initiatives need to be undertaken to improve these ratios significantly by 2021. In addition, providing affordable, accessible, equal and adequate healthcare is a challenge due to poor healthcare infrastructure and high population density. Due to explosive growth of population, poor sanitation, chronic diseases and Bangladesh faces double burden of diseases: Non-Communicable diseases: Diabetes, Cardiovascular diseases, Hypertension, Stroke, Chronic respiratory diseases, Cancer and Communicable diseases: Tuberculosis, HIV, Tetanus, Malaria, Measles, Rubella, leprosy and so on.

In order to overcome these problems, the government has started a new initiative in the health sector by incorporating digital technology for health service delivery which is a part of making digital Bangladesh by 2021. But, there are extremely few well trained individuals and there is a strong demand for capacity building and experience sharing, especially for implementation and policy making (Ahmed et. al., 2014). Most previous studies have only focused on the application of eHealth, in Bangladesh like m-Health, telemedicine, electronic health record, telecare (Hoque at el., 2014). Unfortunately, there is lack of investigation of the current status of digital transformation in health care sector of Bangladesh. So, it is imperative to examine the current status of digital transformation in health sector of public, private sector & NGOs, challenges of digitalization and finally provide recommendations & future direction at the end.

2 Key Concept of Digital Transformation in Healthcare Sector

Expansion of the computer networking is the absolute marvel that makes possible the digital transformation of health care. Impressive advances in programming languages and operating systems over the past few years also have solidified the foundations of digital health care (Jeffrey C. Bauer, 2002). Digitalization includes key areas i.e. reconfiguring the customer value proposition-what is being offered-and reshaping the operating model-how it is delivered. It is generally understood to be the application of Computer, Internet, Mobile phone and other technologies to improve the patients' health status. It involves the use of information technologies to improve health in general and the healthcare system in particular. Given the right policies, organizations, resources, and institutions, ICTs can be powerful tools in the hands of those working to improve healthcare. Surprisingly, this sector has been characterized with some uniqueness that patients have fewer self-service options than they have in other sectors, and less access to trusted information on the quality of care on offer. With regard to the potential for digital and social media, healthcare is distinct from other sectors in several important ways (Erwin Bellon, 2016).

3 Current Status

Digitalization in healthcare services sector is at the infant stage in Bangladesh. In fact, Bangladesh has not yet been prepared to properly cope with the adoption of ICT in the healthcare services sector. There are no specific rules and regulations for applying ICT efficiently and effectively in healthcare sector. In Bangladesh, the role of ICT depends on specific circumstances and some applications of ICT are more used than others. With the exponential progression of internet usages, Bangladesh has stepped down two ranks in the global ICT Development Index by securing 145th among 175 countries (Khatun F., 2015). The following table 1 shows the exponential growth of the number of internet users in Bangladesh from 2005 to 2017.

Table 1   The Numbers of Internet Users in Bangladesh from 2005 to 2017 (Millions)

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Users	0.36	1.45	2.64	3.71	4.65	5.61	6.90	7.76	10.42	15.27	19.42	21.44	70.00

Sources: Statista, 2018

Currently, Bangladesh is adopting an ambitious national ICT/eHealth policy to incorporate ICTs into their health system, aligning with the Digital Bangladesh Vision 2021. For example, Current initiatives are internet connectivity and doctors' access via mobile phone at over 800 health centers; video conferencing facilities in community clinics; database for health policy planning; OMR based patient-level data collection; rudimentary telemedicine piloted by NGOs; mobile-based helpline with doctors. These digital transformations in healthcare sector spread throughout the digital channel, digital startup and digital initiatives for social impact which are discussed in detailed in the following sections.

3.1 Digital channel

Under the umbrella of digitalization, the digital channels are incorporated into the healthcare service providers such as are telehealth, telecare, mHealth, eHealth, Electronic Health Record (EHR), Video Conferencing, Telemedicine etc. There are 26 initiatives with direct or indirect associations with mHealth and or eHealth in Bangladesh. These initiatives were undertaken by private (15.4%), private for profit (53.8%), private not for profit (15.4%) & NGOs (15.4%) (Ahmed et al., 2014).

3.2 Digital startup

The digital healthcare movement is driving a vast array of startups in Dhaka city, many working in mobile healthcare and healthcare for the last mile population. The following table 2 shows the digital

startup operated in Bangladesh.

Table 2   Digital Startup Operated in Bangladesh

Digital Startup	Remarks
Doctorola	It provides eService to mass people i.e. appointment of doctor, live chat, mobile apps and call center.
Jeeon	It organizes training program for local intermediaries and provides equipment to facilitate consultations with remote doctors in order to provide quality healthcare services to rural patients.
Rx71	It builds a huge platform of health related content in Bangla for creating health awareness and educating people on health issues in their daily life.
Tonic	It makes information and suggestions about health and illness, positive health change and editorial style content.
Doctors.bd.com	It has database regarding blood donor, hospital, medical institute, diagnostic center, clinic, kidney/eye bank and online consultations within 24 hours.
HealthPrior21.com	This platform offers health news and information, e-appointment, e-library, videos, and an e-store etc.
D.Net (Development Research Network)	It provides e-Health services through their tele-centers.

3.3 Digital initiatives for social impact

Recently, the Bangladeshi Government, private sector and NGOs have delivered voice messages to mobile subscribers in rural areas with the aim of increasing utilization of community clinic health services for primary healthcare (Islam, 2015).

4 Bangladesh's Health System

Depending upon the type of services patients required, the level of health care can be divided into three broader categories shown in table 3.

Table 3   Levels of Healthcare Services in Bangladesh

Categories of Services	Features	Remarks
Primary Care	Basic or General Healthcare Upazila hospitals are responsible for it.	Ahmed et al., 2014
Secondary Care	Medical care provided by a physician	
Tertiary Care	Medical colleges and hospitals are responsible for specialized healthcare services	

4.1 Policy initiatives

In fact, Bangladesh is currently in the process of adopting a framework for eHealth and mHealth, based on a decade of experience.   The year 1998 is a milestone for eHealth in Bangladesh as the first eHealth project was launched by Swinfen Charitable. It involved a collaboration between the Centre for the Rehabilitation of the Paralyzed (CRP) in Bangladesh and the Royal Navy Hospital Haslar. As part of the 2008 'Digital Bangladesh' campaign, the public, private and nongovernment organizations (NGOs) have started using mHealth in Bangladesh with approximately 20 mHealth initiatives (Ahmed T., at, el., 2014), including primary healthcare, disease surveillance and data collection, health promotion and disease prevention, and health information systems and support tools (Khatun F., 2014). During the same year, the Ministry of Health and Family Planning Welfare (MoHFW) initiated their first eHealth initiative i.e. Program (HPNSDP) 2011-2016 for Ministry of Health and Family Welfare (MoHFW). The HPNSDP 2011-2-16 comprises 32 operational plans (DGHS, 2012) of which one is the e-Health (Health Bulletin, 2017).

4.2 Digital initiatives in government hospital of bangladesh

Bangladesh government has a wider range of specific programs to gradually improve the e-Health infrastructure and its use in the country. In April 2009, Bangladesh has established the Internet connectivity across all health points down to the Upazila level and in 2012, three hospitals have been included for automation (DGHS, 2012). Currently, most of the private clinics and hospitals in Bangladesh are using their own database system for patient health records i.e. Apollo Hospitals, Square Hospitals &

United Hospital. 19 September of the year 2011 was a notable day for Bangladesh for the recipient of the United Nations ICT award titled, "Digital Nations General Assembly". According to Health Bulletin, 2017, Healthcare sector is providing eService to the mass people through the information technologies i.e. Usage of Mobile phone for healthcare service, Telemedicine, Telemedicine service in Community Clinics, Telecare, Telemedicine in Union information and service centers, Complaints-suggestions through SMS, Pregnancy Care advice through SMS, Health statistics by SMS, Hospital Automation, Electronic Health Record (EHR), Online Population Health Registry, Attendance Monitoring System, Human Resources Databases, Online Processing of Dental-Medical Admission Tests, ADP Progress Monitoring System, GIS in Health Service, Schedule Management Software, Bulk SMS, Digital training facility and internet connectivity in health system (Health Bulletin, 2017).

5 Challenges

The difficulties and challenges facing the digitalization of healthcare on the basis of previous studies shown in the following table 4.

Table 4   Challenges of Digital Transformation in Healthcare Services Sector of Bangladesh

Challenges	Description	References
Inadequate ICT Infrastructure	Internet networks and electricity are not sufficient.	Uddin, G. (2012)
Financial Problems	Dependency on developed countries, foreign investors, World Bank and WHO.	Uddin, G. (2012)
Resistance of Change	Lack of motivation and encouragement regarding introducing and adopting new ICTs.	Khalifeshsoltani, S.N & Gerami, M.R. (2010)
Usability & User Acceptance	Unfamiliar, Unaware, Lack of Trust, Lack of Knowledge.	Hoque (2014)
Lack of Policy and Regulations	No modern legal framework and laws against cyber-crime and laws for electronic authentication.	Uddin, G. (2012)
Leadership and governance	No standard or widely accepted operational framework for eHealth or mHealth in Bangladesh.	Ahmed et. al., (2014)
Poor Health Knowledge	Practices of healthy lifestyles and nutrition habits; health education and health research; prevention programs etc. are negligible and, in many areas, absent in Bangladesh.	S. Akter & P. Ray (2010)
Policy Incoherence	Some projects initiated by government has been abandoned due to political reason.	S. Akter & P. Ray (2010)
Monitoring and Accountability	Lack of proper monitoring mechanism and system of accountability.	Khatun F. (2016)
Poverty	Poor people are neither capable of bearing their health expenditure nor conscious of health, nutrition and sanitation.	Khatun F. (2016)
Interoperability of Systems	No central database for citizen's access. The lack of interoperability and standardization among systems.	Gao, X., et al., (2013)
Corruption	Corruption also prevails in the field of purchasing health materials or equipment i.e. food, medicine, ambulance and health personnel etc.	Alam, J. (2012)
Lack Technological Know-how	Less technical knowledges; lack of trust due to recent false report in the healthcare sector.	Alam, J. (2012)
Crisis in Personnel System	Lack of promotion prospects; Doctors are allowed to do private practice at their convenient time with fee.	BANBEIS (2008)

Over the last couple of years, although the healthcare community has witnessed many improvements in methods and technologies used in healthcare delivery, including mHealth as an emerging area of healthcare applications to improve access, reduce cost, save time, money & energy to healthcare services. However, challenges involved in implementing mHealth to optimal advantage do exist which are shown in the above table 4.

6 Conclusion

Improving healthcare sector in Bangladesh is good but not sufficient and information technology has not been introduced significantly to improve its quality, affordability and accessibility of services to the mass people. The current study shows that the overall situation of digital health care services sector in Bangladesh is not up to the mark. Due to illiteracy, lack of technological know-how, and resistance to change, the recipients of this service are not well-known to these innovations in healthcare services. On

the other hand, Bangladesh government has adopted strategic plan to improve this sector which is a critical part of the economy of Bangladesh. But the sensitivity to digital transformation in healthcare sector is conflicting. In this respect, it can be concluded that service providers have to build a quality ICT based health service that must be easily and widely available throughout the country. Government should develop policy guidelines to monitor and supervise the digitalization of healthcare sector. Future research can be conducted on e-health, m-health, telecare, telehealth, electronic health record, telemedicine, digital startups and video conferencing separately.

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Relationship Between FDI and Economic Growth: Time Series Data of Indonesia

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Abstract: Indonesia is activelypromoting foreign direct investment in the past few years. This has been done with the hope that FDI is going to help the country's economy grow. However thebenefits of FDI might not be realized without the support of sufficient internal factors. This research uses OLS to analyze whether FDI alone is enough to bring positive impact on Indonesia's economy. The paper introduces human capital and trade openness into the equation to find out whether these commonly known absorptive capacities of FDI are also applicable in the case of Indonesia. Using data from 2002 to 2014, this research concludes that FDI alone does not positively affect economic growth. Interaction of FDI and human capital as well as interaction of FDI and trade openness show significant effect on economic growth. The effect is positive for FDI and trade but negative for FDI and human capital. These results should urge the government to encourage trade openness and pay closer attention to the country's level of human capital.Promoting FDI without improving internal conditions of the country is not adequate for the growth of the economy.

Key words: FDI; Economic Growth; Indonesia; Human capital; Trade openness

1 Introduction

The topic of foreign direct investment is no longer unfamiliar in the ears of many especially among economists. This occurence has been researched for decades and explored in numerous ways. Many countries especially developing ones have taken great interest in this area. This is because there is a common belief that foreign direct investment promotes economic growth. The reasons this belief has surfaced is due to many positive effects that foreign investment from developed countries brought upon less developed countries. However many researchers have proven otherwise. At the very least, numerous literatures stated that foreign direct investment alone does not bring economic growth for the host country. There are many arguments, debates as well as empirical studies which shed some light of why this might be. The most important point is that the assumption that higher foreign direct investment results to larger economic growth in all cases should certainly be second guessed. Therefore this paper has the desire to empirically test the effect of foreign direct investment on economic growth in a country which is eagerly looking for foreign investment and that is Indonesia.

Indonesia is a developing country located in South East Asia. It is placed 4th in the world in terms of population with more than 260 million inhabitants. Its GDP ranked 16th and 8th in the world in terms of nominal and PPP respectively. Pricewaterhouse Coopers, one of the big 4 accounting firms in the world projected that Indonesia's GDP (PPP) is going to rank 4th in the world in 2050. Indonesia's GDP growth has been steady at around 5%. The current president of Indonesia has been encouraging foreign direct investment into the country as it can also be seen by the increasing trend of FDI coming into Indonesia shown in figure 1 below.
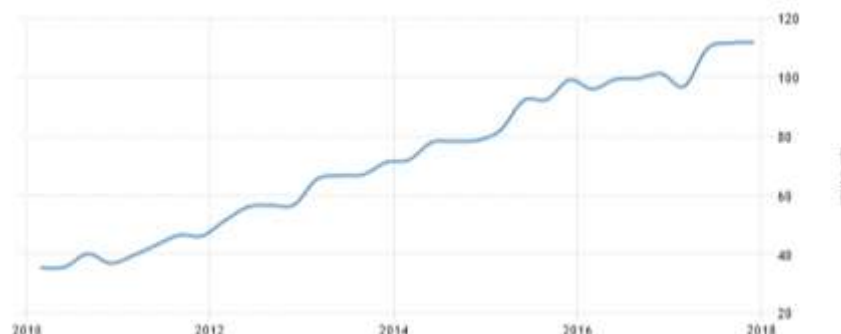
Figure 1   Indonesia's Foreign Direct Investment[1]

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[1]Indonesia Foreign Direct Investment. Trading Economics. (2018)

The question is whether this warm welcome of foreign investment going to support the nation's future and keeps it going in its pace or whether it might actually harm the economy. Since this question should be answered by hard facts and statistics that is specific to Indonesia rather than generalizable results taking into account other countries, a time series study exclusively of Indonesia is going to be carried out in this research. Many researches have been done taking into account data from different countries at once. The result of those researches are not directly applicable to any of the countries in the dataset. Therefore,in order for the result of this research to be useful for the Indonesian government, only data from Indonesia is going to be used. Moreover, as mentioned previously, in many cases FDI does not exert an independent effect on economic growth. Therefore, this research is also going to find out whether there are other variables that induce FDI's positive effect on economic growth in the case of Indonesia. The following section of the paper is going to briefly introduce the literature related to this area of research. Afterward, the methodology adopted in this research is going to be explained on the third part of this paper. Subsequently the result of the research and discussion is shown on the following section. Last but not least, conclusion is drawn in the last section along with several recommendations and limitations of the research.

2 Literature Review

The term of foreign direct investment (FDI), although is commonly discussed in the literature, however its definition is very important to be stated in this paper. This is due to the fact that FDI should be calculated the same way worldwide so that the data can be comparable. The most commonly accepted definition is the one by International Monetary Fund (IMF) and the Organization for Economic Cooperation and Development (OECD) whereby foreign direct investment is the objective of establishing a lasting interest by a resident enterprise in one economy called direct investor, in an enterprise called direct investment enterprise, that is resident in an economy other than that of the direct investor. The definition comes along with many other concepts and principles.

However, the main question is whether FDI does affect economic growth specifically of its host country. This question has been asked and answered by a large number of researchers. There have been many empirical evidences which are conflicting with each other. Therefore in order to make sure that the result of this study adds value not only for the literature but also for practical purposes, this research is only going to take into account 1 country. It means that the result is directly applicable for that particular country, which is Indonesia.

Many empirical researches have proven that FDI does not necessarily affect economic growth in a positive manner. Some proved that the effect does not exist while others proved that it does exist if another variable is introduced into the model. The supporting variables also vary from research to research. Some of the most commonly discussed variables are human capital and trade openness. Several of the authors who support the importance of human capital factor in the relationship between FDI and economic growth are Borensztein, De Gregorio and Lee,Bengoa Calvo and Sanchez-Robles, Li and Liu, Alfaro *et al.*and Fadhil and Almsafir. All of their findings proved the positive effect that human capital exerts in realizing the benefits of FDI on economic growth. Yet, human capital's importance vary in degrees among these different literatures. Some suggested that human capital is a required factor before FDI can affect economic growth in a positive manner. While others suggested that it is important but not a necessary prerequisite.

Trade openness is also discussed deeply by researchers in the area of FDI although it is not as frequently discussed when compared to human capital. Similar with the case of human capital, there are researchers who supported and empirically proved that trade openness is an important variable in unleashing the positive impact of FDI on economic growth. Iamsiraroj & Ulubaşoğlu stated that trade openness is one out of two vital absorptive capacities that a host country should fulfill in order for FDI to have positive effect on economic growth. This result was proven long before by Balasubramanyam, Salisu, & Sapsford . They showed that trade openness is a factor that helps host country reap the benefits of FDI using data from 46 developing countries.

Based on the literature in FDI, it is reasonable to carefully reconsider the positive image of FDI. Therefore in order to ascertain FDI's positivity towards economic growth in the case of Indonesia, this research is going to empirically test several hypotheses using time series data of Indonesia. Human capital and trade openness are taken into account to determine whether the importance of these two variables are also proven in the case of Indonesia. Thus, the following section of this paper proposes several hypotheses to be tested as well as explains the methodology that is used in this research.

3 Research Hypotheses and Methodology

As explained in the literature review above, it is important to test the effect of FDI on economic growth for each country as the literature could not come to a common conclusion. Furthermore, the literature suggested 2 factors which have been proven to play significant roles in the FDI economic growth nexus for many countries. Therefore the following 3 hypotheses also incorporate these 2 factors into account to determine their roles in the specific case of Indonesia. The proposed hypotheses for this research paper are:

$$GROWTH_i = \beta_o + \beta_1 FDI_i + \beta_2 HC_i + \beta_3 TRADE_i + v_i \tag{1}$$

$$GROWTH_i = \beta_o + \beta_1 FDI_i + \beta_2 FDIHC_i + \beta_3 TRADE_i + v_i \tag{2}$$

$$GROWTH_i = \beta_o + \beta_1 FDI_i + \beta_2 FDITR_i + \beta_3 HC_i + v_i \tag{3}$$

These hypotheses are adopted from Alfaro *et al.* (2004) since the objective and model of the research is similar to this research although the data set are completely different. Alfaro *et al.* (2004) used cross-country data set from 1975 to 1995, which is a panel data, however this paper is going to use time series data of a single country. The variables introduced are also different sinceAlfaro et al.focused on financial market, while this research focuses on human capital and trade openness. *GROWTH* represents economic growth.*FDI, HC, TRADE* represent inward FDI, human capital or participation of formal education and trade openness or percentage of trade over GDP respectively. *FDIHC* is interaction form of *FDI* and *HC*,while*FDITR* is the interaction term of *FDI* and *TRADE. i* denotes the time.

The methodology used in this research is Ordinary Least Squares (OLS) which is commonly known by researchers. It is easy to comprehend and able to provide results that determine the relationship between the variables being researched.OLS is a statistical methodology used in linear regression model. As it can be seen from the hypotheses proposed above, all of them are represented in linear equations, therefore OLS can be used in this case. The results of this method is going to determine whether the variables included on the right-hand side of the equations above have impact on the variable on the left-hand side of the equations. The statistical software used to perform OLS is Eviews 7. The data itself are taken from acredible source.

4 Results and Discussion

The dataset covers 13 years from 2002 until 2014. This data range is selected based on availability of data as well as consideration of anomaly. In 2001, the inward FDI data showed a sudden huge increase that was clearly out of the trend, therefore the dataset starts from 2002 to exclude this outlier. The dataset was retrieved from a credible source, which is the Indonesia's Central Bureau of Statistics[1]. This bureau is a government body which is directly responsible to the president. They collect statistical data of Indonesia in many aspects including social, population, economy, trade, agriculture and mining. This research utilized data from trade and social section. The data was analyzed using OLS as it has been mentioned before. The results of equation 1, 2 and 3 are shown in table 1 below.

Table 1   OLS Results

Independent Variables	Dependent Variable: GROWTH		
	(1)	(2)	(3)
C	254.8257*	13.81663*	-4.465650
	(119.3465)	(6.662256)	(6.598331)
FDI	.0000000445(.0000000310)	.00000132**(.000000474)	-.00000126**(.000000531)
HC	-1.444812*(0.680147)		0.105039 (0.078420)
TRADE	-747.6825*(361.9259)	-54.53272(38.50008)	
FDIHC		-.0000000143**(.00000000539)	
FDITR			0.00000812**(.00000323)

Standard errors in parantheses, *** denotes significant at 0.01 confidence level, ** denotes significant at 5% confidence level, * denotes significant at 10% confidence level

From the results above, it can be seen that FDI has no significant impact on growth on its own. In equation 1, all independent variables are significant at 10% confidence level, only FDI is not significant. This conforms with many previous literature (Borensztein, De Gregorio and Lee, 1998; Alfaro *et al.*, 2004; Azman-Saini, Law and Ahmad, 2010; Fadhil and Almsafir, 2015) which suggested that FDI alone does not significantly affect economic growth. Therefore equation 2 and 3 are tested. In equation 2, it

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[1]Badan Pusat Statistik. Available at: https://www.bps.go.id/ (2018)

can be seen that FDI as well as the interaction term of FDI and human capital are significantly related to economic growth. The difference is that FDI has positive significant effect on economic growth, however interaction of FDI and human capital shows a negative impact on economic growth. This is very interesting, since many researchers have proven that interaction of FDI and human capital results to positive impact on economic growth (Borensztein, De Gregorio and Lee, 1998; Solomon, 2011). This negative relationship implicates that the government should take very serious consideration when attracting FDI into the country if the country does not have a high enough level of human capital. Previous study by Fadhil and Almsafir (Fadhil and Almsafir,2015) which analyzed time series data of Malaysia found similar result whereby in the equation where interaction term of FDI and human capital was included, the coefficient for FDI alone was positive, however coefficient of the interaction term was negative. The study was similar to this study since both studies used time series data of a single Southeast Asian country. Therefore it is reasonable to arrive at similar results. As pointed out by Fadhil and Almsafir (Fadhil and Almsafir,2015), Malaysia and in this case also Indonesia need to focus on improving their human capital level in order to absorb the positivity of FDI so that it will contribute to economic growth of the country.

Moreover, the opposite result is seen from equation 3. In this equation, the interaction term of FDI and trade showed positive result, however the result of FDI alone showed negative effect on economic growth though both results are significant at 5% confidence level. Significant positive impact of FDI and trade interaction on economic growth was also proven by Iamsiraroj and Ulubaşoğlu (Iamsiraroj and Ulubaşoğlu,2015). This research's result confirmed previous finding which concluded that trade openness is an important absorptive capacity in order for FDI to bring positive effect on economy growth. It is however interesting that in the last equation where interaction term of FDI and trade was introduced, the coefficient of FDI turned negative. Regardless, the coefficient is very small and smaller compare to the coefficient of the interaction term.Therefore higher trade openness is still desired since the positive effect is larger than the negative effect of FDI alone. Overall, the results show that human capital and trade openness should be taken into account by Indonesian government when attracting FDI.

5 Conclusion

Indonesia has been growing very quickly in the past few years. The current president has been campaigning around the world to increase the amount of investment from aboard in order for the country to grow further. Therefore, it is important to find out whether FDI really brings higher economic growth for Indonesia. Many cross-country studies have been done but the results are not necessarily applicable to Indonesia. Thus this research has taken the initiative to focus on a single country so that the result is directly applicable and can be taken into account by the government. As a result, this research adds into the current body of knowledge andhas practical implications.

The results of this research showed several interesting conclusions. The first one is that the effect of FDI and human capital on economic growth is negative, this shows that the government should pay closer attention to the level of education in the country to make sure that investment from aboard can be absorbed and result to positive implications instead of negative ones. The second is that FDI and trade openness show significant positive result on economic growth. Thus trade in and out of Indonesia should be encouraged in order for FDI to exert positive impact on economic growth. The third is that FDI alone does not exert any significant impact on economic growth. It means that the government should not only focus on attracting FDI but they should focus on developing internal factors instead so that inward investment can benefit the economy as much as possible. Encouraging FDI alone without internal improvements is not doing any good for the country's economy.

There are certainly several limitations of this research. The first being limited number of variables included in the analysis. There are many other possible absorptive capacities which might be important for Indonesia. The second is the research methodology. OLS is simple and easy to comprehend, there are many other statistical methodologies to analyze time series data which can also be used. Third, the data itself. This research is only applicable to Indonesia, although it might also suggest similar results forsurrounding Southeast Asian countries, however it might not be relatable for the rest of the world.

The main suggestions for future researches are to work on the limitations of this research. Research on inward FDI to Indonesia can include variables such as financial market development and macroeconomic stability as potential absorptive capacities. This is important so that the government know exactly where to focus on. Researchers can also use more advanced methodologies to analyze the data. Last but not least, researchers from other countries should develop a time series analysis of their

own countries so that respective governments can gain many insights when developing policies regarding FDI instead of relying on cross-country analysis which might not be applicable to them.

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Research on Financial Performance Evaluation of Listed Companies in Artificial Intelligence Industry of China: Empirical Test Based on Principal Component Analysis

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Abstract: Taking the sample of A-share listed company of artificial intelligence industry in Shanghai and Shenzhen main board market in 2014-2016 and using the statistical tool of SPSS software, this paper adopts principal component analysis method and constructs 4 principal components affecting financial performance of company.This paper also calculates comprehensive evaluation score according to each principal components' weight, which is obtained from total explaining variance. Through analysis, we can come to the conclusion that profitability is the core element deciding financial competitiveness of company, solvency is the key to enhance financial competitiveness, and operation capability and growth capability are important factors affecting financial competitiveness. Based on above conclusion, problems of some listed companies in the industry are further analyzed and feasible suggestions to improve their financial performance are proposed.
Key words: Artificial intelligence; Financial performance; Principal component analysis; Empirical test

1 Introduction

As artificial intelligence is becoming the core technology of a new round of science and technology revolution and industrial change, and widely used in all kinds of industry, its role in economic construction and national strategic level is increasingly significant. At present, researchers in academic circle have made relatively comprehensive, detailed and extensive researches on listed companies in various industries. Wu Fengxia has evaluated financial performance of iron and steel listed companies in 2006 through economic meaning of principal component. (Wu Fengxia, 2008). Xia Xueying has evaluated financial performance of coal enterprises through efficiency coefficient method and evaluated Shenhua Group from 4 aspects, i.e. profitability, asset operation capability, solvency and development capability. (Xia Xueying, 2011). Tao Xinyuan has evaluated financial performance of listed companies of real estate industry of China in 2010 by taking factor analysis method, analytic hierarchy process and correlation analysis as main methods. (Tao Xinyuan, 2013).

However, at the present stage, there are few researches to artificial intelligence industry, based on which, selecting 66 listed companies of artificial intelligence industry as samples, taking SPSS software as statistical tool, and adopting dimensionality reduction thought, this paper transforms multiple initial financial indicators affecting the financial performance of the artificial intelligence industry into a few comprehensive principal components for analysis through linear combination so as to bring enlightenment to enhancement of financial competitiveness of listed companies in artificial intelligence industry of China.

2 Research Design

2.1 Sample selection

Taking the research object of A-share listed company of artificial intelligence industry in Shanghai and Shenzhen main board market in 2014-2016, this paper eliminates total 24 ST companies and data missing companiesand selects 66 listed companies in the industry as samples. Required financial indicators and other data are sourced from CSMAR database and straight flush website, and restricted to data availability in 2017, analysis data of this paper is ended in 2016, and to reduce empirical results deviation arising from data fluctuation, 3-year mean value of each indicator is selected as the analysis data.

2.2 Indicator selection

Financial performance of enterprise is a comprehensive evaluation system, mainly including profitability, solvency, growth capability and operation capability. Based on 4 dimensions, this paper selects 11 financial indicators, i.e. asset return rate, net profit rate of total assets, net asset yield, net business interest rate, quick ratio, reciprocal of asset-liability ratio, liquidity ratio, total asset growth rate, capital accumulation rate, total asset turnover and working capital turnover, and defines them as each

variable, which is as shown in table 1.

Table 1   Variable Setting

	Name of indicators	Variable
Profitability	Asset return rate	X1
	Net profit rate of total assets	X2
	Net asset yield	X3
	Net business interest rate	X4
Solvency	Quick ratio	X5
	Reciprocal of asset-liability ratio	X6
	Liquidity ratio	X7
Growth capability	Total asset growth rate	X8
	Capital accumulation rate	X9
Operation capability	Total asset turnover	X10
	Working capital turnover	X11

3 Empirical Analysis

3.1 Descriptive statistics

Table 2   Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
X1	66	-0.0218	0.1930	0.058067	0.0403933
X2	66	-0.0164	0.2014	0.056879	0.0428478
X3	66	-0.0995	0.3075	0.087042	0.0739516
X4	66	-0.3408	0.5301	0.121595	0.1148470
X5	66	0.3005	34.1355	2.589041	4.2018109
X6	66	1.2442	34.7939	3.978898	4.3509487
X7	66	0.4416	39.2472	3.109388	4.7711668
X8	66	-0.1287	2.5594	0.400093	0.4607239
X9	66	-0.0507	10.6024	0.572403	1.3521994
X10	66	0.1366	1.7526	0.535619	0.3274614
X11	66	-215.8933	23.2962	-0.643483	27.1691734

According to analysis of table 2, compared with other indicator data, mean and standard deviation of asset return rate, net profit rate of total assets, net asset yield and net business interest rate reflecting profitability are relatively small, which shows that overall profitability of the industry is comparatively weak and there is not much difference between enterprises. Mean and standard deviation of quick ratio, reciprocal of asset-liability ratio, and liquidity ratio reflecting solvency are relatively great, which shows that solvency of the industry is comparatively strong, and individual enterprises have outstanding advantages. However, there is obvious difference among enterprises. Mean value of working capital turnover reflecting operation capability is negative with the largest standard deviation, which shows that capital of most companies in artificial intelligence industry is not sufficiently managed and used, and difference of capital management efficiency of each company is relatively great.

3.2 Applicability test of principal component analysis

This paper adopts KMO and Bartlett test (Li Xiaosheng, 2010). The test results indicate that test value of KMO is 0.622>0.6, which shows that there is a certain correlation between variables. Besides, Sig=0.000<0.05 shows that there is a significant correlation between correlation coefficient matrix and unit matrix. Therefore, sample data selected in this paper is appropriate for principal component analysis. Specific results are as shown in table 3:

Table 3   KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.622
Bartlett's Test of Sphericity	Approx. Chi-Square	1067.506
	Df	55
	Sig.	0.000

3.3 Analysis of variance contribution rate

Calculate characteristic value of each normalized variable, extract principal components with characteristic value greater than 1 (Liu Jinfu, 2008), and obtain 4 principal components in total, where variance contribution rate of 4 principal components respectively is 32.667%, 27.675%, 16.401% and 10.769%, and their accumulative variance contribution rate reaches to 87.511% with original information basically retained, which is as shown in table 4.

Table 4   Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.593	32.667	32.667	3.593	32.667	32.667
2	3.044	27.675	60.342	3.044	27.675	60.342
3	1.804	16.401	76.742	1.804	16.401	76.742
4	1.185	10.769	87.511	1.185	10.769	87.511
5	0.859	7.805	95.316			
6	0.267	2.424	97.741			
7	0.159	1.442	99.182			
8	0.054	0.491	99.674			
9	0.025	0.226	99.899			
10	0.009	0.081	99.981			
11	0.002	0.019	100.000			

3.4 Scree plot

Scree plot in figure 1 clearly and intuitionistic reflects characteristic value of each principal component, and the figure intuitionistic reflects that characteristic value of former 4 principal components is greater than 1 with relatively steep slope, and slope turns to be gentle with increase and decrease of principal components, which shows that 4 principal components include most original variable information with comparatively strong explanation power. (Shao Jingbo, 2008).
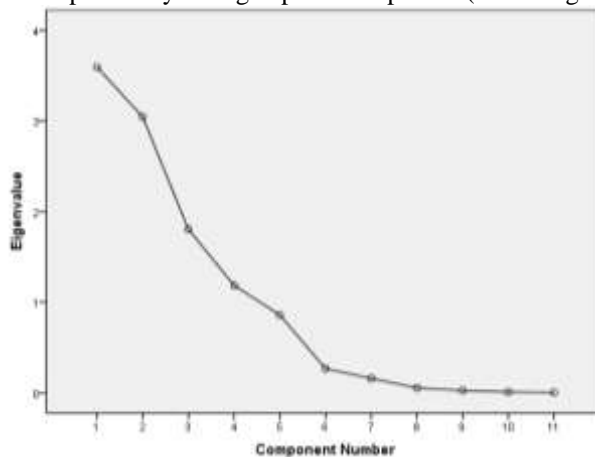
Figure 1   Scree Plot

3.5 Common factor variance

Table 5 shows that common variance of most indicators is greater than 0.9, which i that each variable is extracted with relatively great information degree, and further shows that 4 principal

components can effectively cover most of information in original variable.

Table 5 Communalities

	Initial	Extraction
X1	1.000	0.977
X2	1.000	0.973
X3	1.000	0.936
X4	1.000	0.788
X5	1.000	0.989
X6	1.000	0.977
X7	1.000	0.986
X8	1.000	0.924
X9	1.000	0.899
X10	1.000	0.721
Continual Table 5		
X11	1.000	0.458

3.6 Principal component extraction

Following component matrix in table 6 can be obtained through calculation of normalized data: X1, X2, X3 and X4have relatively high load in the first principal component, which shows that the first principal component reflects profitability of enterprise, and therefore it is defined as profit principal component; X5, X6 and X7 have relatively high load in the second principal component, which shows that the second principal component basically reflects solvency of enterprise, and therefore it is defined as debt paying principal component; X8 and X9 have relatively high load in the third principal component, which shows that the third principal component basically reflects growth capability of enterprise, and therefore it is defined as growth principal component; X10 and X11 have relatively high load in the fourth principal component, which shows that the fourth principal component basically reflects operation capability of enterprise, and therefore it is defined as operation principal component.

Table 6 Component Matrix

	Component			
	1	2	3	4
X1	0.972	0.130	0.083	0.091
X2	0.955	0.204	0.108	0.080
X3	0.946	0.127	-0.014	0.154
X4	0.716	0.314	0.307	-0.286
X5	-0.227	0.955	0.057	0.150
X6	-0.256	0.949	0.086	0.061
X7	-0.259	0.945	0.047	0.156
X8	-0.091	-0.165	0.937	0.097
X9	-0.259	-0.225	0.880	0.083
X10	0.180	-0.286	-0.157	0.763
X11	-0.190	-0.081	0.013	0.645

Composition diagram of rotation space of figure2 is sourced from 3D rotation to component matrix, and 4 principal components extracted are intuitively shown according to intensity of the variable indicator distribution, which further verifies scientificityof 4 principal components extracted above.
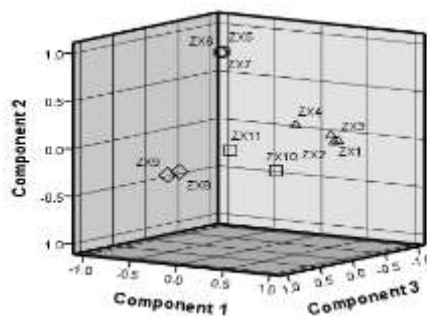
Figure 2 Component Plot in Rotated Space

3.7 Principal component score calculation

Following formula can be obtained according to component score coefficient matrix to calculate final score of 4 principal components:

F1=0.270X1+0.266X2+0.263X3+0.199X4-0.063X5-0.071X6-0.072X7-0.025X8-0.072X9+0.050X10-0.053X11

F2=0.043X1+0.067X2+0.042X3+0.103X4+0.314X5+0.312X6+0.310X7-0.054X8-0.074X9-0.094X10-0.027X11

F3=0.046X1+0.060X2-0.008X3+0.170X4+0.032X5+0.048X6+0.026X7+0.520X8+0.488X9-0.087X10+0.007X11

F4=0.076X1+0.067X2+0.130X-0.242X4+0.127X5+0.051X6+0.131X7+0.082X8+0.070X9+0.644X10+0.544X11.

Table 7　Component Score Coefficient Matrix

	Component			
	1	2	3	4
X1	0.270	0.043	0.046	0.076
X2	0.266	0.067	0.060	0.067
X3	0.263	0.042	-0.008	0.130
X4	0.199	0.103	0.170	-0.242
X5	-0.063	0.314	0.032	0.127
X6	-0.071	0.312	0.048	0.051
X7	-0.072	0.310	0.026	0.131
X8	-0.025	-0.054	0.520	0.082
X9	-0.072	-0.074	0.488	0.070
X10	0.050	-0.094	-0.087	0.644
X11	-0.053	-0.027	0.007	0.544

3.8 Comprehensive score

This paper uses the contribution rate as the weight to construct the comprehensive evaluation formula. *ZF=F1*0.32667+F2*0.27675+F3*0.16401+F4*0.10769*. Due to space restrictions, only top 10 and bottom 10 listed companies ranked according to comprehensive score are listed, which is shown in table 8.

Table 8　Artificial Intelligence Industry Companies Comprehensive Score Summary Table

Company Name	F1	Rank	F2	Rank	F3	Rank	F4	Rank	ZF	Rank
GLGF	-2.01215	65	6.94927	1	0.16279	19	1.67762	4	1.47	1
THS	3.21313	1	0.86097	4	1.06669	5	-0.37100	45	1.42	2
HKWS	2.85035	2	0.43316	8	0.36589	14	1.14777	6	1.23	3
HTXX	1.65780	3	0.00663	26	-0.46112	47	2.75943	2	0.76	4
WNJK	1.44629	7	0.20643	14	0.79937	8	-0.38400	47	0.62	5
DHGF	1.46913	4	-0.03012	28	-0.07934	29	1.06970	8	0.57	6
CAQC	1.44847	6	-0.21573	42	-0.23660	33	0.75944	11	0.46	7
GDYT	1.09707	8	0.14024	21	0.14167	21	-0.13547	33	0.41	8
DFT	0.10563	26	0.68970	6	1.54601	4	-0.70092	59	0.40	9
BXY	-0.18815	38	1.27627	2	0.51350	12	-0.08920	32	0.37	10
HWKJ	-1.02409	58	0.28477	11	-0.75766	57	-0.24574	38	-0.41	56
JSQJ	-0.63989	54	-0.37055	51	-0.56707	50	-0.37255	46	-0.44	57
ZXTX	-0.61850	53	-0.64364	57	-0.79994	58	0.392150	17	-0.47	58
SNYS	-0.87331	57	-0.88751	63	-0.81084	59	1.57060	5	-0.49	59
CXGF	-1.87280	64	0.80771	5	-0.91207	61	-0.41546	49	-0.58	60
JZTZ	-0.85659	56	-0.49374	53	-0.92199	62	-0.76986	62	-0.65	61
SCCH	-1.05629	59	-0.83607	62	-1.15475	64	0.97084	9	-0.66	62
GDGX	-1.26869	61	-0.75075	61	0.02737	25	-0.72568	60	-0.70	63
WTKJ	-1.16507	60	-0.71429	60	-0.57737	51	-0.21923	37	-0.70	64
LJKG	-1.64825	63	-0.67391	58	-1.06823	63	0.04858	24	-0.89	65
NGGF	-1.54122	62	-0.90670	64	-1.16454	66	-0.26543	39	-0.97	66

3.9 Robustness test

Following robustness test is made in this paper: utilize clustering analysis method to divide the indicator into 2 categories, select the representative indicator and then adopt principal component analysis method again for financial competitiveness evaluation. Make Wilcoxon sign rank test form paired samples with evaluation result after elimination of indicator and evaluation result before elimination of indicator to The test result is as shown in table 9: bilateral significance level is 0.207>0.05, which shows that there is not obvious difference between comprehensive score rankings before and after elimination of indicator, thus verifying that change in financial competitiveness ranking caused by change in financial indicator selection is not statistically significant, which means that empirical analysis of this paper has certain reference significance.

Table 9   Test Statistics

	ZF1 - ZF
Z	-1.262
Asymptotic significance (bilateral)	0.207

4 Results

According to analysis, ranking of profitability scores has maintained a high consistency with the comprehensive ranking, which is almost the same (except for Goldlok Holdings). Therefore, profitability of enterprise is core element of financial competitiveness and important reference indicator under investment by investor and basic guarantee to obtain investment income. There is a comparatively high correlation between solvency ranking and comprehensive score ranking, and if solvency is ranked top, its comprehensive score will also be ranked relatively top. Therefore, improving solvency is the key to improve the comprehensive financial competitiveness of enterprise. Operation capability and growth capability are important factors affecting financial competitiveness, and improving operation capability and growth capability is the effective way to improve the financial competitiveness of listed companies in artificial intelligence industry of China. But growth capability score of 6 companies in top 20 companies in table is negative, and operation capability score of more than half of the companies is negative, which shows that overall asset utilization efficiency of the industry is low, with less income obtained, and level of long-term development needs to be improved.

5 Conclusion

Based on above results, problems of some listed companies in the industry are further analyzed and feasible suggestions to improve their financial performance and overall development of the industry are proposed. In terms of companies, some companies rank top in terms of comprehensive ability, such as Unis Holdings, they have limited their overall rankings due to the lower ranking of individual abilities.Therefore, management negligence of the company on any financial indicator will affect the promotion of financial comprehensive competitiveness. These companies shall focus on overall development and not ignore the overall long-term development of the company just to improve its profitability or operation capability. In terms of the whole industry, China shall strengthen personnel training support and improve self-innovation capability. Specifically speaking, on one hand, China can enrich related artificial intelligence subjects, encourage the cultivation of innovative talent, and encourage universities, research institutes and enterprises to jointly cultivate professional, innovative and compound talents in key field of artificial intelligence by increasing investment in training education funds, and relying on key universities and research institutes. On the other hand, China shall actively establish international exchange platform and hold education alliance of robot engineering major nationally. (Zhu Wei, 2016)

Supported by actual data, this paper analyzes development status of artificial intelligence industry and proposes related suggestions. Other researchers can make an empirical study on the profitability and solvency status of artificial intelligence industry based on it, so as to contribute to improving profitability of artificial intelligence industry and promoting development and future development of artificial intelligence industry of China.

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Business Mode Innovation of Jointown Pharmaceutical Group in the Background of Big Data

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Abstract: The development of big data has brought a profound impact on the business decisions of all parts of life, and derived many new business modes. Focusing on Jointown, the benchmarking enterprise in the pharmaceutical industry, this paper analyzes the impact of big data on Jointown 's business mode innovation and sums up the major types of business mode innovation, including deep vertical integration mode, O2O platform mode and cross-border integration mode. Based on this, some strategies are proposed, such as establishing the idea of using big data resources to create value, setting up an information platform based on big data management, and laying out a big data-driven smart business system, so as to provide reference for the innovation of business mode in pharmaceutical industry and related enterprises.
Key words: Big data; Business model innovation; Jointown; Pharmaceutical industry

1 Introduction

With the development of new technologies on the Internet and the widespread dissemination of communication channels such as social networks and e-commerce platforms, a large number of complex data have penetrated into every industry and gradually became an important production factor.Bughin (Bughin, 2011) pointed out that big data can release tremendous value through information transparency and propose data-oriented competitive advantage. The McKinsey Global Institute (McKinsey Global Institute, 2011) has made an assessment of the potential value of big data applications in various industries in the United States. The results show that the financial industry and the pharmaceutical industry will benefit the most in the development of big data technology.Morabito (Morabito, 2015) thought big data is now becoming a key organizational asset, which represents a strategic basis for business competition.

As Peter Drucker (As Peter Drucker, 2006) said: "The competition between companies today is not the competition between products, but the competition between business modes.". At present, research on business mode innovation mainly includes three aspects. Firstly, is about the concept. Teece D J (Teece D J, 2009) pointed out the business mode refers to how the company operates to achieve the purpose of delivering value to customers within a reasonable cost range. Georg and Bock (Bock, 2011) believed the business mode is to configure the organization resources to generate new profit opportunities. Demil and Lecocq (Lecocq, 2011) pointed out that business mode innovation is a process of constant adaptation to environmental changes from an external perspective. Secondly, is about the component. Lindgadt (Lindgadt, 2009) thought business mode innovation is achieved through innovations in value propositions, operational modes, and a range of sub-elements contained in these two elements. Osterwalder (Osterwalder, 2013) designed business mode innovations from the nine components of the business mode, including customers, channels, markets, resources. After reviewing a large number of documents, Clauss (Clauss, 2017) pointed out that business mode innovation is an innovation in value creation, value proposition, and value acquisition.Thirdly, is about the influencing factors. Li Wenlian and Xia Jianming (Xia Jianming, 2013) believed that "Big data" is influencing the business ecosystem of companies in various ways. It has become the basic background of corporate business mode innovation.Gassmann (Gassmann, 2014) argued that companies need to constantly discover conflicts between business modes and the environment, then update their business modes to counter market threats. Velu C (Velu C, 2015) believed that new technologies often catalyze business mode innovation.

So, in the context of big data, how to collect, process, analyze, and utilize complex data information, then explore new business opportunities, realize business mode innovation are important issues to companies.In the face of fierce market competition,Jointown Pharmaceutical Group, relying on big data, seized the opportunity to innovate its business mode continuously, successfully broadened its profit sources to shape its competitive advantage and took the lead in the industry, which brought many advantages to the pharmaceutical industry and enterprises.

2 Background of Jointown'sBusiness ModelInnovation

The pharmaceutical industry is a special industry. It communicates directly with a large number of customers, so it has a complex and large number of customer groups. The information of it is in an explosive growth, including daily sales management data, enterprise data, upstream and downstream data in the supply chain, and so on. It's obvious that big data affects the resource environment, technology environment, and demand environment on which pharmaceutical companies depend. It also triggers the reconstruction of traditional concepts such as resources, values, relationships, and borders, which provides a new foundation and path for the business mode innovation in pharmaceutical companies.

Established in March 1999, Jointown mainly deals with Western medicine, Chinese medicine and equipment. Its main customers include medical institutions, wholesale companies, and retail pharmacies. It also provides customers with value-added services such as information and logistics. Jointown has won a large number of customers by quickly opening up the market at low prices, realizing low costs through large-volume rapid operations, and using cash transactions to reduce the risk. However, the customer's needs and consumption habits are constantly changing, the demand for personalized products and services is increasing. This has brought challenges to the traditional business mode of Jointown. Jointown began to think about how to use resources to fully tap customer needs and conduct accurate marketing for different customer groups. The advent of the era of big data has enabled Jointown to fully and accurately acquire the characteristics of customers, dynamically track the trajectories of customers, dig deeper into the individual needs of customers, and rationally configure the company's core resources. This provided support and driving force for Jointown's innovative business mode.

3 The Main Innovation Model of Jointown

3.1Excavate big data, build deep vertical integration mode

In the context of big data, Jointown uses its existing advantageous resources to develop potential needs and markets through R&D software systems and technologies, then extends its business scope both upstream and downstream of the industry chain. It establishes a pharmaceutical resource platform including upstream pharmaceutical R&D, production, pharmaceutical wholesaler, distribution, logistics distribution in the middle reaches, and downstream pharmaceutical retail, etc. Jointown has effectively integrated the upstream supply network, downstream distribution network and its own marketing network to realize the expansion of the industrial chain and the integration and sharing of resources. The efficient communication and sharing of procurement information, logistics information, and sales information make the links in the Jointown industry chain more effective. As shown in Figure 1, the deep vertical integration business mode help to reduce costs and increase efficiency.

On the one hand, Jointown makes use of big data to dig deeper into customer needs and explore the market segments upstream of the industry chain. Jointown has invested in the construction of western medicine production plants, Chinese medicine decoction pieces' production plants.It has initially formed a pharmaceutical industry chain that includes quality assurance systems such as scientific research, planting, acquisition, sales, deep processing of products, and standard decocting.

On the other hand, Jointown has entered the downstream consumer-oriented retail terminal field and established Jointown 's self-operated hospitals and chain pharmacies to achieve an effective connection between retail pharmacies, chain headquarters, and distribution centers. Through the use of big data resources and technologies to transform complex data into guidance for companies to make decisions, Jointown can simulate customer buying behaviors and trends, accurately locate potential customer groups, and achieve accurate marketing.
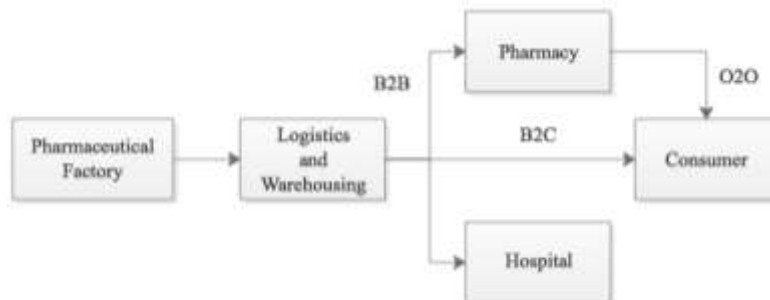
Figure 1   Deep Vertical Integration Mode

3.2 Connect big data, create O2O platform mode

With the development of the Internet and the popularity of mobile terminal devices, major changes have taken place in the consumer's spending habits and channels. Jointown used the big data to layout the mobile healthcare system, breaking a single offline sales channel, fully adapting to the consumption upgrade under the new market environment, and promoting the development of the O2O platform mode through innovative value creation and value transfer processes, as shown in Figure 2.

Customers can ask professional doctors on the online hospital platform of Jointown and get an e-prescription, then Jointown will deliver the medicines to the users offline, it completes the entire process of visit and form a complete service system.

Jointown creates and transmits value through data mining, sharing, and utilization. It integrates the resources with the offline and online of the enterprise to provide customers with comprehensive and convenient products and services. Jointown meets the multi-level and personalized health needs of customers, it expands the business scope of the company, and promotes the transformation of it into a health industry service provider.
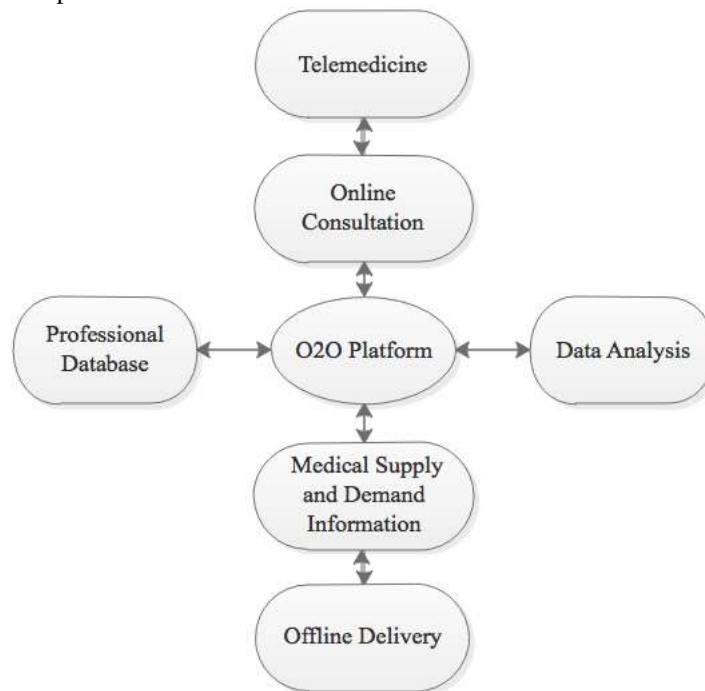
Figure 2   O2O Platform Mode

3.3 Share big data, develop cross-border integration mode

From the perspective of resource foundation theory, the boundaries of an enterprise mainly depend on the value radiation capabilities of the core resources owned by the enterprise and its control capabilities. Jointown has accumulated huge data resources, developed advanced technologies, and built a nationwide distribution network. Making use of big data, Jointown gets accurate forecast trend of the market. Combined with the resources owned by the company, it creates a cross-border business integration through value creation. The mode is shown in Figure 3.

With the use of big data, Jointown has improved the foresight of market judgments and reduced the error rate and cost of market analysis. Through the integration of business operations and data, it has achieved good results by judging potential businesses with high profitability and rapid growth, entering the consumer goods circulation market. At the same time, Jointown also conducted a full-scale expansion of cross-border integration. It changed the simple trading relationship with upstream and downstream companies in the industry chain, and formed a collaborative system and partnership of the industrial chain.
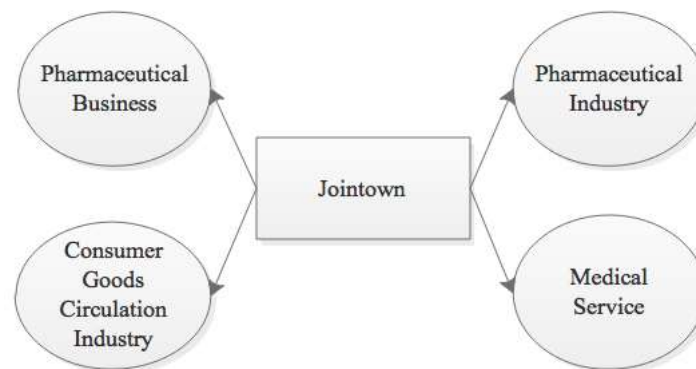
Figure 3   Cross-Border Integration Mode

4 Conclusion

Nowadays, big data has gradually become an important production factor, bringing a new strategic resource and core competence to pharmaceutical companies. In the context of big data, Jointown actively adapts to changes in the environment, it makes use of big data resources and technologies to transform its own resources, structure, processes and the entire value network, finally achieve the innovation of business mode.

From the case study, the following suggestions are made for pharmaceutical companies to make business mode innovations in the context of big data.Firstly, pharmaceutical companies should recognize the business opportunities brought about by big data, and regard big data as the core resource for which companies can create value. With the cross-border integration of the Internet, pharmaceutical companies can obtain customer behavior data of e-commerce platform systems, business data of upstream and downstream partners in the supply chain, and medical health data of customers. From big data, pharmaceutical companies can learn about the composition of the industry, the characteristics of different market segments, the needs of consumers, and the status of competitors. Through the system's data collection, analysis, and excavation, the company's initiative in the market is guaranteed.

Secondly, establishing an information platform based on big data management is important.With the growth of customer demand and the expansion of enterprise scale, the massive data generated through the Internet need advanced information back-end systems based on big data management to quickly provide data basis for managers' decisions. Pharmaceutical companies can further clarify the extent to which their products and services are accepted by customers by obtaining data information and analyzing them. The establishment of a big data information management platform will help pharmaceutical companies accurately locate the market, formulate targeted marketing programs and differentiated marketing strategies. Through the mining of customer profile data, the analysis of the customer's consumer behavior characteristics, forecasting the customer's needs, and improving the ability of the customer's comprehensive system of services.

Thirdly, pharmaceutical companies need to lay out big data-driven smart business system. Pharmaceutical companies must use big data to drive changes in traditional business practices and develop in the direction of information, transparency, visualization, efficiency, and intelligence. Supported by information technology, pharmaceutical companies can use big data to make business management decisions, product and service innovation, precision marketing, and supply chain optimization. Only by taking the customer as the core, laying out a smart business system, and innovating the business mode, can companies achieve the intrinsic value of big data.

Acknowledgement

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Construction of Intelligent Control and Control Collaborative Innovation Platform for Expressway Based on IoT

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Abstract: Huanghuang Expressway Management Office has built a cooperative control platform by means of information management through the use of internet and IoT technology. This paper mainly introduces the construction of the intelligent collaborative management and control platform of Huanghuang Expressway Management Office, and expounds its construction ideas, target system and main function design. Through the integration of resources, a very practical and comprehensive platform can be built, the platform is supported by rich data and advanced technology, it covers the functions of personnel management, financial management, asset management, operation management and so on.

Key words: Intelligent Control Platform; Informatization; Collaborative control; Internet of Things

1 Introduction

Highway management in Hubei Province has completed the construction of the information system, but it has not realized the informatization of the control, which leads to many invariances. Department-office-office-road, different levels of system have different needs, but can't achieve information exchange; road-to-land information system has different ownership, different rights and responsibilities, can't be interconnected; there are multiple sets of assets, finance, personnel, etc. in the management office. Information system forms an isolated island of information; in emergency management, early warning, disposal, and risk assessment belong to multiple systems, hence information cannot be transmitted in real time, resources cannot be allocated in time, and the situation can't be directly presented.

Huanghuang Expressway Management Office has established various business information management systems through information management methods, including toll operation management system, early warning management system, OA office automation system, electromechanical equipment management system, and road administration management. Undoubtedly, it has played an important supporting role in promoting intelligent management of expressway. However, due to the separate design and construction of each business information system of Huanghuang High-speed Management Office, different database management systems and information storage formats are adopted, the software platforms are inconsistent, lack of unified management standards, business data is dispersed in various business departments, and there is no effective centralized storage and archive. At the same time, the data resources of various departments are not shared, the utilization of information resources is not high, and the business systems are difficult to interconnect, which restricts the comprehensive utilization of information resources and the application of information technology.

With the rapid development of expressway construction, it is urgent to break the barriers between departments, strengthen the integration of information resources, pay attention to the use of data resources, improve the road network management level and operational efficiency. We need to build a comprehensive management platform with rich data, advanced technology and easy to use, so as to promote the unified processing, exchange and sharing of data resources of Huanghuang Expressway Management Office. Under the trend of internet of everything, mobile terminals can be used everywhere, smart devices can be found everywhere, and intelligent control of expressways must comprehensively apply related technologies of the IoT, with "things" as the main line, stringing up various systems to improve coordination and service efficiency.

2 Literature Review

Intelligent transportation is a new research field, and the application of IoT to solve the intelligent traffic problem is a new application direction. Although there are not many researches on the intelligent traffic information based on the technology of IoT, there are lots of researches in the fields of intelligence transportation, smart city, intelligent agriculture and intelligent home. These studies have focused on solving the problem of intelligent transportation.

Filev D P (Filev D P, 2017) used biometrics simulation technology to study vehicle identification, inter-vehicle communication and interconnection. Although the concept of vehicle networking was not explicitly mentioned, the research problems have the prototype of the Internet of Vehicles.

Dong (Dong, 2017) applied IoT technology and cloud computing technology to state monitoring and disaster warning of dams, using satellite alignment technology and observing base stations to monitor dam health data in real time, creeping and cracking of dams real-time monitoring and early warning of disaster status such as subsidence. The methods and techniques of Dong's (2012) research can also be applied to the state monitoring and disaster warning of traffic infrastructure such as highways, roads, bridges and tunnels.

Song (Song, 2016) comprehensively analyzes the collection technology of traffic information in intelligent transportation from the types of traffic information required by intelligent transportation to the advantages and disadvantages of current major information collection technologies.

Liu (Liu, 2014) applied optical fiber communication technology to explore and design the whole process of expressway vehicles. In the design process, it comprehensively involved the vehicle perception, vehicle operation information collection, and the processing and transmission of collected information. Such problems have realized the intelligence and wisdom of vehicle operation management.

Shah S H (Shah S H, 2016) summarizes and describes the application prospects, application levels and major technical difficulties and challenges of IoT applications in the field of transportation applications and major technical challenges. It gives some inspiration to the application of the IoT to solve the problem of intelligent transportation.

Li (Li, 2015) analyzed information verification, information coupling and information reliability and information security issues in IoT communication technology. Information coupling technology solves the problem of information compatibility of multiple information sources. Through the research of information verification, the redundancy of IoT information is greatly reduced, thus ensuring the security and reliability of information.

Qian (Qian, 2016), in the research process of the real-time online monitoring system for container logistics, fully utilizes the IoT technology to realize real-time online tracking, recording, and monitoring of dynamic objects, and has a good reference to the vehicle monitoring problem in intelligent traffic.

Wang (Wang, 2016) realized the vehicle's understanding of the environment through the sensing technology. At a certain level, the intelligent vehicle, the intelligent vehicle and the traffic environment were automatically coupled, and the basic characteristics of the intelligent traffic were initially established.

Dong (Dong, 2017) studied the construction mode of smart cities. The construction mode fully reflects the idea of integrating urban management systems. The existing urban management system is regarded as the middleware of the smart city system. The integration, the use of existing resources, speed up the progress of smart city construction, reference to the development of smart transportation system construction mode and system architecture.

Xue (Xue, 2014) applied the IoT technology to study the urban intelligent transportation problem. Although urban traffic and highway traffic have great differences, they have strong commonalities in the collection, processing, transmission and release of traffic information.

3 Overview of the Management Platform

In line with the "Smart Huanghuang" collaborative management and control system construction, around the strategic objectives of "up and down coordination, road coordination, resource coordination, and public collaboration", Huanghuang Management Office responded to the deployment of the superior units and integrated the status quo, and promoted the management system construction by building a collaborative management and control platform.

The collaborative management and control platform is based on the large asset platform and financial integrated management, and fully utilizes the Internet and related technologies, and extends to AR, VR, GIS, emergency management, dispatching services, information security, operational risk, BI and other related fields. At present, the platform is trying to apply the core technology such as Internet of Things, security large data intelligent analysis and so on. In the future, a collaborative integrated management platform will be formed.

The project planning has completed the existing system analysis and integration platform planning and architecture; data resource integration and collaborative management platform definition; data

resource integration and collaborative management platform infrastructure; data resource integration catalog and collaborative management platform molecular system construction. Data visualization, decision analysis, data intelligent technology implementation, data resources sharing services, external system integration, data service capabilities are being built, in the future, big data analysis, data resource service capabilities, and collaborative management and control systems will be improved.

The platform construction ideas are as follows:

(a) Platform innovation ideas

The information management system based on the IoT, based on the main line and the serial highway will be constructed to realize high-speed management and intelligent innovation.

Collaboration between the upper and lower levels: to achieve synergy between the management office and the superior leadership units and subordinate units.

Road and ground coordination: to achieve synergy between highways, highways and local resources along the line.

Resource synergy: to achieve synergy between human resources, materials, data, information and other resources.

Public collaboration: to achieve synergy between the Huanghuang Expressway and the public.

(b) Target system

Long-term goal: building the intelligent control system based on the IoT, speeding up the implementation of technology transfer and industrialization of achievements, and popularizing in the whole country.

Short-term goal: construct the intelligent control system of yellow-yellow expressway based on IoT, and try the Yellow Expressway management office.

Intelligent control system function objectives: system integration, data fusion, information intensive, management leave marks, emergency controllable.

(c) Project construction organization

Under the leadership of the ministry and the department, Huanghuang Management Office has initially established a more comprehensive information management system based on the characteristics of the managed routes, and completed the first phase of the rolling plan. Data resource integration and collaboration projects were initiated, and organizational needs research was initiated to conduct feasibility analysis.

The project is undertaken and operationalized with the mutual cooperation of both practitioner and academic researcher. The cooperative enterprise is Wuhan Weicheng Technology Co., Ltd., and the research unit is Wuhan University of Technology. Weicheng Technology is a high-tech enterprise with independent intellectual property rights, which provides long-term integrated solutions for software development, system integration and engineering construction. Now it has built a comprehensive control system for many expressways. Wuhan University of Technology has strong scientific research strength in the fields of transportation and logistics, electromechanical and automotive, information, security and emergency management.

4 Control Platform Function Design

The data resource integration of Huanghuang Expressway Management Office will become a comprehensive management and control platform to realize the management of existing people, finance, materials and operation and maintenance, mainly divided into portal homepage, personnel management, financial management, asset management, operation and maintenance management, GIS, emergency management and master data.

(a) Portal homepage

The portal homepage mainly includes functional modules such as pending audit, notification announcement, message center, OA (transceiver management, mail management) and decision-making statistical graph display.

(b) Personnel platform

The personnel platform mainly integrates the existing personnel system, and the existing personnel system business remains unchanged. The organizational structure and personnel information interface are provided for the permission system to use.

(c) Financial platform

The financial platform mainly integrates the departmental budget management system, including budget project library, budget preparation, budget decomposition, budget execution and other functional modules.
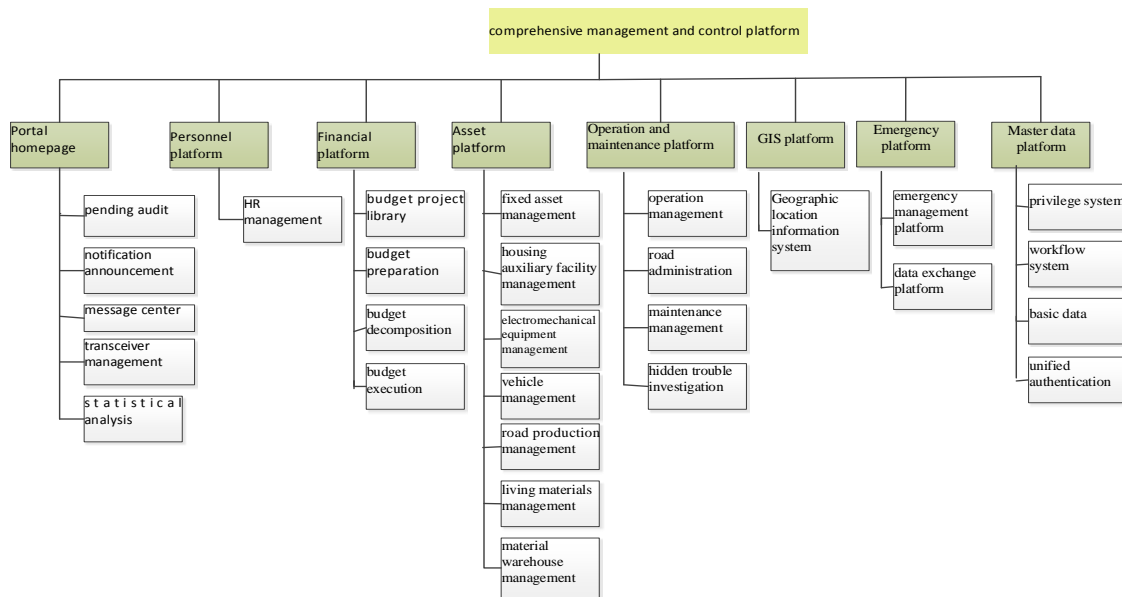
Figure 1   Management Structure of the Control Platform

Budget project library: budget project library project, project candidate registration, project execution query, project performance

Budget preparation: budget income declaration, basic expenditure declaration, project expenditure declaration, budget text generation

Budget decomposition: budget decomposition, budget adjustment

Budget execution: pre-examination of budget execution, project bidding, contract management, payment management.

(d) Asset platform

The asset platform mainly integrates business modules such as fixed asset management system, housing auxiliary facility management system, electromechanical equipment management system, vehicle management, road production management, living materials management, and material warehouse management.

Fixed asset management: fixed asset management asset allocation standards, annual asset update/additional plans, sporadic procurement, inspection income pool, allocation, rental, maintenance, disposal.

Housing Subsidiary Facilities Management System: information about the yards, structures, floors, rooms, etc. of the housing facilities management station

Electromechanical equipment management system: mechanical and electrical equipment management monitoring, communication, charging, power supply and distribution, tools and other equipment

Vehicle Management: vehicle GPS, dispatch, annual review, ETC, fuel, accident, violation, vehicle Maintenance, vehicle driver management, etc.

Road production management: road management bridges, tunnels, service areas, toll stations, information boards, etc.

Living materials management: living materials management clothing and other living materials

Material warehouse management: material warehouse management material storage and storage, intelligent warehouse

(e) Operation and maintenance platform

The operation and maintenance platform mainly integrates the existing road inspection system, maintenance system and operation management system. Through data statistics, we can know the general situation of passing vehicles. For example, platform statistics, the historical data of vehicles passing toll stations. Sometimes data deviate considerably, such as the free traffic increases suddenly in a certain period of time, this may be due to seasonal reasons, or many people disguise their vehicles as free-riders. Managers should notice such abnormal data.
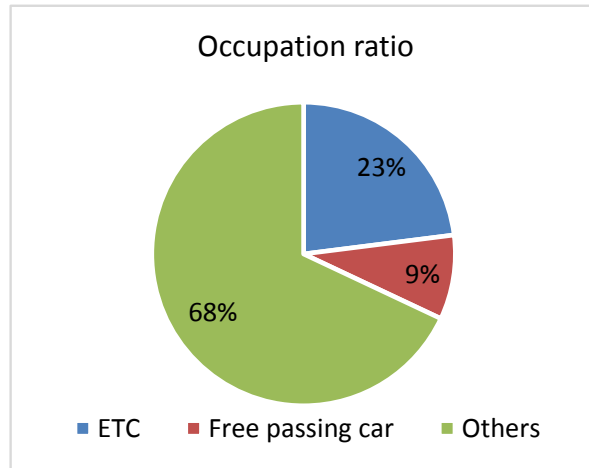
Figure 2   Data of vehicles passing toll stations

(f) GIS platform

The GIS platform mainly provides geographic information display, and displays objects such as stations, bridges, tunnels, structures, monitoring points, weather inspectors, construction information, rescue, and emergency on the map.

(g) Emergency platform

The emergency platform integrates the emergency management and control platform and the data exchange platform.

Emergency control mainly through external sensors (such as smoke sensors), video equipment, positioning equipment (GPS, RFID, etc.) for data analysis, combined with predefined event solutions for early warning processing.
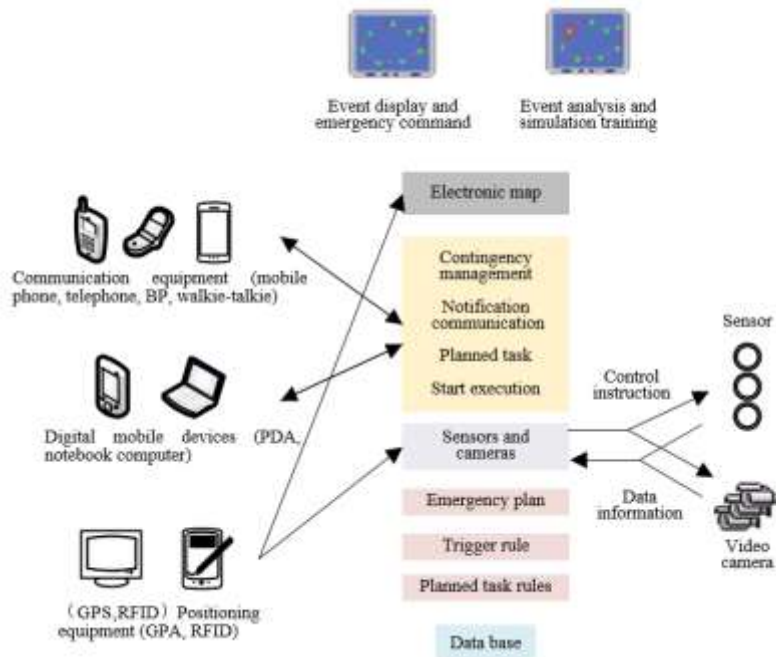
Figure 3   Schematic Diagram of the Emergency Platform Work

External devices and interfaces: supports a wide range of industry-standard sensors and systems such as pyrotechnics, climate control, access control, motion detection, emergency buttons and positioning equipment (including GPS, IR, RF and LF tags), video surveillance, intelligent video detection, etc.

Event Workflow and Rule Engine: the event logic engine integrates external devices, GIS, and other real-time data based on predefined response plans and rules to navigate the entire process of event management. The event logic engine manages events, tasks, device monitoring, user and data access rights rule definitions and applications, and rule definitions.

Communication: the notification server supports automatic or manual communication. Notifications include task assignments and attachments that can be triggered by device alert or alert escalation events, or by mobile clients used by monitoring room personnel or field personnel. The notification engine supports radio, telephone, public address systems, fax, email, SMS and multimedia communications over secure networks, standard telephone interfaces, GPRS and other mobile communication protocols.

(h) Master data platform

The main data platform includes a privilege system, a workflow system, basic data, and unified authentication. The main data platform includes:

i. privilege system role authorization management

ii. workflow system process modeling, process engine, process design, etc.

iii. basic data dictionary, subjects, logs, etc.

iv. unified authentication single sign-on, unified authentication information

(i) Mobile APP

The mobile APP mainly integrates the pending waiting, the message center, the notice announcement, and the asset inventory, mechanical and electrical inspection, road maintenance inspection, and safety hazard investigation.

i. message management, notice announcement, upgrade assistant, communication, emergency message push, pending trial

ii. asset inventory through asset barcode scanning for asset inventory

iii. inspection of electromechanical equipment patrols electromechanical equipment through scan code, which can be repaired by fault

iv. checking the security hazard by setting the troubleshooting list of the hidden danger type, discovering the hidden dangers and reporting them in time, and handling the hidden dangers

v. road maintenance inspections to inspect the construction, emergency events, bridge tunnel structures, etc. on the expressway

vi. WeChat public number pushes all kinds of data information such as event alarm, emergency help, consultation, infrastructure status, traffic and weather conditions, and event status.

At the same time, in order to realize the intelligent control of expressways, ensure the smooth operation of the road network, improve the management level of the road network, and provide data and technical support for decision support, the next stage will be combined with the key measures of "Things Security Big Wisdom Mobile" to promote research.

Things - that is, the Internet of Things, deep into the "Internet of Things" technology application, through the radio frequency, infrared, positioning, laser, remote viewing, telemetry, remote control and other technologies to connect intelligent devices to communicate, to achieve intelligent ICT goal of intelligent control of highways.

Security - that is, according to the relevant requirements of the "Electronic Signature Law of the People's Republic of China" and "Technical Specifications for Electronic Signature of Public Security Information Network", and establish an electronic signature/name in conjunction with the "General Plan for the Application of Passwords in Important Business Fields of the Transportation Industry" The certification service system realizes the security, legality and traceability of information transmission, certification and signature, and strengthens the information security assurance capability.

Big- that is, big data, expand the scope of data analysis from latitudes such as time and space, and intelligently count big data, and finally form a BI (Business Intelligence) solution to present reports quickly and accurately, and provide scientific decision-making basis.

Wisdom- that is, intelligent, combining communication technology, computer network technology, and intelligent control technology to make full use of its "wisdom" and "ability" to effectively control electronic sensing, remote control, image recognition, speech recognition, video and audio analysis, etc. Ground transportation is used for platform construction.

Mobile- mobile interconnection, mobile Internet technology, supporting mobile applications, such as APP, WeChat enterprise number, public number, nailing and other diversified models, thus making the integrated management and control platform diversified, breaking through time and space restrictions, and accelerating collaborative management and control.

5 Conclusion

Hubei Huanghuang Expressway Management Office has built a cooperative control platform by means of information management through the use of Internet and IoT technology. This paper mainly introduces the construction of the intelligent collaborative management and control platform of Huanghuang Expressway Management Office, and expounds its construction ideas, target system and main function design. Through the integration of data resources, a comprehensive management platform with rich data, advanced technology and convenient use is constructed to realize the management of existing people, finances, materials and operation and maintenance.

Acknowledgement

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Using H.264 Codec Remote Conference System to Realize Credit Transfer of Global MOT Course at Yamaguchi University and Overseas Universities

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Abstract: The Yamaguchi University Graduate School of Technology Management collaborates with universities in Indonesia, Malaysia, Thailand and Vietnam to establish unit-compatible classes with overseas universities using the H.264 codec remote conference system Heisei I have been working on it since the 27 (2015) year.

We recently completed the introduction of the H.264 codec remote conference system at each university and started to develop a compatible matrix for each lesson based on the curriculum map to realize full-scale unit compatible classes. In this presentation, I will report the results so far and future prospects.

Key words: Remote Tele-conference lecture; Course sharing; Credit transfer system

1 Introduction

Graduate School of Engineering Management at Yamaguchi University is a graduate school for technical management specializing in graduate students of society. Since it was established in FY 2005, we have promoted problem-solving learning that incorporates learning methods such as active learning, technology. We have accumulated experience in management education.

From FY2010, with the aim of fostering human resources capable of globally playing an important role in expanding the base of technology management education cultivated up to now, in collaboration with influential universities in ASEAN countries, crossing the borders, academic fields, industry and academic barriers Asia Innovation Center was established as an educational base for cultivating advanced professional people promoting open innovation, and faculty members of Yamaguchi University Graduate School of Technology Management focused on dissemination of global MOT education.

In this presentation, we cooperated with universities in Malaysia, Indonesia, Thailand and Vietnam, developed the framework of international lecture using remote system, and introduced H.264 codec remote conference system as a tool for lecturing Report it.

2 Background

From now on, innovation is indispensable for sustainable growth in Japan. It is not innovation that is completed in the country, but it is necessary to create innovation that is widely accepted abroad, especially in the Asian region centered on ASEAN countries where growth is remarkable.

Innovation is not mere technological innovation but means "innovation" that succeeds as a business based on the context of society, economics and culture.

Human resources who can drive such innovation can grasp things from a compound eye viewpoint of technology and management and understand diversity of culture and society while cooperating with people in the Asian economic zone to mutually benefit the ability to create business models is required.

At Yamaguchi University, as an "Asia-wide Practical Innovation Education Base", with the aim of implementing an educational program (Global MOT Education Project) that trains global technicians across national borders in order to foster such human resources we opened Asia Innovation Center.
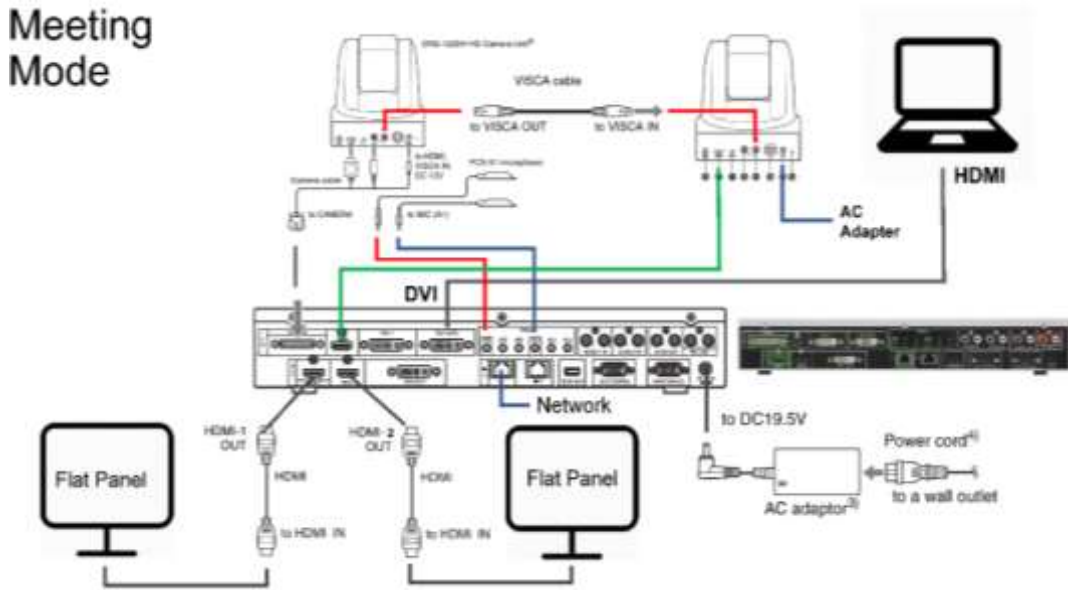
Figure 1   Connection of Equipment Compatible with Meeting Mode

3 Collaboration with Overseas Universities

3.1 Global MOT education consortium

As a cooperative university for implementing global MOT education project, Indonesia ·Bandung Institute of Technology Business School, Malaysia Institute of Technology Malaysia Japanese International Institute of Technology, Mala Institute of Technology Business School, Thai ·Chiang Mai University Business School, Vietnam ·Da Nang Science and Technology University Business We aimed to collaborate with the school and formed a consortium on global MOT education.

3.2 Study of remote tele-conference system

In this global MOT education project, we introduced H.264 codec-based remote conference system as communication means for connecting Yamaguchi University and each university.
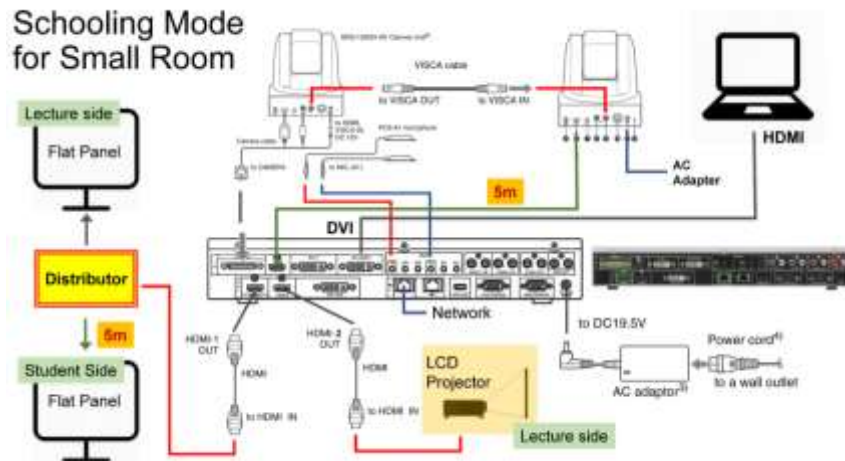
Figure 2   Connection of Equipment Compatible with Schooling Mode

Utilizing the H.264 codec-based remote conference system, Yamaguchi University has accumulated experience such as remote lectures in the university and remote training in multiple campuses. The feature of the H.264 codec-based teleconferencing system is that it is possible to deliver clear lecturers' images and voices as well as personal computer images. As long as the Internet communication environment is in place, it is possible to connect anywhere in Japan and overseas. In addition, since the H.264 codec-based remote conference system installs dedicated hardware, it is easy to establish a connection by simply turning on the power of the receiver and calling the other station. In

this project, we emphasized that faculty members and students who do not have expertise on communication can communicate easily and stably easily.

3.3 H.264 codec-based remote conference system

In order to establish a smooth telecommunications connection with overseas universities, it is not enough to just introduce the H.264 codec-based remote conference system. Therefore, in this report we report examples of Vietnam ·Da Nang Science and Technology Business School introducing the same model as the H.264 codec-based remote conference system (made by SONY) used at Yamaguchi University.

Since the H.264 codec-based remote conference system is basically a system for remote conferences, it assumes a mode in which they face each other in equal positions while facing each other. We call this mode the meeting mode.

On the other hand, in distance class, it is divided into lecture delivering side (lecture station) and receiving side (student station), so we will call this style schooling mode.

Fig. 1 shows the connection diagram of the equipment compatible with the meeting mode. The equipment to be connected consists of two remote video cameras, two flat panels (about 60 inches), one codec and one personal computer.

A dedicated video camera is a type that separately connects a video signal (HDMI cable) and a control (VISCA cable), and it is possible to adjust the angle of the camel and the zoom (wide: tele) with the remote controller. In addition, if the distribution station and the receiving station are using the same manufacturer's H.264 codec-based remote conference system, remote distances such as adjusting the camera on the other side (for example, switching the camera on the Vietnam side from Japan side) Operation is possible. By allowing such instructors to perform such operations smoothly, it becomes possible for lecturers with realistic feeling to be delivered to remote locations.

Next, the connection of equipment compatible with the schooling mode is shown in FIG. In the schooling mode, from the viewpoint of the instructor on the delivery side, arrange so that the student on the remote (receiving) side seems to be in the same classroom as the local student. Also, from the students on the receiving side, arrange the lecturers on the remote (distribution) side as if they are in the classroom where they are.

(a) Full view of lecture room introducing H.264 codec-based remote conference system

(b) The secondary camera takes a lecturer and a front screen.

(c) Primary camera shoots the classroom from the instructor's point of view

(d) Classroom viewed from the primary camera (student view)

Figure 3　In the Lecture Room Introducing the H.264 Codec-based Remote Conference System, Shows the Arrangement and View of the Primary Camera and the Secondary Camera

In order to realize this arrangement, in the schooling mode, connect to two flat panel monitors and one liquid crystal projector by increasing the number of video monitors compared with the meeting mode. At that time, the two flat panel monitors display the same image through a distributor (Fig. 2).

In each station (distribution station and reception station), two cameras are arranged so that lecturer view and student view can be taken. Here, we must pay attention to the priorities of the cameras on the system. Due to limitations of the system, the primary camera is a camera that takes a student view and the secondary camera is a camera that takes a lecturer view.

Figure 3 shows a photograph showing the arrangement of equipment at Yamaguchi University.

3.4 Telecommunication connection with overseas universities

In May 1990, Yamaguchi University and Da Nang Science and Technology University were connected to demonstrate distance lecture by H.264 codec based remote conference system. This demonstration started a lecture with the Japanese side (Yamaguchi University) as the distribution station and the Vietnamese side (Danang Science and Technology University) as the receiving side. We were able to conduct interactive video live lectures such as receiving questions from Vietnamese students in the middle of the lecture and switching students' view of the cameras to each other and discussing students between Japan and Vietnam with each other. On the day of the presentation, I will show the state of the demonstration.

4 Conclusion

In order to implement the global MOT education project, Yamaguchi University has been working

with universities in Asian countries to introduce H.264 codec-based remote conference system. Following the successful completion of the demonstration tutoring lecture with the H.264 codec based remote conference system, we will begin designing the curriculum for the implementation of the code share lecture and further the unit compatible classes.

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Governing Higher Education's IT in Cloud Era: Challenges and Possible Solution

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Abstract: One of the leading growing information technologies which appear affecting organizations in specific ways and levels is cloud computing technology. Many kinds of literature found from neither professionals nor academicians concentrating on pinpointing enabler and inhibitors in governing or embracing the cloud solutions. Nevertheless, only few who identified how such solutions would have predisposed IT Governance in an organization, in which having the effective one will consider as a guide to enduring the emerging and competitive market. Cloud computing services which have flooded over the market of business for many recent years offers almost everything to be much more at ease for anyone to occupied and access. They covered practically from personal file backup to central production server and application services completely. It can be ascertained that the cloud computing service trend is undoubtedly placing pressure on traditional IT governance processes to reconcile. For that reason, this paper aims to study the challenge and what are the possible solutions of Higher Education's IT governance in the cloud era. This paper was built through an exhaustive literature review describing IT governance including the challenge in cloud computing, in conjunction with transformations of organization cited by several researchers.
Key words: Higher education; IT governance; Cloud computing; Challenge

1 Introduction

The emerging technologies and significant challenges arising from efforts in embracing new technologies are the results of higher education all across the globe to be in persistence changes and development situation. The new category of the student which have entirely different learning needs from their precursor and the increasing of recognition of the technology utilization are requisite to delivering high-quality education in the century are becoming a primary cause. To many people, likewise student, it is noticeable that the needs of Higher education with an emphasis on higher order learning experience, changing knowledge and communication-based society (Pacesila M, 2006) demanded are unable just by addressing the traditional method of IT. IT which has become part of a Higher education institution is an essential issue. The progressive of IT evolution becomes vigorous warranty of effective and efficient to the organization (Ribeiro J., Gomes R., 2009). In addition to other institutions, Investment in IT also turns out to be noteworthy spending to Higher Education Institutions. The activity of teachings, administration, research, student learning needs IT support. However, in the case of supporting IT investment in decision making, IT performance measurement at a strategic level and comprehensive approach to risk management are essential to set in for an institution (Coen M., Kelly U., 2007). The term "governance," in common denotes the way an organization ensures that strategies have been set up, monitored, and accomplished (Weber K. et al., 2009). An almost entire aspect of universities, school's academic and business affairs already pertained to IT. Efficient IT Governance is required to convince that all kinds of costly and complicated IT process are governed adequately. Moreover, all the stakeholders will want to be satisfied. In order to support the business goals of learning, teaching, research, and administration, there had some studies in IT governance which applied in university as the point of research (Ajayi BA, Hussin H., 2014).

The new technology utilization such asa cloud computing service recently cannot be denied provided many advantages. However, it is necessary for organizations to be able to recognize and evaluate the impacts of cloud adoption to their information system before deciding to migrate to the cloud. The embracing of cloud computing technologies will bring an innovative approach in IT utilization in an organization. Nevertheless, a particular information system maturity management and the capacity for recognizing appropriate substances and facet that may predispose to the new adoption are required. Therefore, the influence of such technology on IT governance policies needs to assess before the migration process. Re-evaluation is also needed in many facets of the IT governance.The most discussed in published papers are the benefit of IT governance and or cloud service in common industry implementation, meanwhile, few who discuss what and how IT governance in Higher Education Institutions (HEI) need to have re-thought in facing the cloud era. The paper studies purposes

are to support three goals. First, to analyze the benefit of IT governance implementation in HEI, second is to obtain the benefit of cloud computing to HEI, third is to understand the challenge and possible solution in governing HEI IT in a cloud environment.

2 IT Governance and Higher Education Institution

IT Governance essentially is a whole enterprise of IT function. With a proper framework, organizations can gain quantifiable outcome in regards to succeeding their goals and strategies. IT governance also treated as a framework which intended to encourage behavior in using IT for decision making and accountability (Weill P., Ross J.W., 2004) which containing a series of arrangement process and structure in an organization to ascertain operational and strategic management perpetually managed and continually monitored (Weill P., Ross J.W., 2004). As an organizational capacity, IT Governance done by the board, executive and IT management with the objective of integrating business with IT and the implementation of IT strategy (Van Grembergen W. et al., 2004). Stakeholder's needs are also taking into account in addition to the needs of staff and the method they follow on formal program. The overall main objectives of IT Governance are to enhance business performance and conformance along with regulation (Bhattacharjya J, Chang V, 2010). Regarding the methods, ITIL, COBIT, and ISO are widely practicing framework.

Higher Education Institutions (HEI) known as an exceptional type of organization, where its technological infrastructure comprises application diversity, different program, academic systems, and used different technologies (Coen and Kelly, 2007) and knowledge in teaching learning and research as primaryactivities. It is distinguished broadly not just in their objectives, condition, arrangements, and procedures, yet additionally in their IT application, prerequisites and foundation. Studies had performed and demonstrated the contrast amongst companies and university in their IT systems and divisions (Zhen and Xin-yu, 2007). Since higher education institutions also pursue a better and more cost-effective method to perform IT service, seeing such distinction will mainly help in picking the most appropriate framework of IT Governance to be utilized in a higher education institution. Nevertheless, IT Governance mechanisms in an organization determine by the characteristics and the needs of the organization itself (Hicks et al., 2012). Like companies, higher education institutions are anxious to quickly answer to new prospects, without spending much time to perform a business-critical program. What's more, similar to organizations, higher education institutions need to understand the maximum capacity of their information to better strategic advice choices about what's to come.IT Governance employment in HEI is relatively identical with other industry and institution in benefit acquisition. Benefits of implementing IT Governance at HEI are (Khther RA, Othman M., 2013):

A. Improvement of alignment between IT and institutions strategy

B. Improvement of regulatory compliance and business performance

C. Improvement of decision making for a better direction in the organization and able to develop an important IT strategies and policies

D. Improvement of risk management associated with IT due to adequate management

E. Improvement of Communication among crucial stakeholder group for central IT includes teaching staff, students, business process owners, research, and development, divisional IT management

F. Improvement of quality of services and administrative

G. Improvement of controlled and managed the IS more efficiently

H. Improvement of a range of activities in an academic environment\

I. Reduced the incident/failure of systems

3 HEI's IT Governance in the Cloud

The IT sector advancement influences other related system development, and the current trends appear to be the cloud service concept. It is imperative for the organization to have the suitable and sufficient structures and dimensions to actualize effective governance that aligns business strategy with the IT (Van Grembergen W., 2004). When a new technology needs to implement in an organization, it will affect its governance. Hence, to have adequate governance when implementing cloud solutions, the organization must be ready, regarding capacities and structures dedicated to the cloud. Therefore, an organizational design, with the appropriate skills and expertise to support the established IT governance, is needed. To both public and private organizations, cloud technology brings prospective benefit propositions by making IT services as a commodity (Forell T. et al., 2011; Al-Ruithe M. et al., 2016). The efficiency of cost, backup and recovery, automated software incorporation, indefinite storage,

access to information, more manageable service measure, prompt establishment, and new distribution facilities are commonly entitled as the benefit of cloud computing (Ko RK., Jagadpramana P., et al., 2011). Not to mention, enhanced server usage, dynamic scalability, and reduced life cycle extension of new applications as a further value. Many factors which mostly concerning the moving of business data to be handled by a third party made cloud computing still have not adopted broadly (Niemi E., 2011), then there are also other players like cloud auditor, cloud broker, and cloud carrier (Bumpus W., 2010). Therefore, data control, security, and privacy, data quality,and assurance, can be mentioned as real concerns in adopting cloud computing business models (Ramachandra G., Iftikhar M., Khan F.A., 2017).

The usage and knowledge constructions of an influential factor for social, economic, cultural and transformation of technology in higher education required to employing cloud-based education system. Accomplishing this objectiveare unavoidably comprises technological use, which would grant knowledge transmission and generate new spreads for education, research, and development. What cloud has to affect to education sector has been put forward particularly regarding the implications of technology and open access to knowledge which attracted many researchers and attention from all over the world (Sultan N., 2010). Regarding the utilization of the assetandgenerates a customized learning environment or somewhat virtual teaching and learning, clouds offer more flexibility and agility. Teachers, staff, as well as students, can access any form of information needed from anyplace, using any device withcloud computing technology. In this manner,the adoption of this cloud technology by both public and private learning institutions considered as another way of delivering enhanced services using limited assets at their disposal. Plenty of features arrangement can be shifted to the cloud as shown in Figure 1. For instance, the use of SaaS and IaaS services of clouds providers by the students, administrative staff and lecturers can be completed. These services preferably operated through thin clients (a terminal which no more than a screen and a keyboard). Any software establishedwill stay on the SaaS cloud provider server, andit can access online. The need for disk space or further hardware is performedonline directly by the IaaS, cloud provider. The similar condition happens to the developers' group in this setting through a PaaS, cloud provider. Lastly, researchers who demand sufficiently processing power andextra server capacity for their project maycarry outwithin clicking a button over an IaaS,cloud provider.
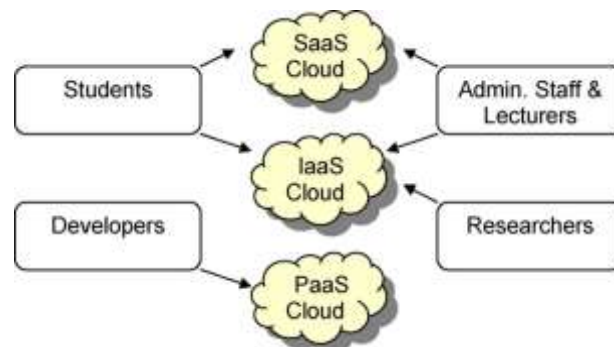
Figure 1   Simplified Structure of Cloud Service in a Typical University (Sultan N., 2010)

The implications of cloud computing technology on higher education IT governance research and innovation, categorized as followed.

3.1 Students

It is takingnumerous effects that cloud significantly adjusted education mechanism, equally in traditional and online courses or classrooms. A typical issue with reading material in consistently changing the world is that they are immediately obsolete and unreasonably costly for both students and educational institutions to persistently obtain the recent version. This matter is almostentirely removed with cloud solutions, as the cloud-based materials can merely be real-timeupdated and continually supporting students to access to the most recent learning resources. Cloud computing like wise employed in the education division for accommodating learning management systems (LMS).In the e-learning system, teachers/trainers and students are the two primary entities where the students will be able to access exams, courses, and can submit their projects online.Utilizing cloud (SaaS) applications service, which denotes to the software program is overseen remotely and conveyed using the web.Itis feasible for the teacher/educators and the student to get to their individual information utilizing an internet browser from a PC or cell phone at school, home, library or some other place, consequently

guaranteeing proficient joint effort, correspondence and trade of shared documents, notes, and in addition contacts among other information. Cloud computing also delivers students with quick access to primary course resources and links them with one another.Following are the implications for studentsin quick summary (Ghilic-Micu B. et al., 2011):

-. Propose visibility, computer-based educational system
-. Digital Learning conditions
-. Educational process with an individual portfolio
-. Autonomous Web-based service
-. Social knowledge and Resourceful environments synchronizations

3.2 Teachers/Educators

Cloud computing technology can address many of the world education problems including inadequate infrastructure, deficiency of teachers, low rates of graduation, likewise small size classrooms. Several aspects of the previously mentioned components can effortlessly exchange to the cloudasappeared in figure 1. For instance, it is practicable for teachers and students to partake in class deprived of the school premises. Within virtual classrooms – Communications between teachers and students who geographically spreadcan be conducted in person. This technologywill allow universities the occasion to join upand gains the student diversity population.Furthermore, Instead ofthe student's advantageto get to access and delivered their assignments, course,and examin real-time, the teachers/trainers also can convey courses and homework evaluation and assignments to the students,thenboth can be connected with each other (Dong B. et al., 2009)**.**At the same time, itsignifies that both teachers and students can be versatile and accomplish their learning purposes by utilizing their interconnected devices. Teachers, staffslikewise the students might be bound to use services from service providers of (IaaS) and (SaaS) clouds which will hold accountable for numerousfeaturescontainingperforming the application and operating systems, etc. on behalf of the client. Implications for teachers or educators, in summary, are the followings (Ghilic-Micu B. et al., 2011):

-. Computer-based, incorporated and flexibility teaching systems
-. Tutoring accommodations for educational advancement
-. Convenient access to educational and research matters
-. Online knowledge collaboration
-. Software presentation utilization and advance substance

3.2 Researchers

Researchersin their daily routine and their private and professional lives are employing cloud computing, such asutilizing email (e.g., Gmail, Yahoo), social media (e.g., Facebook), online storage (e.g., GoogleDrive, DropBox), survey platform (e.g., SurveyMonkey), real-time communications (e.g., Skype, Hangouts), collaborative projects (e.g., Google Docs), or mobile apps. It is a necessity to perform investigation demanding high levels of computation and processing to support researchers and post-graduate students with the essential hardware and software. The research and teaching resources required being the primary objective of constructing such a library, and its structure should apply the planning process design involvingthe labor division through an initial concentration on the principles that escorting innovation process and creating suitable use of the existing resources. There is essential to categorize,manage, likewise to captivate the recent outstanding outcomes in using cloud computing services tied with improvement and methodical quality in the development to guarantee that the library legitimately outfitted with the essential teaching and research resources. Furthermore, researchers can complete their project assignments with huge processing ability in demand through cloud(IaaS) provider. The followings are the Implications for researchers in summary (Ghilic-Micu B. et al., 2011):

-. Partaking and Cooperation research infrastructure
-. Access to digital data and information
-. Economic challenge knowledge and supporting research

4 Discussions

Critical key process in maximizing the value that every institution received from its investment in IT sector is by having effective governance. All the technologies needed for supporting the research, teaching and administrative processes demanding an effective IT governance framework which composed of structures, processes, and relational mechanisms. Every mechanism has its function and once implemented, should positively influence the organization. The process of recognizing the right

mechanisms to a specific condition is a complicated endeavor. Studies had reported that the organizations which have taken on formal mechanisms of IT governance improving their accomplishment and profit (Weill and Ross, 2004; Lunardi GL. et al., 2014). Moreover, the effectiveness of IT governance had specified will assists an institution in attaining its objectives by employing IT resources in an optimum method (Grama JL., 2015). It is quite famous that each type of organization is essentials to have formal IT governance to obtain decent results in the organizational performance. The ineffectively of an IT governance ishighly possible to predisposing the organization performance, quality of services, management of operations and costs(Ali & Green, 2012; Pang, 2014). In higher education institutions occasion, this ineffectively of IT governance will predispose the standard of teaching, research, and internal management processes.

What cloud technology proposes for IT directions is flexibility, efficiency, faster, cheaper of resources and services. Nevertheless, its implementation has an impact on the IT function. Many aspects must be reviewed and rethought. Managing top-down decision making regarding cloud technology adoption makes it more challenging due to its simplicity of acquisitions where buying or signing up cloud service possible to be completed by anyone. The campus community will be arranged by a consideration of in which way the decisions are taken and who made them within an integrated, effective and established IT governance campus structure.   Also can be saying that that decision in the cloud can derive top down and vice versa, however fully transparent and well-coordinated are the critical foundation. IT governance which demonstrates the process of institutional IT decision-making, considered as mature IT governance. The uniqueness of Culture and mission of Higher education institutions affect how decisions about cloud computing are made.

(1) Dedication to students. Cloud technology is about meet up students' needs as it is also about creating campus efficiency. Greater interoperability platform, secure access, reliable network, and the capacity to provide, convey, and share content through devices amongst university and students required to be delivered by IT departments. In other words, it has to serve the students along with their own devices on the campus.

(2) Higher education complicated finance type strained and involving several educational funds composite.

(3) Decision-making method. The culture of governance in higher education in taking top-down decisions in participatory methods is frequently barring or a bit complex. Particularly while attempt to reaching a concurrence in deciding where to allocate limited resources which involving the stakeholders. Stakeholders in this kind of situation are essentials to grasp thoroughly to the advantages of cloud-based services.

Highlighting and portfolio administration to a certain level also subjected to good IT governance. The university portfolio of IT services might develop rapidly within the used of cloud service. IT governance with the awareness of cloud technology should take a role in managing the use of these services by dealing their availability and prioritizing the necessities to prevent a repetition of effort and to influence the economies of scale. In order to develop good IT governance model that integrates cloud, below crucial functions shall be included (ECAR, 2015):

(1) Providing an instrument to authorize for both top-down and bottom-up needs to be involved in the process

(2) Providing decision-making rights and accountability frameworks that are agile and easy to use by IT decision makers

(3) Preserve the institution and its behalf

(4) Recognize and managing risk

(5) Pay attention to privacy and security matters, as well as policy and regulatory compliance

(6) Make confident that administrative as well as academic units are entirely contributing in the process, on behalf of a business, IT, legal, risk, procurement, compliance, and other institutional perspectives

(7) Make sure that the centralized and decentralized IT units mutually are synchronizing their needs and opportunities.

Prior adoption of cloud computing into existing IT governance, a review would become an optimum process. Governance shall endorse institutions in developing a reliable process which builds credentials by means of responsiveness. Drawing up specification or criteria for higher education institutions to contemplate when deciding to adopt a new cloud service or making substantial changes to an existing cloud service is assisting reliability and speed at the same time. For instance, IT decisions supporting research activity might be excluded by several institutions review or on behalf of community

usage some particular tools might be allowed. These following criteria might incorporate (in no specific order) in addition to standard criteria that existed which considered through the review of IT Governance regarding additional cloud particular concern effort: Current services assessments, trouble-free access, data sensitivity, security and privacy, audit compliance, exit strategy, campus business operation transformation, staff endeavor, contract agreement, budget operation, and risk and policy management.

5 Conclusion

Responsibility, strategy, acquisition, performance, conformance, and human behavior, specifically are the essential construction of principles of IT governance in HEI. These principles are supposed to have good performance either for governance practices or management practices and likewise, will determine that every performed phase aligned with the vision and mission of the university's stakeholder. The IT governance committee could make a further decision about the optimal approach to accomplishing ITgovernance primary objective in the cloud within the engagement of the right stakeholder. This may bring clarity and liability to cloud decision making and incorporate lessening cost from duplication, data privacy, sensitivity protection, and giving better support to the environment. This procedure may integrate some intentional central decision-making hand-over through IT governance committee for mutual and more decentralized methods.

IT governance should be no longer as the duty of the IT unit/division only but has to be as an integrated part of the university as an institution. Therefore corporate governance related to conformance processes can be improved, and business governance related to performance is also allowed to produce something beneficial for the university. Specific inference about the mechanisms of IT governance in higher education institutions practice is that many committees had been formed. Every committee has their own purposes and intentions in the IT governance of the organization. The upcoming IT governance in higher education's institutions shall be shifting to cloud computing services. Confidential data, safety control, will still always becomes a critical and crucial matter since social media as a platform, and the growth of data will incorporate with current data from various sources. Traditional IT governance security will not successfully adapt to the cloud. Further solutions need to be delivered to focus on governance in the cloud era. The governance framework is primarily essential in cloud computing. Several vital regulations need to be measured, but the existence of the framework itself is very crucial regarding maintaining the cloud process at high parameters.

Acknowledgement

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The Future Developing Path and Constraints of Wearable Smart Services Based on Health Management

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Abstract: Health is an important basis for all life activities.For the purpose of managing health, this paper studies wearable smart devices.Combined with the current situation and existing problems of wearable smart devices in health management, it is expected to provide some feasible Suggestions on the futuredevelopment path of wearable smart devices based on health management. Forexample,Layout Sign Signal Monitoring, Data Accuracy, Health IoT Management System, Health Cloud Database, Medical Alert Service.The value of the research, the methods used, the conclusions drawn, and the significance.
Key words: Health management; Wearable smart devices; Healthy internet of things; Development path

1 Introduction

In Ci Hai, the concept of health is that the human organs are well-developed, functional, healthy, energetic and have good working efficiency (Xia Zhengnong, 2010). Health management is in the late 1950 s in the United States put forward the concept of the first (Managed Care), its core content is the medical insurance institutions through medical insurance to its customers (including disease patients or high-risk groups) to carry out the system of health management, to effectively control the occurrence of diseases or development, the purpose of reducing the loss of medical insurance claims. Health management is the process of comprehensive management of health risk factors of individuals or groups. Its important significance is to manage health scientifically.In this era of rapid social development, people's health problems will become more and more prominent, and the concept of health management has been put on the agenda. Health management refers to a process of comprehensive management of health risk factors of individuals or groups (Zhang Fenglou, 2011). In 2017, Xi Jiping, general secretary in the report pointed out that socialism with Chinese characteristics into a new era, the main contradiction in our society has changed, according to the "much starker choices-and graver consequences-in" health and health planning "the instruction spirit, our country put forward the" health". To build, we will put the improvement of the national health management level at the strategic height of the country, and people's health will shift from medical treatment to prevention.With the help of wearable smart devices to help build healthy habits and habits, people are constantly improving their awareness of self-health management.

The idea and prototype of wearable devices was proposed by the media lab of the Massachusetts institute of technology in the 1960s (Kong Bin, 2013). Products and electronic devices that can be worn on users can be used to record and organize their daily activities or to monitor and protect their physical health.Wearable and more intelligent device to have part of the calculation function, can connect mobile phones and portable accessories of all kinds of terminal, the mainstream product forms include supported by wrist watch class (including watches and bracelets and other products), supported by the feet of shoes (including shoes, socks, or other leg wear products in the future), supported by the head of Glass (including glasses, helmet, headband, etc.), as well as smart clothing, bag, crutch, accessories and other kinds of non-mainstream products form.With the rapid development of electronic products, various wearable products have also entered our life, among which, wearable products such as smart bracelet and watch have been well known by many people. However, there are still many bottlenecks in the development of wearable devices, such as high cost, short battery life, low data accuracy, inability to use independently and incomplete functions (Yang Chenxiao, 2018). The mainstream product forms include wrist watches (including watches and wristbands, etc.), which are supported by the feet. The shoes (including shoes, socks, or other leg wear products in the future), head-supported glasses (including glasses, helmets, headbands, etc.), and smart clothes, school bags, crutches, accessories, etc. Mainstream product form. With the rapid development of electronic products, various wearable products have also entered our lives (Zhong Yi, 2017). Among them, wearable products such as smart wristbands and watches have been well-known to many people. However, there are still many bottlenecks in the development of wearable devices, such as: high cost, short battery life, low data accuracy, cannot be used independently, incomplete functions (Xie Lingqin, 2015). With the development and progress of

wearable technology, wearable devices will be mainly implantable and ex-situ devices in the future. With the continuous development of wearable smart devices, wearable devices can be implanted in the human body to rely on the human body's energy to run, real-time monitoring of the human body's physiological indicators, through intelligent system analysis, to provide people with accurate, intelligent services (Cui Hai, 2018).

2 Application Status in Health Management
2.1 Health monitoring
The pace of social life is getting faster and faster, the pressure of life and work is increasing, and people are paying more and more attention to the health status of their bodies.The function of sports health monitoring is the key to the rapid growth of the wearable industry. Throughout the industry status quo, wearable products industry is almost all sports health demand, in almost all of the wearable equipment, including bracelets, watches, smart shoes, clothes, health function is indispensable.Sports health monitoring is mainly divided into two categories: one is human physiological condition monitoring, the other is environmental perception monitoring.Human physiological state monitor, such as sports fitness class of wearable intelligent bracelet is using sports interactive class sensor to sense the user's motion state and sleep, there are other types of wearable intelligent device by monitoring steps to collect, heart rate, blood pressure, blood oxygen, exercise, body fat, body temperature, calories, etc.;Environmental awareness monitoring such as start-ups in Vancouver, Canada (TZOA) research and development of a wearable environment detection sensor TZOA size of a button, can clip on clothes, used to detect the air quality, such as ultraviolet light, humidity and temperature indicators.Therefore, wearable smart devices in the health management function is quite limited, the data and physical signs for the future needs to be together, can generate more useful data and judgment and feedback to the user, to give the user more comprehensive experience.

2.2 Gender and age distribution
Global wearable retail market size in 2015 forecast for 72 million units, up 132% from a year earlier, the public awareness of the wearable intelligent devices is rapidly increase, the first year of 2015 is regarded as wearable markets.In terms of users, the survey results show that the majority of wearables users are male, accounting for 85%.However, because the key technologies related to wearable smart devices are difficult to break through, the application development of sports monitoring and sports health management is slow.Female users will become a new growth factor, intelligent health deserve to act the role of science and technology company, for example, developed in 2017 called widgets "Leaf Urban" a metal Mosaic Leaf pendant, not only have the regular steps, monitoring of sleep, also can pass the physiological changes to monitor the user's mental health, once detected abnormal psychological pressure, the app will automatically recommend corresponding relief activities and schedule, to help users relieves stress.Also, from an age perspective, the older you are, the more likely you are to use a bracelet.37.3% of the post-70s have used or are using smart bracelets, compared with 26.1% of the post-90s, and only 21% of the post-2000 generation. In addition, the number of people born in the 1980s and 1990s who use mobile phone rings is the same as that of mobile apps.As a result, the community of wearables users is quietly changing, and the need for movement and health monitoring has not diminished.

2.3 Price factor
In classical economics and Marxist economics, price is the external embodiment of the intrinsic value of goods (Karl Marx, 2010). In modern market economics, prices are generated by the mutual influence and balance between supply and demand (Bender, 2010). The price of goods reflects the value of goods. Simply, cheap goods are not good, good goods are not cheap. Nowadays, wearable intelligent hand ring, for example, within one hundred yuan intelligent bracelets you could have many choices. It's not wisely to attract users by lower price, only to meet the needs of users can solve the pain points.According to the research data from the leading edge industries research institute, the largest percentage (48.2%) of the reasons for not buying wearable smart devices is "functionally useless".Therefore, at present, wearable smart devices have little effect on health intervention in functional applications, and cannot affect users in functional applications. It's a cautionary tale for wearable smart devices. Users' eyes are bright, and only by focusing all their efforts on solving users' pain points can they succeed in the business competition.

3 Problems of Wearable Smart Devices in Health Management

3.1 Low accuracy of monitoring data

Scientific monitoring data is the core of wearable smart devices to manage users' health.Currently, the data monitored by wearable smart devices on the market are mainly steps, heart rate, blood pressure and calorie consumption.However, some intelligent device manufacturers do not consider the complete product function definition, but only want to gain market share. For example, if the function of movement bracelet is not very accurate, playing several rounds of mah-jongg, and making a bus in the back, you may rank among the top in the APP.On monitoringheart rate and blood pressure, wearable intelligent devices provide data is an instantaneous value, cannot provide the result of visualization of data analysis all the time, for users, this type of health information has little function, and it's unscientific for usersto choose sports or rest refer to these data. Thus, wearable intelligent device to improve the user's health habits, provide reliable health planning advice, the top priority is to improve the accuracy of testing data, and provide users with personalized, accurate service through the data analysis.

3.2 Poor user stickiness

Wearable smart devices are said to be the next breakthrough leading the technological revolution, attracting as much attention as smartphones. Smartphones have human organs function extension, wearable smart devices compared with smartphones, almost all the people all the time need to mobile phone, but not all people need wearable smart devices. In the case of people who use smart bracelets, it's not as if they're always around as if they're on a cellphone. Most of the time, take it for a few days, then take it off, and if you remember it, carry it on, and if you can't remember it, it can be put on hold for a few days -- it's not at all the way to a product with a rigid demand. So, show that the needs of the masses have not been well met -- I need, but you've given me the wrong things.Meeting the needs of the public, especially exploring the "irreplaceable value of existence", is the key to the selection of wearable smart devices by the public.

3.3 Information security risks

From 2013 to 2017, the production of wearable smart devices has increased rapidly, and the market capacity will become larger and larger.Therefore, in the increasingly popular future of wearable sports devices, personal information and data are at great risk of leakage, and are still leaked unconsciously. If personal information and privacy protection, then the future of information crime in society will increase significantly. In this way, the product experience of users will be hurt, which is not conducive to the accumulation of user reputation, and the development of wearable intelligent equipment industry.For the fitness crowd, it is too easy to get their track, range and range of motion on the Internet.For some criminals, it is easy to get personal information about their home and work places, leaving a hidden danger for their personal safety.Therefore, strengthening information protection is also an important problem to be solved by wearable smart devices.

4 Paths of Future Development

4.1 Layout and sign monitoring

The wearable intelligent device on the market at present stage mainly functioned in the human body signs as: heart rate monitoring, temperature monitoring, energy consumption, sleep monitoring, etc. (Wang Hao, 2014). Only such signs can not get the purpose of monitoring user's health. Therefore, if want to layout health management from the beginning, we must speed up the related technical research of wearable intelligent equipment, to provide support on policy, financing, taxation of wearable intelligent device which makes wearable intelligent development enterprises have a good development environment to introduce core key technology as much as possible.Only in this way can we obtain as much, comprehensive and accurate physical data as possible.

4.2 Improve the accuracy of data

At present, most of the healthy wearable devices cannot meet people's needs for personalized health management and monitoring (Liang Wei, 2013). Although the current intelligent bracelet or watch can monitor data, but the data is relatively single and not accurate, the user just pure data usually, the accuracy of the data itself and the significance of data back to the user has no way to know. Facing of China's digital health trend, people have begun to monitor their health status and share information with health care workers through the Internet. The vast majority of medical professionals believe that everyone will use interlocking technology to help manage their health in the future. Imagine, the body data can be real-time monitored, don't have to go to the hospital to obtain professional, personalized health guidance and counseling, which makes the digitization and personalized Internet medical

solutions for the effective management of personal health and prevention provides a new train of thought. From this point of view, the most valuable thing is the data itself, which is the premise to ensure the validity of all data extension, so the accuracy of data is the core of digital health management.

4.3 Healthy internet of things management system

The health Internet of things is the application of the Internet of things in medical and health industries (Cui Hao, 2018). The health Internet of things will complete the collection and transmission of health information, providing strong technical support for the development of medical and health information. The establishment of the health Internet of things will greatly improve the health information and intelligent problems. Health education, health sign monitoring, prevention and other comprehensive health services are provided to users of wearable smart devices through the health Internet of things.It helps people adjust their lifestyle and pace of life, keep approaching the ideal health status, and achieve the real effect of "cure before illness".

4.4 Mobile medical service

Based on wearable smart device GPS and wireless communication technology, or rely only on the positioning of wireless communication technology (Xu Yuebin, 2018). In the practical application, all kinds of health information such as vital signs monitoring, temperature detection and telemetry of patients or sub-health groups are collected independently. No matter when and where the user is, by monitoring the body physiological index deviated from its normal value can provide the user a reasonable evaluation and the suggestionin time, to assist the user the most scientific and rational processing meansin dangerous circumstances. At the same time, professional health care workers can obtain comprehensive body data indicators through longer data collection, and medical decisions will become more personalized.

5 Conclusion

There are still many problems in the health management of wearable smart devices that have not been solved. Under current technological conditions, wearable smart devices do not currently have the ability to manage health. Wearable smart devices can only play a supporting role. Users who want to manage their health must change from their subjective intentions and become Your own lifestyle and lifestyle. However, with the development of science and technology and breakthroughs in related key technologies, wearable smart devices can assist users to establish healthy living habits and methods to a certain extent, so as to achieve the purpose of health management.

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Expressway Mobile Patrol System Based on Cloud Platform

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Abstract: Huanghuang Expressway Management Office of Hubei provincial department of transportation established an information management system of road administration supported by GIS technology, which adopted the idea of Service-Oriented Architecture (SOA). This paper mainly focuses on the application and development of mobile patrol technology in Huanghuang Expressway Management Office, expounding the core function design of mobile patrol system as well as the development idea of cloud platform it based on. By building cloud platforms and using handheld mobile terminals, we can easily realize intelligent management of road production, road maintenance, assessment and supervision, and emergency response.

Key words: Mobile patrol; Cloud platform; Highway management; Internet of things; GIS

1 Introduction

Promotion of information technology in highway operation is a huge project. Not only does it need to establish and maintain amultipartite communication channels, but also itrequires an effective way of information collection and information processing. Road Administration inspection is one of the key links of highway operation. Traditional road inspection often involves organizing staffs to drive on the road to record and check the road conditions. But there is no effective information transmission and feedback mechanism, because the way of recording and oral cannot be detailed or comprehensively feeds back information, furthermore, it may even lead to information distortion. There are certain limitations in general rules and regulations which governing and standardizing road inspections. On the one hand, it's hard to know whether employees operate in accordance with the process. On the other hand, once there is a situation beyond the ability of the inspectors,a lot of complicated procedures are needed, such as dispatching experts, communication and scheduling, and then the management office can gradually identify problems, analyze causes and form solutions.For a long time, the satisfaction degree of the highway patrol has been very low. Although it has invested a lot of manpower and material resources, it is still weak in dealing with the crisis and danger.

The development of cloud computing and internet of things has brought great changes to our life and work, using these technologies in combination with mobile terminals, such as mobile phones, tablets, and vehicle equipment can greatly improve both efficiency and ability of our inspecting staffs. The real-time information transmission and information feedback channels can not only standardize the inspection work, making the workflow more standardized, but also help to guide inspecting staffs to deal with emergency. On the basis of management and control platform, Huanghuang Expressway Management Office applied cloud computing technology in the process of informatization to research and develop an intelligent mobile patrol system.

2 Literature Review

In both government service and business purpose, the research of cloud platform is very extensive.Alibaba's cloud server uses a distributed system developed by Ali, which provides infrastructure services through virtualization technology. Open Storage Service (OSS) is an external cloud storage service provided by Ali.

Hua P, Huang Z and He Z proposed that the integrated service platform includes information service foreground and background, information service foreground can be the unified public information service website; information service background is a shared public information database. They also proposed a concept of cloud image platform based on cloud computing infrastructure, such as the video cloud platform and Google maps, which can provide various image business management and services for individuals or businesses.

Based on the meaning of large data, Du and Bian analyzed the relationship between spatial data and large data, reviewed the existing problems of traditional spatial data mining. She discussed the latest research progress of spatial big data mining from two aspects: platform and algorithm.

Professor Ashton (MIT Auto-ID center) first proposed the concept of internet of things at the time

of studying RFID in 1999. The second China Mobile Government Seminar "knowledge society and innovation" in 2008, pronounced that development of mobile technology and internet of things technology represented a new generation of information technology, leading to the transformation of economic, social forms and innovative forms. It promotes the formation of the next generation of innovation which oriented to the knowledge society. Innovation and development pay more attention to users and it is people oriented.

In recent years, Internet of things has become a competitive field in many countries. Japanese "U society" strategy based on the Internet of things, European "Internet of things action plan" and the United States "smart grid", "smart earth" are national strategic planning.

In 2016, Microchip announced that they have launched an end to end solution for IOT devices. It's the first end to end solution designed to connect to the Amazon Web Services IoT (AWS IoT). Internet of things devices connected to the AWS IOT platform can easily achieve mutual authenticationwith other platforms.

Li and Gong (Information security research center of China Institute of electronic technology standardization) have made a detailed analysis of the security status of internet of things in China. It is considered that the safety protection of internet of things in our country need to focus on "beforehand", special standards and specifications need to be set up.

Mobile patrol technology has been used in electronic equipment and production management for a long time. Gu (Gu, 2016) put forward a standardized inspection system PDA, which is developed by a small handheld mobile digital device combined with its own business needs. The PDA which can record inspector's place automatically is composed of the front user interface and the backstage database system. In that case, the system can realize the function of defining inspection contents and uploading data. At the same time, users need to be trained.

GIS technology is an important auxiliary technology for mobile patrol. Zeng and Bao mentioned that the GIS road maintenance patrol system can help inspectors to obtain their inspection tasks. Terminal automatically calculates optimal patrol line and send order of inspection according to the current position of the inspectors. It shows the patrol task in various forms, such as drawings, texts, sounds, images and so on. At the same time, the monitoring center can issue command and dispatch instructions according to the location and status of patrol personnel.

Ziani A, Sadouq Z A and Medouri A put forward that GIS technology can display both spatial data and attribute data, manage them completely, scientifically and effectively.

3 General Framework of Highway Mobile Patrol System

The highway mobile patrol system based on cloud platform aims to maintain inspection services such as inspection task, inspection result, inspection track, inspection point, disease management, summary report and other functional sections, thus regulating maintenance inspection, road administration inspection, electromechanical patrol and so on. With the cloud platform, intelligent highway inspection management can be realized through technology such as internet of things, cloud computing, GIS, GPS, radio frequency technology, virtual reality, speech synthesis and others. Generally speaking, mobile patrol is part of the construction of intelligent information system of expressway, its system framework and function are attached to the chief information management system. The ultimate goal is to achieve "cloud" + "end" collaborative management.

Platform construction combined with AOP and SOA architecture interfaces programming between various layers. By means of isolating business system from each other, service simulation decouples the relationship between logical business processes and enables them to be implemented independently.
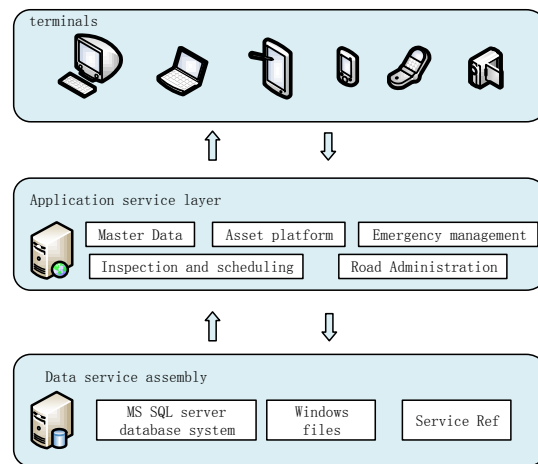
Figure 1   General Framework of Highway Mobile Patrol System

Development framework becomes highly reusable and easy to expand, it improves the efficiency of developing and is benefit to the maintenance of the code either. The application service layer provides service to external distribution and supports distributed deployment. AOP (Aspect Oriented Programming) is a technology cutting surface programming to achieve unified maintenance of program functions through pre-compilation and runtime dynamic agents. SOA, stands for service-oriented architecture, is a component model that connects different functional units of the application through well-defined interface and contract between these service. The design of cloud platform technical scheme which introduces the construction mode of ESB (Enterprise Service Bus) extends the architecture of SOA and combines the framework of JSON and web service technology. Using the "bus" mode to manage and configure the application services, application service units are independent, it can be combined and pluggable freely. Each application service unit is combined through a unified service management program and service configuration to construct an application service library model of the development framework.

Mobile patrol system is mainly composed of three parts of the intelligent management system of freeway. First, the application layer client directly operated by the staff, that is, the terminal. Application layer client program can be independently developed and deployed. In theory, all the intelligent terminal devices are supported, such as PC, notebook, tablet, PDA, cell phone and remote. According to the supporting terminal devices, we need to design and develop applications that response the platform. The application service adopts the SOAP protocol to maximize the service support for heterogeneous platforms or operating system, so as to realize the diversification of client programs. Second, the application service program hosts in the Windows operating system helps to realize service in the restful style. It provides independent service management procedures to support the integration of various business system services into application services in a "pluggable" way. Business system services support distributed mode development, and service management program integrates the assembly files uploaded by the business system by way of configuration. Third, a set of data service assemblies. Data service module is provided by the framework program set, and the application service layer invokes the performance function by referencing the data service to complete the data storage function.

In order to satisfy the heterogeneous data source and reduce the maintenance cost brought by the change of the data source, the data service interface "I Base Repository" is unified in the data service layer according to the storage mode. Traditional relational database is connected by the "ado.net entity framework". The service uses "http client" object to simulate the client to access the data. The process of communication and interaction between application layer, application service layer and data service layer is based on the defined interface service standards and specifications. The interface programming is implemented when the layers are accessed, and the interface implementation layer can be replaced and reconstructed according to the actual requirements of the project.

4 The Operation of the Motorway Mobile Patrol
4.1 Data access and management

Using handheld mobile patrol equipment which connect the cloud platform can efficiently

complete the data transmission work, that is, the recording and reporting process is reduced, and the distortion of information is avoided. In addition, there are many kinds of data which needs to be recorded in the work of highway inspection, and the amount of data is large. The requirements for the collection of data for different tasks are not the same. Traditional road inspection cannot meet the needs of expressway maintenance management, as well as road inspection and road production management. Using the mobile patrol system, inspectors can enter data strictly according to the standardized information collection form through the information transfer mechanism between the handheld terminal and the platform. Then, platform can classify the data, in case data need to be transferred at any time. With the "cloud" + "end" mobile inspection system, even if the inspectors do not have the complex professional knowledge, they can also use the terminal to connect with the experts. Some data and information that needed in various situations can be clearly defined by remote instruction. In that case, inspectors can collect detailed information about road production status, report details of events and so on. In addition, the mobile patrol system can also achieve the docking with other external institutions, Data sharing can be achieved through cloud platform when consulting external organizations or assisting external agencies.

4.2 Due diligence

The duty state of the road inspection has been difficult to present effectively. The lack of efficiency in patrol work may be the factor of the inspectors themselves, or the unreasonable management of inspection regulations and rules. Application of GIS technology to mobile inspection can realize the supervision of fixed location. It can also optimize the patrol route through the data service function of the cloud platform and identify the key inspection area. Furthermore, GIS function data configuration can set up organization, display, query, event and field of GIS data, Realize the visual management of location information data in housing, road, production, mechanical and electrical, vehicle, emergency and single soldier ground. In addition, based on the GIS platform, the integration of freeway video and electronic map can be realized, and the location of the fixed video monitoring can be displayed on the electronic map with icons. By clicking on icons, the basic information of video surveillance equipment and video surveillance images are displayed. Real-time monitoring can not only reduce the repeated patrol route, but also check the inspectors in place and guide the inspection.

Figure 2   Interface of Control Platform

4.3 Emergency response

Sudden event of expressway needs timely treatment. The cloud platform of mobile patrol can help inspectors to report information directly to corresponding emergency treatment units in crisis, when it comes to a crisis, a danger or a disaster, thus Simplifying the multifarious information transfer program. Emergency management and control mainly through external sensors (such as smoke fog), video equipment, positioning equipment (GPS, RFID, etc.) to conduct data analysis, then a pre-defined event solution is used.

Through the inspection status and data from monitoring facilities, management and control platform can command warnings according to the pre-set plan. For example, during the snowfall, cloud

platform would choose a plan based on feedback information from mobile patrol system.

Table 1   Rain and Snow Warning Scheme

Warning level	Snowfall (mm/h)	Snowfall (mm/h)	Description	Speed limit(km/h)	Safe distance(m)
Green alarm	Safe	<0.08	Flurry	-	-
Blue warming	Threat	(0.08-0.25)	Snow	50	>100
Yellow warming	Dangerous	(0.25-0.5)	Heavy snow	40	>80
Orange warming	Perilous	>0.5	Blizzard	20	>50

The external devices and interfaces of the cloud platform support various industrial standards of sensors and systems, such as smoke fire detection, climate detection, biological detection, mobile detection, emergency buttons and positioning equipment (including GPS, IR, RF and LF tags), video surveillance, intelligent video detection and so on. Event logic engine can control the whole process of event management by integrating external devices, GIS and other real-time data according to pre-defined response plans and rules. Event logic engine is responsible for events, tasks, device monitoring, user and definition and application of data access rules.

4.4 Signs of road problems

The main contents of road maintenance inspection are signs of road problems. Notification server support automatic or manual communication. The notification includes task allocation and attachments, which can be sent by device alarm or alert escalation events, and can also be sent through mobile clients by the monitoring room personnel or on-site personnel. The notification engine supports radio, telephone, public broadcasting systems, fax, e-mail, SMS and multimedia communications through security networks, standard telephone interfaces, GPRS and other mobile communication protocols.

5 Conclusion

Based on the work requirement of the highway mobile inspection, this paper analyzes and designs the structure and function of a "cloud" + "end" system for expressway mobile patrol. Through the data service function provided by the cloud platform, it can manage the information collected by the terminal systematically, and realize the information sharing and information processing function. In addition, the cloud platform can easily realize the dynamic expansion of the service scale, invoke the required terminal equipment for the inspectors, simplify the complex workflow and improve the efficiency of inspection work.

To build a mobile patrol system based on cloud platform needs professional training for inspectors to help them understand the operation mode and operation method of the system. In addition, it needs to introduce more advanced handheld mobile terminals, and promote the standardization, informatization and intelligentization of inspection work.

Acknowledgement

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Global Synchronization of Uncertain Time-varying Networks

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Abstract: Complex dynamical networks based on big data have attracted a lot of attention in the fields of sociology, biology, mathematics, and engineering science. To date, little attention is paid to the networks with uncertain time-varying couplings. In the manuscript, the global synchronization in the absence of control of a general uncertain time-varying coupled network is investigated. For an uncertain time-varying coupled map network, several less conventional synchronization criteria are proposed by stability analysis and maximum singular value theory. Simulation results illustrate that the proposed novel synchronization criteria work effectively.
Key words: Big data; Complex network; Time-varying; Synchronization

1 Introduction

Nowadays, it has been demonstrated that various complex dynamical networks based on big data exist in many fields of our daily life. Complex network based on big data with the well-known small-world (SW) property (D. J. Watts and S. H. Strogatz, 1998) and scale-free (SF) property (A.-L. Barabasi and R. Albet, 1999) have attracted a lot of attention including sociology, biology, mathematics, engineering science and so on (C. V. Loan, 1992; G. Yan, Petra E. Vértes, Emma K. Towlson, Yee Lian Chew, Denise S. Walker, William R. Schafer and Albert-László Barabási, 2017; S. H. Strogatz,2001;Y Fang and T G Kincaid, 1996; Y. Zhang and J. Sun,2004;Z. Zahreddine, 2003). In general, a complex dynamical network is a large set of interconnected nodes, where a node is a fundamental unit with detailed contents. Many interesting properties of realistic complex networks can be well understood by considering the interactions of the every pair of nodes. Such as synchronization, a collective motion displayed by many large-scale complex dynamical networks, is mainly determined by dynamics of each single node and the coupling scheme.

Despite the great majority of research activities have been focused on synchronization of static networks whose connectivity and coupling strengths are constants, there are applications where the coupling strengths and even the network topology can evolve with time. Examples of such networked systems pervade nature at every scale, including for instance discrete-time coupled map lattices and continuous-time cellular neural networks. For coupled map networks, some studies on synchronization of random networks(P. M. Gade,1996), small-world networks (P. M. Gade, C-K,2000), and coupling delays networks (C. G. Li, G. Chen,2004) have been achieved. However, there has been little theoreticalresults dealing explicitly with synchronization in general discrete time-varying coupled networks, especially when the network coupling is an unknown nonlinear function. Even in the literatures (H.Shi, Y. Sun, L. Miao, and Z. Duan, 2016; J.Zhou, J. Lu and J. Lü, 2006) on synchronization for uncertain time-invariant coupled complex dynamical networks, controlled network models have been considered.

In the manuscript, we further investigate synchronization of such uncertain time-varying coupled network models, in the absence of controller.By using the matrix singular value analysis and the stability theory(H.Shi, et al.,2016; J.Zhou, J. Chen, J. Lu and J. Lü,2017; J.Zhou, et al.,2006;Y Fang and T G Kincaid,1996;Z. Zahreddine,2003), some globally asymptotic stable synchronization criteria are presented for a general uncertain time-varying coupled map network. Provided with certain conditions, the synchronous solution of the uncertain map network is globally asymptotic stable. In particular, the results proposed in the manuscript are applied for the networks with not only directed but also undirected topology.

The left paper is organized as follows. In Section 2, the general uncertain time-varying coupled network models are introduced. Section 3 establishes globally synchronization theorem and its corollary for the general time-varying coupled map network. Illustrative numerical examples are given in Section 4 to verify the effectiveness of our synchronization criteria. Summary conclusions are finally drawn in Section 5.

2 A General Model of Uncertain Time-Varying Coupled Map Network

Consider a general uncertain time-vary map network consisting of N diffusively coupled identical

nodes, being each node an *n*-dimensional dynamical system. The proposed uncertain map network is described by

$$\mathbf{x}_i \ (m + 1) = \mathbf{f}(\mathbf{x}_i(m)) + \mathbf{h}_i \ (\mathbf{x}_1,..., \ \mathbf{x}N, \ m), \ i = 1,2,...,N, \tag{1}$$

where $\mathbf{x}_i = (x_{i1}, x_{i2},...,x_{in})^T \in \mathbf{R}^n$ is state vector of the *i*th node, $\mathbf{f} : \Omega \times \mathbf{N} \to \mathbf{R}^n$ ($\Omega \subseteq \mathbf{R}^n$)is a smooth nonlinear function vector, the individual node dynamics is$\mathbf{x}_i(m+1) = \mathbf{f}(x_i(m))$, $\mathbf{h}_i : \Omega \times .. \times \Omega \times \mathbf{N} \to \mathbf{R}^n$ is an unknown diffusive coupling function vector at time *m*, $\mathbf{h}_i$ istime-varying, nonlinear, smooth and satisfying $\mathbf{h}_i(\mathbf{x},...,\mathbf{x},m) = 0$.

Suppose that $\mathbf{x} = \mathbf{s} \ (m; \ m_0, \ \mathbf{x}_0)$, denoted as $\mathbf{s}(m)$, is a solution of single node system $\mathbf{x} \ (m + 1) = \mathbf{f}(\mathbf{x}(m))$. Then the vector $\mathbf{S}(m) = (\mathbf{s}^T(m), \ \mathbf{s}\mathbf{T}(m),...,\mathbf{s}^T(m))^T$ is a synchronous solution of the uncertain time-varying coupled map network model (1) since it is a diffusive coupling network. Denote the error vector as

$$\mathbf{e}_i(m) = \mathbf{x}_i(m) - \mathbf{s}(m), \qquad\qquad i = 1, 2,..., N.$$

Then the error system can be retained as

$$\mathbf{e}_i(m+1) = \overline{\mathbf{f}}(\mathbf{x}_i(m) \ , \ \mathbf{s}(m)) + \overline{\mathbf{h}}_i(\mathbf{x}_1,\ldots,\mathbf{x}_N ,\mathbf{s},m), \qquad i = 1,2,...,N, \tag{2}$$

where $\overline{\mathbf{f}}(\mathbf{x}_i(m) \ , \ \mathbf{s}(m)) = \mathbf{f}(\mathbf{x}_i(m)) - \mathbf{f}(\mathbf{s}(m))$ and $\overline{\mathbf{h}}_i(\mathbf{x}_1,\ldots,\mathbf{x}_N,\mathbf{s},m) = \mathbf{h}_i(\mathbf{x}_1,\ldots,\mathbf{x}_N ,m) - \mathbf{h}_i(\mathbf{s},\ldots,\mathbf{s},m)$.

3 Synchronization Criteria

In this section, several global synchronization criteria for the uncertain time-varying coupled map network model (1) are derived.

At first, two useful assumptions are introduced in order to reach our main results.

Assumption 1(A1). Assume that there exists a positive constant α such that

$$\left\| f(\mathbf{y}) - f(\mathbf{z}) \right\| \leq \alpha \left\| \mathbf{y} - \mathbf{z} \right\|,$$

where $\mathbf{y}, \mathbf{z}$ are time-varying vectors, $\| \cdot \|$ represents 2-norm of a matrix or a vector.

The assumption A1 reveals that the individual dynamics is Lipchitz-continuous. It can be satisfied easily for many dynamical systems, such as all the linear systems, Chen system (G. Chen and T. Ueta,1999) and many new chaotic systems (I. Pehlivan and Y. Uyaroglu,2014).

Assumption 2(A2). Assume that there exist a set of time-varying term $\gamma_{ij}(m)$ ($1 \leq i, j \leq N$)satisfying

$$\left\| \overline{\mathbf{h}}_i(\mathbf{x}_1,\ldots,\mathbf{x}_N,\mathbf{s},m) \right\| \leq \sum_{j=1}^{N} \gamma_{ij}(m) \left\| \mathbf{e}_j(m) \right\|,$$

where $1 \leq i \leq N$.

The assumption A2 shows that the couplings in the network satisfy the Lipchitz-like condition, which guarantees the uniqueness of the synchronous solution.

Based on these two assumptions and error system (2), one has

$$\left\| \mathbf{e}_i(m+1) \right\| \leq \alpha \left\| \mathbf{e}_i(m) \right\| + \sum_{j=1}^{N} \gamma_{ij}(m) \left\| \mathbf{e}_j(m) \right\|$$

and then has

$$\eta \ (m + 1) \leq (\mathbf{\Gamma}(m) + \alpha \mathbf{I}_N) \ \eta(m)$$

where $\eta(m) = (\left\| \mathbf{e}_1(m) \right\|, \left\| \mathbf{e}_2(m) \right\|,...,\left\| \mathbf{e}_N(m) \right\|)^T$, $\mathbf{\Gamma}(m) = (\gamma_{ij}(m)) \in \mathbf{R}^{N \times N}$.

As a result, a global synchronization criterion for coupled map network (1) can be obtained by rigorous theoretical deduction.

Theorem 1. Consider the uncertain time-varying coupled map network (1). Suppose that A1 and A2 hold. Then the synchronous solution $\mathbf{S}(m)$ of (1) is globally asymptotic stable if

$$\prod_{k=m_0}^{+\infty} \sigma_{\max}(\mathbf{\Gamma}(k) + \alpha \mathbf{I}_N) = 0 \tag{3}$$

where $\sigma_{\max}$ represents the maximum singular value of a matrix. In particular, if there exists a positive constant $0 < \epsilon < 1$ such that for all sufficiently large m,

$$\sigma_{\max}(\mathbf{\Gamma}(m) + \alpha \mathbf{I}_N) \leq \epsilon, \tag{4}$$

then the synchronous solution of (1) is globally asymptotic stable.

Proof:Consider the function $W(m) = \left\| \eta(m) \right\| = \sqrt{(\eta(m))^T \eta(m)}$. Since the elements of vector $\eta(m)$ are nonnegative, it is shown that

$$W^2(m + 1) = (\eta \ (m + 1)) \ T\eta \ (m+ 1)$$

$$\leq (\eta(m))^T (\Gamma(m) + \alpha \mathbf{I}_N) \; \mathbf{T} \; (\Gamma(m) + \alpha \mathbf{I}_N) \; \boldsymbol{\eta}(m)$$
$$\leq \sigma_{\max}^{\;2} (\Gamma(m) + \alpha \mathbf{I}_N) \; W^2(m)$$

Then one has

$$\|\eta(m+1)\| = W(m+1) \leq \sigma_{\max}(\Gamma(m) + \alpha \mathbf{I}_N) W(m) \leq \ldots \leq \prod_{k=m_0}^{+\infty} \sigma_{\max}(\Gamma(k) + \alpha \mathbf{I}_N) W(m_0)$$

and

$$\lim_{m \to +\infty} \|\eta(m+1)\| \leq W(m_0) \prod_{k=m_0}^{+\infty} \sigma_{\max}(\Gamma(k) + \alpha \mathbf{I}_N) = 0 \;,$$

by using the stability theory. That is, if Equation(3) is satisfied, the vector $\eta(m)$ will uniformly asymptotically converge to zero, which means that the synchronous solution $\mathbf{S}(m)$ of the network is globally asymptotic stable.

Besides, provided that $\sigma_{\max}(\Gamma(m) + \alpha \mathbf{I}_N) \leq \epsilon$ for all $m \geq M$, where M is an appropriate constant, one has

$$\|\eta(m+1)\| = W(m+1) \leq W(M)\epsilon^{m-M}$$

Since $W(M)$ is a constant, model (1) is globally asymptotic stable.

This completes the proof.

For the case that the coupling scheme of model (1) is linear time-varying satisfying

$$\mathbf{h}_i(\mathbf{x}_1,\ldots,\mathbf{x}_N,m) = \sum_{j=1}^{N} c_{ij}(m)\mathbf{A}(m)\mathbf{x}_j(m) \;,$$

where $1 \leq i \leq N$, $\mathbf{C}(m) = (c_{ij}(m)) \in \mathbf{R}^{N \times N}$ is diffusive time-varying outer coupling scheme and $\mathbf{A}(m)$ is time-varying inner coupling matrix. Then coupled map network (1) is recast as

$$\mathbf{x}_i(m+1) = \mathbf{f}(\mathbf{x}_i(m)) + \sum_{j=1}^{N} c_{ij}(m)\mathbf{A}(m)\mathbf{x}_j(m) \;,i = 1,2,\ldots,N. \tag{5}$$

It is obvious that A2 holds by choosing $\gamma_{ij}(m) = |c_{ij}(m)| \cdot \|\mathbf{A}(m)\|$. Then the following corollary can be deduced accordingly.

Corollary1.Suppose that Equation (3) and A1 hold. Then the synchronous solution of linear time-varying coupled map network (5) will be globally asymptotic stable. In particular, if there exists a positive constant $0 < \epsilon < 1$ such that Equation (4) holds, then the synchronous solution of model (5) is globally asymptotic stable.

4 Numerical Examples

To show the effectiveness of the presented synchronization criteria, a linearly time-varying coupled map network consisting of 30 identical systems is considered in this subsection. The dynamical map is described by

$$\mathbf{x}_i(m+1) = \mathbf{f}(\mathbf{x}_i(m)) + \sum_{j=1}^{30} c_{ij}(m)\mathbf{A}(m)\mathbf{x}_j(m) \;, \quad i = 1,2,\ldots,30, \tag{6}$$

where $\mathbf{A}(m) = diag\left\{\frac{1}{8},\frac{1}{9},\frac{1}{10}\right\}$ is a diagonal matrix, $\mathbf{C}(m) = (c_{ij}(m)) \in \mathbf{R}^{30 \times 30}$ is chosen as

$$c_{ij}(m) = \begin{cases} -2\sin(m) \text{ if } j=i \\ 2\sin(m) \text{ if } j=i-1 \\ 2\sin(m) \quad \text{if } i=1,j=30 \\ 0 \qquad\qquad\qquad \text{otherwise} \end{cases} \quad i,j = 1,2,\ldots,30,$$

and dynamics of each single node $\mathbf{x}(m+1) = \mathbf{f}(\mathbf{x}(m))$ is given by

$$\begin{cases} \xi(m+1) = \dfrac{1}{4}\xi(m) - \dfrac{1}{8}\eta(m) \\ \eta(m+1) = \dfrac{1}{4}\xi(m) - \dfrac{1}{6}\zeta(m) \\ \zeta(m+1) = -\dfrac{1}{8}\xi(m) + \dfrac{1}{8}\eta(m) + \dfrac{1}{4}\zeta(m) \end{cases}$$

It is clear that $\|\mathbf{A}\| = \frac{1}{8}$ and that A1 holds for $\alpha = 0.4586$. By numerical calculation, it is found

that $0.4586 \leq \sigma_{\max}(\mathbf{\Gamma}(m) + \alpha\mathbf{I}_N) \leq 0.9586$, thus Equation (4) holds.

According to Corollary 1, the synchronous solution of linearly time-varying coupled map network (6) is globally asymptotic stable.

In this simulation, take the initial values $\mathbf{x}_i(0)$=(1+0.5i,2+0.5i,3+0.5i)^T, $\mathbf{s}(0)$ = (1,2,3)^T, where $1 \leq i \leq 30$. The synchronous errors are plotted in Figure 1, which illustrates the states of the synchronous errors. Obviously, synchronization of the time-varying map has been reached quite soon.

(a) $e_{i1}(1 \leq i \leq 30)$ (b) $e_{i2}(1 \leq i \leq 30)$ (c) $e_{i3}(1 \leq i \leq 30)$
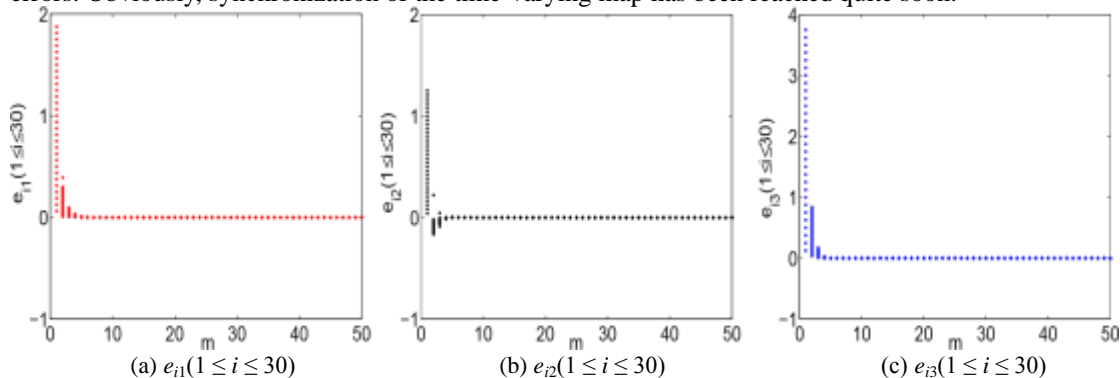
Figure 1   Synchronous Errors of the Linearly Time-varying Coupled Map Network (6).

5 Conclusion

Synchronization phenomena in the absence of control of a general uncertain time-varying coupled map network is investigated in the manuscript. By using the matrix singular value and the matrix measure theory, some synchronization criteria for such network have been proposed. In particular, corollary has been deduced for special types of time-varying couplings of such networks. Compared with similar literature, our network model considered is more novel and our synchronization criteria presented are rather unconventional. The results are more convenient to be applied to many practical networks. Illustrative numerical example has been shown to verify the effectivenessof the synchronization criteria established in the manuscript.

Acknowledgement

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An Analysis of the Influence of Artificial Intelligence on Translation Industry

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Abstract: The rapid development of artificial intelligence (AI) has changed the understanding of the general public on certain occupations and industries and has also enriched the connotation of them. At present, machine translation and AI translation not only make great progress but also pose huge challenges to the traditional society. This paper reviews the development of AI and its impacts on translation industry and teaching modes of translation and interpretation, discusses the innovative cultivation of translation and interpretation majors. The paper takes positive views to predict that in the next 2 or 3 decades, AI will be a good assistant to translators during translation, and high-level translators will be in short supply.
Key words: Artificial intelligence; Translation industry; Translation and interpretation major; Innovation

1 Introduction

In 1947, the pioneer of Information Theory Warren Weaver generated the idea of automatic translation with machine and put forward it formally in Translation Memorandum in 1949. In 1954, the American Georgetown-IBM Laboratory successfully used the IBM 701 computer to translate 60 sentences from Russian into English. Then in the past 7 decades, machine translation never stopped advancing. Currently, the general public has systems such as Google Translation and Baidu Translation on hand. Besides practice, machine translation theory is also under way. From 1954 machine translation has started gaining attentions from scholars. One significant representative is M.A.K. Halliday who criticized that researchers and developers ignored the linguistic elements of machine translation in his Linguistics and Machine Translation (Halliday, 2007). Domestically, machine translation emerged in 1957. Before 1988, domestic scholars focused on the translation evaluation, and after 1988, the studies extended to the application, evaluation, impact and prospect of machine translation.

In the last two decades, scientists tried to apply AI to improve the quality of machine translation and have made made significant progress. This paper, through analyzing the development and prospect of AI translation, combined with the current condition of translation education, translation industry and translation majors, will study the impact of AI translation on translation industry. It is assumed that AI translation will enhance the reform of translation education and translation industry and the future trend is the cooperation between AI translation and manual translation.

2 The Development of Artificial Intelligence (AI) Translation

2.1 Machine translation: the predecessor of AI translation

Machine translation stared in 1954 from the experiment mentioned before. From 1950s to early 1960s, machine translation research was on the rise because the two superpowers have provided a large amount of financial support out of their military, political and economic purposes. China started studying machine translation in 1956 and carried out the experiment of Russian-Chinese machine translation and translated 9 relatively complicated sentences of different types in 1957. From 1964 to 1975, machine translation sank into stagnation. During 1970s, with the development of science and technology and the frequent exchanges of scientific and technological information among countries, machine translation was urgently needed again. Currently, driven by market needs, the commercial machine translation has entered the practical stage and has gone to the market. By now, many advanced machine translation apps are available to mobile phone users.

Through the development of six decades, machine translation has already had many advantages compared with manual translation, including higher speed, lower expense and more languages with less time and space limitation. Yet machine translation can't replace manual translation in the next several decades for the limitation of technology. According to the report of China Workshop on Machine Translation (CWMT) 2011, machine translation performed relatively better in similar languages but not

in the translation of Chinese to English (Zhao & Lv & Ben & Huang & Liu, 2012). Meanwhile, machine translation fails in providing qualified translation of literature works because of being unable to understand the context and connotation. Last but not least, the basis of machine translation is the corpus or existing translation versions, which are established by translators. All in all, the prospect of machine translation is bright, especially after adopting AI.

2.2 The booming development of AI translation

During 1970 machine translation started to recovery with the adoption of AI. Machine translation can be divided into Rule-Based machine translation and Corpus-Based machine translation. Rule-Based machine translation is based on dictionaries and rule base. Corpus-Base translation can be subdivided into Example-Based machine translation and Statistics-Based machine translation. In 1985, in Translation by Analogy, Makoto Nagao put forward the fundamental idea of Example-based machine translation: machine, based on existing experience and knowledge, translated through the method of analogy rather than in-depth analysis (Xu & Liu, 2017). Statistics-translation selects the sentence with the greatest probability, such as Google Translation.

In 2013 neural machine translation became a breakthrough of AI translation in three aspects: Firstly, the core of AI translation is a deep neural network with massive nodes (neurons), which can automatically learn translation knowledge from the corpus; secondly, with the in-depth learning ability, AI translation will be able to form a virtuous circle. AI translation will preliminarily translate the text, and translators will modify the translation, especially for literary works and professional texts. In this process of revising, AI will also be involved and keep studying translation knowledge based on its study ability. Although AI translation has advanced in last decade, the technology of AI translation is not yet mature.

As for near practice, in 2016, Wang Xiaochuan, CEO of Sougou corporation, claimed that the developed real-time machine translation by his company can reach the accuracy rate of translation at least 90%, but the performances of this new technology failed at twice. Incidents like this show the instability of current AI translation. Meanwhile, the same as machine translation, AI translation also need the support of big data such as language rules, which is created and enriched constantly by linguists and translators.

3 The Challenges of Cultivation of Translation Majors

3.1 The changing translation industry

During 21st century, because of the global economic integration and the Belt and Road Initiative, the language service market has developed rapidly. According to the statistics of the State Administration of Industry and Commerce, from 1980 to 2011, the number of enterprises providing language services has increased from 16 to more than 35,000, a 30.3% increase rate annually. In 2013, the number of full-time translators is 1.19 million and of part-time is over 3.3 million (Teng&Zhang, 2013). In fact, the quality of translators is uneven and the supply of high-end translators is inadequate to demand. Quite a few problems are appearing with booming, including the uneven quality of translation, seldom regulation of translation market and vicious competition of price and quality. At the same time, the limited scale of domestic translation company restricts the development of translation industry.

The translation industry has also gone through changes in the last decade. In 1999, China published Occupational Classification of the People's Republic of China, in which, the item "translator" was classified under the category "News Publishing, Cultural Workers" and was tied with reporters, editors, and proofreaders. In 2015, the item "translator" was revised due to the new development of occupation. From the revision, the traditional translation industry has already been affected deeply by machine translation, which also indicated that the relationship between translators and machine translation would be cooperation rather than competition. And translation education, as one responsibility of translators, should also be reformed based on the changes in the industry.

3.2 The current situation of translation and interpretation major

The Academic Degree Commission of the State Council has set MTI (Master of Translation and Interpreting) in 2007. From 2007 to 2016, the number of schools that set MTI has grown from 15 to 205 with over 60,000 students in progress. MTI includes translating and interpreting, the curriculum of them are different based on the needs of translation market. Nearly, all MTI majors of different colleges have similar curriculum design, i.e. public compulsory course, required courses and optional course. While, the differences among schools are majorly embodied in the set of optional courses. For example, the

MTI of Beijing University has set the course Corpus Construction and Literature Search and the PLA University of Foreign Languages has set Senior Military Translation.

Actually, many graduate of MTI majors cannot find ideal jobs. Because good translation work opportunities concentrated in first-tier cities and some second-tier cities, and the traditional curriculum design has not been updated in many colleges, the graduates cannot meet the new demands of the translation industry. What's more, vicious competition among translators and translation companies also makes the loss of translation talents. Currently, the price of translation even is as low as 20 yuan per thousand words. In general, machine translation has made great progress in the past decade, especially after applying AI technology. With some overblown reports, even some MTI majors believe that in the future, manual translation will be totally replaced by AI translation, which is only a matter of time. In fact, the market is calling for high-end translators and interpreters. Many companies are still providing high price to attract translators with expert knowledge such as pharmaceutic translator and biology translator.

4 The Impact of Development of AI Translation
4.1 The positive impact on healthy development of translation and interpretation major
Although the "AI Threat Theory" is popular, the positive impact of AI translation will influence translation majors. First of all, the development of AI translation will change the job content of translators. Wang Xiangling and Jia Yanfang predicted the translation mode in the future would be AI translation plus manual post-editing (Wang&Jia, 2018). Machine translation post-editing is human-computer interaction translation, which is the process of editing and modifying the results of machine translation, so that the translation quality can meet the needs of terminal users (TAUS, 2017). In the future, the main task of translators will be much less time- and energy- consuming.

The change of job content will enhance the reform of MTI education subsequently. MTI majors will be trained to master machine translation and its post-editing. Meanwhile, the market need interdisciplinary translators as AI translation still cannot distinguish terminologies in certain context, therefore MTI education will include more expert knowledge of inter-discipline. Current MTI education put less emphasis on literary translation, but when AI translation completes most non-literary translations, students of MTI should focus more on literary translation. All in all, MTI majors will be involved in AI translation research, majorly the evaluation of AI translation quality and establishing and enriching the big data behind AI translation.

4.2 The prospect of translation industry
Because of the development of emerging economies, translation service is involving more languages. It seems that sole manual translation is hard to satisfy market needs. Currently, the most feasible method is AI translation plus crowd-sourcing. The primary mode of translation crowd-sourcing is based on the concept UGC (user-generated content). Translation companies can use their online platform to release specific translation tasks to the broad users of the online community, who are actively involved in the translation (Zhu, 2016). In such translation, because of a great amount of participants, the effective management and incentive measures will make the translation be speedily carried out with high quality. In this mode, AI translation deals with the basic translation firstly, then the post-editing tasks are delivered through crowd-sourcing and translators just correct the errors made by machine translation. Subsequently, the advanced translator will further improve the literariness or professionalism of the translation. This streamline operation will bring higher efficiency and quality. And AI is helpful to not only artificial translation but also personnel assignment. For example, in the case of crowd-sourcing translators, AI will understand the specialty of different translators. By collecting and analyzing such data, AI can assign different translation tasks to suitable translators.

4.3 The concern of development of ai translation
Although the results of recent experiments and practices of AI translation are not as satisfactory as expected, opinions on it maintain optimistic. In 2017, scholars in University of California Berkeley published the paper A Berkeley View of Systems Challenges, which analyzed the research directions and future challenges of AI. Generally speaking, AI translation will affect our life more widely. And the subjects such as sustainable learning ability and privacy security will be further focused on (Stoica, et al, 2017). For the future relationship between manual translation and AI translation, the CEO of Iflytek said that the future translation must be a positive interaction between translators and AI. In the future, some scholars believe that in the field of AI Translation, there will be many translation institutions that take advantage of minor languages. In addition, because text is an important carrier of culture, AI translation

will also play a critical role in cultural heritage and exchanges of various nations (Luo&Pan&Yi, 2017). It should be mentioned that China is regarded as a forerunner in AI translation. In the latest AI industry research report China's Rise in Artificial Intelligence released by Goldman Sachs in September 2017, it is pointed out that China has become the main rival in AI, especially BAT (Rong, 2017).

The debate was whether AI translation was possible or not, but nowadays, the debate has become whether the AI translation will replace manual translation or not. It seems that AI translation has already been in overwhelming status. Under this circumstance, some scholars have put forward sensible opinions. Zhang Keliang claimed that although being short of latest public test data, it is an indisputable fact that the quality of machine translation has not yet achieved breakthroughs (Zhang, 2016). Luo Jimei and Li Mei compared the machine translation and manual translation of 100,000 sentences from auto technology literature translation corpus of Tongji university. The outcome was negative as presented in following figures. Figure 1 is the accurate rate of machine translation and figure 2 is the occurrence frequency of the three main errors of machine translation in this experiment (Luo & Li, 2012).
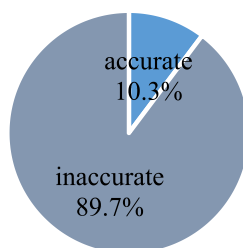
Figure 1　Accuracy Rate
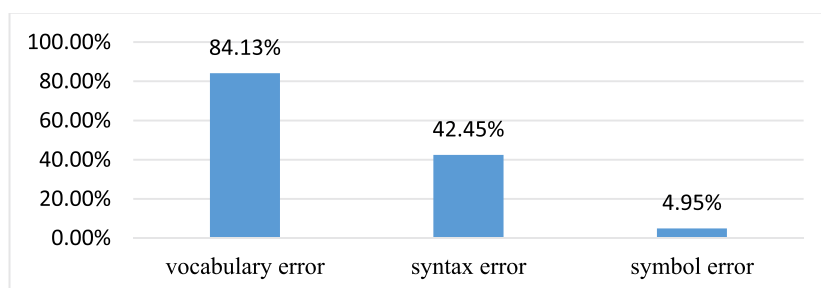
Figure 2　Occurrence Frequency of Three Main Errors

From these concerns, it can be concluded that the prediction of AI translation is positive in general. Meanwhile, existing problems should also be paid attentions to for sustainable and healthy development.

5 Conclusion

Through studying related papers and analyzing the latest application and experiments of AI translation, this paper studied the development of AI translation and the impact of AI translation on translation industry and translation education and draw a conclusion that the prospect of AI translation is promising and its development will enhance the reform of translation industry and MTI education. It is also predicted that in the next several decades, AI translation will positively interact with manual translation and the possible mode is AI translation plus crowd-sourcing. Due to limited time and fund, this research has no access to latest AI translation, the evaluation of AI translation mentioned in this paper considered other authoritative reports or papers. AI translation has gained increasing attentions from many scholars. Yet most scholars focused on the development of machine translation method and AI translation quality evaluation. Therefore, further researches of AI translation can focus on the machine translation post-editing and the AI translation evaluation system.

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A Long Walk toward Wholeness

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Abstract: The aim of this paper is to show the evolution of Science and Spirituality to come-to a convergence, as the focus of Science changed from the Object to the Subject in Post Modernity. Love from the spiritual wisdom is recognized as the possibility of subtle connections like in quantum Physics. Human kind awareness of Transcendent Reality, rather than belief is a very important point to help create constructively, in tune with the whole and individual experiences are essential to lead to a positive inner cohesion that may make a difference in the world, considering the Self, the other and the environment as Sacred. A Vision / Approach of Creative Inner Processes may be a possibility to help the process, with the consciousness of the inner Worth, which leads to the perception of Wholeness. This is the dawning of a new era characterized by Conscious Evolution.
Key words: Interdisciplinarity; Levels of consciousness; Wholeness

1 Introduction

Mankind has long been striving childishly along life using inner and outer powers mostly because of lack of higher awareness deriving from the Know Thyself; but now it may come the time to go faster in particular to follow closer the accelerated advances and convergence of Neurosciences and Quantum Physics. So, if in some areas in Science and Technology one may be speaking of Tipping Points that represent disruptive innovations, something similar may be happening with Evolutionary Consciousness. These kind of process may have inspired Theilard de Chardin some time ago when he envisioned and suggested that in the future, after fostering all kinds of Renewable Energies, Mankind would learn to foster for God the Energies of Love; quite a tipping point in our Evolutionary Journey of Consciousness.

2 An Outline of Evolution of Science and Spirituality towards Wholeness

Humanity has been living a great transformation. We have been to the moon, to other planets and to the heart of an atom, but we have also built atomic bombs. We have moved from the first industrial to the 2nd and 3rd and now to the 4th faster and faster which makes our life better but not for all; and without taking care of our Mother Earth, and all that because our level of Values and Consciousness is getting behind.

Around the year zero, with Greek Philosophy and the emergence of Traditions such as Buddhism and Christianism, there was a deep awareness of the Sacred. Such consciousness did not extend to the whole population, but to the "Masters" who brought significant messages, like Socrates or Plato in Philosophy or Buddha and Jesus Christ in religion. Humanity as a whole, until then, had felt attached to various deities, which had led to rituals, sacrifices - even with humans, and supplications. Humanity had been in an age of childhood, more egocentric than ecocentric and still far from cosmocentric.

Along the twenty centuries, whichfollowed from then on, there has been a growing development of reason, culminating in an encounter, albeit unreal, with the sacred. The *Church of Reason* began in France. In other words, the Holy Dimension was "rationalized". That corresponds to adolescence of Human Beings who wanted to reaffirm itself – with the exclusive world of doing.

According to Descartes, a few centuries ago, the Human Beings should cope with Science, whereas the Church with the Spirit. It must have been a strategy of the philosopher, so that Science escaped the Inquisition or did not suffer like Galileu and Giordano Bruno in the VII Century that were trying to break the system with new ideas and scientific knowledge. Nonetheless, our evolutionary process continued breaking barriers in Spirituality with the St. Francis movement, in Art with the Renascence, that awakened our feelings as needed for and opening to a next state.

All this made possible because of a hidden rational cognitive and intuitive genetic potential that was socially being awakening along the time, as mentioned in the recent book Sapiens by Yuval Noah Harari as breakthroughs. Harari describes several stages of our evolutionary process: The Cognitive, The Agricultural, The Social and The Scientific Revolution; and alert us that now Homo Sapiens wants to overcome himself and become Homo Deus and wonders about the risks of losing control due to

accelerated development in Artificial Intelligence and Genetic Engineering in particular.

If Science advanced, so much and nowadays so faster, the same did not happen with the religions, which were left with the responsibility of the "Spirit". In the twentieth century, the majority of the population was seeking for an independent experience of what the Sacred would be. The State and the Church wereseparated in a unique way in history, left few communities with such connected realities, particularly in the East where it still occurs, as mentioned by Reza Aslan on his book *God: A Human History*.

Nevertheless, Science itself turned to a transcendent view of Life with some outstanding thinkers like Jung in Psychology, Einstein and David Bhom in Physics and so many of their followers and companions. Jung pointed to the integration of the ego with the self, so that the process of individuation could occur, and quantum Physics pointed to the deep unity of Life – wholeness, including a vision of mystery in the essence of its Origin.

Such a mystery appears in science as coming from the fact that all known living beings are born biologically "ready" for life, except for the Human Being, who brings the trace of the source of what we call "mystery", which is their "freedom". The Human Being can "create" or "destroy" from the inner strength. The lack of awareness of such an inner force, that is, the absence of self-knowledge can prevent the Human Being from contacting what we call the Sacred. Of course, there are different views. However, those who followed Jung or Capra, for example, nowadays bring this returnto the Sacred in a clear way! Yes, it is the moment when Transpersonal Psychology arises, together with the perception of the possibilities of connections in the heart of matter and perception of inter / transdisciplinarity as a consequence of the unity of knowledge, transcending dualities.

Actually, Jung insisted on the coincidence of opposites, as a sign of a unity of knowledge, which is gradually moving towards the interdisciplinary position. A vision of "Being and Doing" brought by Goswami also appears. Why do these facts mentioned above turn to what we call the Sacred?

In fact, Jungian Psychology pioneered in the 20th century by turning to the transcendent dimension of the human being when he stated that in the unconscious mind there were not only the "repressions" proclaimed by Freud, but also the "self" which, if ignored, it would prevent the process of individuation. Such process surely came to mean the possibility to Know Thyself announced by Socrates, over twenty centuries ago as the beginning of all wisdom, actually fundamental in several traditions. Certainly, the whole foundation of Jung's work leads us to perceive the spiritual dimension of the so-called self, and eastern religious traditions talk about transcending the self.

The drama of ignorance of this reality is the use of this transcendent energy in a destructive and conducive way, for example, to an atomic bomb, as mentioned above. In what concerns quantum Physics, we do not only have Newton's perception of the religiosity of the Universe brought by Einstein, but also the question of the mystery of the emptiness of an atom, different from Newton's "billiard balls". Such emptiness of the atom, which contains invisible particles, presents the already mentioned possibilities of connections in the work *Mutation Point* by Fritjof Capra or in his *Tao of Physics*. What is the deep meaning of such possibilities? There is a Symbolic Encounter with the Traditions, which affirm in the clearest case of the Christian Tradition, that the Creator is Love and that Human Being wascreated in His Image and Likeness! Such a metaphorical view that our essence is Love will coincide with the image of possibilities of connections, coming from the scientific view! Love is connection, which brings us the vision of synchronicity, as by Jung who would say, between Science and Faith. It would be the Encounter of Faith with Science, *Fides et Ratio that are like the two wings with which the human spirit rises towards the contemplation of the truth* (Pope John Paulo II).

On the other hand, the view of Matter Unity also arising from quantum Physics will coincide with the view of Unity also brought by the Christian Tradition, when it states that "*we should be One, as Jesus and the Father are*". Unity will lead us to aninter or transdisciplinary attitude, that is, the Unity of Knowledge.

What would be, from the point of view of Religions, this perception of the Sacred Coming from Science? One of the first thinkers to manifest in *this direction was the Jesuit priest Theilard de Chardin when he stated in his work "Human Phenomenon" that: "After going through the Path of Analysis for a long time, the Human Being comes to the luminous Synthesis".*

Later, Pope John XXIII, who called a historic Council, (Vatican II), came to bring to the Catholic Church, in this case, a remarkably ecumenical vision and a deep respect for the universe of science. It would be too long for the dimension of this article to go further in these considerations, but today we feel a deep integration of scientists and religious people in countless fundamental actions of the present world. We could mention Mother Tereza of Calcutta, among other religious people. Mother who was a clear

example of the universe of Being and Doing.

Another fundamental point for the deepening of the Sacred in this moment is the recognition of two more facts of extreme synchronicity: one occurred in the 19th century and the other in 1.945. In the nineteenth century, with the emergence of the *Church of Reason* in Paris, the appearance of kardecism took place in the same country and city, which did not mean a new religion, but rather a scientific study of the spiritual existence of the human being. It was an event that "shouted": "*you have reached the peak of reason with Augustus Comte, but do not forget that the Spirit is also present*"! The reading of *The Book of Spirits* will make clear the reflection in this direction. The second fact, and as synchronistic as the first, was the emergence of Nag Hamadi documents in Egypt in the same year of the atomic bomb explosion in 1945. From scratch, an Egyptian peasant finds documents in a cave from two thousand years ago, which come to be the so-called "Apocryphal Gospels", widely studied by authors such as Jean Yves Leloup in his vast work, among others. Such documents, added to those of the Dead Sea, found in the sequence, reveal an incredible vision of a spiritual renewal.

3 Complex Thinking and Transdisciplinarity

All that mentioned before may be considered from the point of view of Complex Thinking brought by Morin or the transdisciplinary view, as presented by Basarab Nicolescu or Ubiratan D'Ambrósio, among others. In fact, the Long Walk of Science towards the transcendent and the unitary view of Life brings the interdisciplinary view proclaimed by Ivani Fazenda with expertise as one of its consequences. The Encounter with the Sacred will be the inevitable consequence of the attitude of unity in face of Knowledge, bringing awareness of our spiritual dimension, as shown in the following poem by Ruy Cezar.

The Way from Believing to Knowing ...

Knowing is to feel what is most within
*It is **to awake** the eternal child who "fell asleep" with adolescence*
Believing is to look at our image, narcissistically.
With the adolescent, competitive look

Knowing is to look with the soul
That was awaken
Believing is not looking
It's having eyes and not seeing

Knowing is to perceive with the Spirit
It's starting the journey, in the eternity of the Moment ...
Believing is to perceive with the senses
Searching for "security"

Knowing is quantum change, which promotes love
The Infinite Connection with Life
Believing is keeping the power
Recluse in the "ego"

Knowing is to walk towards transcendence
Discover the inner time - "kairós"
Believing is to see yourself as a number ... One more ...
The getting lost in the crowd

Knowing makes spirituality conscious
Which was "in" the unconscious mind
Believing keeps selfishness
Leaving the Light under the "bushel"

Knowing is to be with the Creator
It is to live the Image and Likeness "announced"

Believing is to be with one's own beliefs
"Crawling" in the adolescence of life ...

Awareness liberates
And we realize, then, that only Truth gives us freedom ...
Believing keeps the Spirit attached to concepts and prejudices
It is what we call "suffering" ... Unhappiness ...

Knowing is to find happiness
And Joy, its first fruit
Believing is keeping oneself in suffering
Regarding oneself as an eternal victim ...

Knowing is to perceive beyond the appearance
It is to find the deep meaning of existence
Believing is seeing with the eyes
Without anything to see

Knowing, as Jesus did it
Is resurrection after the crucifixion ...
The deep wisdom we all need to "learn"
And celebrate.

Moreover, the change of focus in Science from the Object to the Subject in Post Modernity enables the Encounter with Spirituality. In these inevitable Encounter of Science and Spirituality, so individual experiences, which have always been part of Human existence, find epistemology, at last.

Society built on references of the Object, in Education, Work and even Family, mostly developed based on models and patterns from outside, came to an extreme point that highly threatened the life on planet Earth. The single bottom line – economical profitability – a reflection of linearity of thinking, took time to give way to the triple bottom line, including the environment and Human Being, as elements considered in Management of enterprises and schools. The difference between machines and humans need to be considered for companies to really make a competitive advantage. Competitive advantage or a difference to Humanity? The choice of words mean a huge difference, between linear or Complex Thinking. Indeed, to really understand the difference, perception of own Worth has to emerge from inside as a new level of ethics and consciousness.

Interdisciplinarity, besides being an attitude to knowledge allowing for the integration of disciplines, also regards the ontological and praxiological aspects of the researcher for epistemology. It was in this line that a Vision and Approach developed from the Creation to the Realization of proposals, shows that the experience of the Creative Inner Processes leads to the consciousness of the inner Worth. Regarding the being as full of possibilities in the Knowing and Doing is essential to activate the spiral of creation, which involves all the dimensions of the Being. When one opens to perceptions on a topic and registers what emerges through words, one collects invaluable raw material. The movement of creation of the proposal follows with the correlation of words, and detection of the meaning of the correlations, individually and collectively. The 4 quadrants by Ken Wilber may be used, bringing individual and collective inner and outer consciousness.   Along this Creative Inner Process, it may be possible to gain depth of meaning, concerning the topic, themselves and the decisions involved to constructive, innovative solutions. Three other movements follow in this Vision and Approach: the Definition of the Unity of the proposal which provides insights for the own Unity and wholeness; the Way, with the opportunity to adjust the aspects involved in the proposal, feeling the possible inconveniences, assuring their aim is constructive. All that brings clarity and harmony for implementing a proposal with a sense of Achievement with Self   Realization, which needs commitment as, mentioned by Goethe in one of his poems *"Until one is committed, there is hesitancy, the chance to draw back, always ineffectiveness. Concerning all acts of initiative and creation. However, at the moment one definitely commits oneself, Then Providence moves too. All sorts of things occur to help one that would never otherwise have occurred."*

Hence, there is the perception that as we have the will power to begin something, Providence moves too. This is actually what was stressed at the time when Peter Senge et al at MIT started developing a

revolutionary system thinking approach, that led to another level of Cognitive Capacity; and from where Otto Scharmer was inspired to devleop his U Theory. This approach shows how by reinforcing Presence one may allow synchronicities to happen and become more consciously involved (Commitment) in co-creating the future as it emerges (Providence).

An evidence of Wholeness, even if may take time as was the case of the centenary Mandela that spent 27 years in jail because of his fight against apartheid and wrote this beautiful poem about the critical importance of the awareness of our Light: "*Our deepest fear is not that we are inadequate. Our deepest fear is that we are powerful beyond measure. It is our light, not our darkness, that most frightens us... You are a child of the universe... We are born to make manifest the glory of the universe that is within us. It is not just in some of us: it is in everyone. In addition, as we let our own light shine, we unconsciously give other people permission to do the same. As we are liberated from our own fear, our presence automatically liberates others.*"

With the consciousness of our spiritual dimension, we could bring expansion and well-being to everyone. Indeed, the Human Being potential is full of possibilities. As an example one could even see that recent approaches to Marketing 3.0 by Philip Kotler calling for the need to awakening marketers to reexamine their theory and practices by a growing recognition of planetary finite resources and high environmental costs. Marketers hence need to reexamine their theory and practices and even start considering the various dimensions of the Human Being (Mind, Hearth and Spirit) and their impacts on their organizations mindset (Mission, Vision and Values). Moreover, Richard Barret its Values Center already provides metrics to help building values-driven organizations and societies, somewhat based on contributions by Ken Wilber ś Integral approach as well as the Spiral Dynamics model.

At a Global Level, one could see that important organizations like the UN is getting very much involved into implementing a global new Sustainable Development (UNSDG) with goals focusing in particular *to end poverty, protect the planet and ensure prosperity for all.* Moreover, Klaus Schwab founder and director of the World Economic Forum (WEF) mentioned at the release of his 4th Industrial Revolution book the need of a more *prosperous, equitable, humane, and ecologically sustainable society.* Finally, now that we are in the middle of a complex economical, social, and environmental crisis comes Pope Francis with its *Laudato Si* message suggesting a holistic approach to *Care of our Common home* reminding us that everything is interconnected and that all of creation is a *kind of universal family.*

4 Conclusion

How can we reach higher levels of consciousness and spirituality? Undoubtedly, as we get more mature this may help; but we could also experience internal cohesion with the alignment of every single thought, feeling, speech and action in a constructive way in the studies, work, and personal life. Then we may consider our life as a mission, reflecting the divine purpose of life in the individual Human Being towards the whole. Moreover, ancient wisdom and various religions could bring us a contribution; and maybe, as presented in the book by Kurt Jonhson and David Robert we are at the dawning of an age of interspirituality. This will be welcome particularly nowadays that from the convergence of neurosciences and quantum mechanics is emerging a greater need to understand more deeply what consciousness is, how mind and matter interact; and how this could lead us to a deeper sense of unity, interconnectedness and wholeness. However, for that to happen we may need a methamorphosis as suggested by Edgar Morin.

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Patent Documentation as a Source of Innovation for Sustainable Development

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Abstract: Patent documentation may help provide growth of innovativeness and development of clean technologies. Technology transfer via patent documentations has fostered and revealed itself of high economic importance because of the ability to leverage innovativeness more quickly with low cost and low use of resources and efforts. However, organizations still don t seem to take the advantage and monetize their full potential related with the use of patent information that could stimulate more innovation resulting in greater economic growth. This paper presents that a coherent and effective use of patent information from existing R&D activities with operational application may contribute more efficiently to solve problems and to foster innovation through the creation of new products, services and processes with sustainability and social responsibility. The use of unexploited inventions and the formulation of new products based on successful R&D experiences may be adapted to create sustainable solutions, attend new global needs, generate new jobs, and protect natural resources and the environment as a whole.
Key words: Patent information; Sustainability; Intellectual property; Innovation and natural resources

1 Introduction

The concept of sustainable development has its origins in the attempt of integrating environmental aspects in economic policy, bringing the ideas of environmentalists to the central area of world politics that currently focuses on Economy (Dresner, 2008, p. 69) even though is becoming more aware and concerned on impacts of Climate Change(IPCC, UNFCCC). Sustainable development seeks to carefully balance environmental concerns with economic development, a difficult task when immediate concerns focus ever more on economic aspects than in preserving the environment and natural resources.

This concern is of particular importance in economic models adopted in developing countries, mostly located in the southern hemisphere. These countries concentrate most of natural resources available that should be used more for the sake of improving the lives of the people who lives there.

Another concern, directly related to economic issues, is the one related to difficulties for developing countries in accessing the most updated innovation and technologies. These countries are those where companies often seek to sell outdated products, which no longer have demand in developed markets. These products have caused environmental problems contributing to the increase of level of pollution with negative impacts on the local environment.

In order to shorten the path of reducing environmental impacts though innovation and use of new technologies, patent information may help to prevent the waste of time, material and financial resources. Thus, it may avoid reinventing what already exists and has consumed resources to be invented (Jolly & Philpott, 2009). In addition, this strategy allows the realization of sustainable solutions, by the use of unexploited inventions (new products based on research and development - R&D already available) that may be adapted to new global needs and by protecting the environment and natural resources.

Patent documentation is an important source of information that covers scientific and technical activities of human creativity that being coded allows quick recovery and use. Then, patent information repositories, in the format of databases and digital libraries are the largest sources of scientific and technical information, available freely via the Web globally.

The analysis of this type of information allows the free exploitation of certain inventions, without the obligation to pay any license fees if the patent is in public domain and free to be used (Petroski, 2008). This is the case of generic drugs. Some active substances of certain medicines reached their protection limit and are free to be explored, what has been done successfully by various national and international companies along the time.

The authors of this paper argue that a coherent and effective use of patent documentation, containing information resulting from R&D activities with practical applications may contribute to the increase of firms' innovativeness through the creative use of this open-source information in order to

solve real problems. This organizational strategy may generate benefits for the sustainability of countries due to the use of resources more efficiently by reducing costs and resources spent.

Several environmentally friendly technologies are available to be exploited and some of them at no cost. Some of these technologies, for instance, are using clean energy with relevant economic advantages for those (people, organizations and countries) who want to implement them. As a matter of fact the X-Prize foundation from the Silicon Valley has being fostering Large Scale Impact Innovation that may help Global Well-Being.

Then, this research aims to contribute to the increase of the use of patent documentation as an important source of innovation, in order to stimulate the development of clean and sustainable solutions in many areas such as manufacturing, service and even educational ones. The outcome of this strategy might be the minimization or reduction of cost and resources creating a business environment much friendlier for both: organizations themselves and society as a whole with benefits for all stakeholders involved.

2 Origin and Advantages of Patent Information

Ullrich (1989) argues that Intellectual Property (IP) , especially patents and utility models, represent relevant economic and industrial policy tools as they play an important role as a stimulus for innovation. This stimulation is achieved by the temporary protection granted to the commercial exploitation of the outcome of R&D activities.

In the case of patents, during the registration and grant process, the Patent Offices will generate one or more legal documents that are designated by patent literature. The information that these documents contain is called patent information.

After patent application has been registered in the respective patent office (the granting of protection is only given three years after application on average), this information may take normally 18 months to become publicly available for those who wish to consult it.

In the patent document package may be found the following information: " i) The 'state of the art' of the technical knowledge available to date in the area in which the invention was carried out; ii) Type and nature of the technical problems that the invention will solve; iii) Detailed description of the invention and how it works; iv) Illustrations, diagrams and drawings of the constituent parts of the invention for easier understanding of it, where necessary and appropriate and furthermore, patent information can clarify and supplement articles published by the inventor" (Macedo & Barbosa, 2000, p. 58).

One of the prerogatives so that the patent may be granted, is that the information in the patent application is in such detail that a skilled person in the area will be able to perform the invention (product or process). Thus, analyzing patent information may allow the development of products leading to cost reductions and driving their holders to competitive advantages (Petroski, 2008).

Intellectual property has as its main function, the dissemination of technical and economic information that stimulates the economic performance of a country and individual business units. IP also has the merit of supporting technology transfer processes by establishing the link between university R&D activities, business centers and the economic and financial structure characterized by market architecture.

The patent document discloses the invention necessarily liable of industrial application, but also defines the scope of protection required if the respective patent is obtained and granted by the responsible Office (Jolly & Philpott, 2009). The disclosure of technical secrets contained in the documents resulting from a patent application disseminates valuable information to the public about the 'state of the art' in a given area by promoting through that knowledge technological development.

Because of this disclosure, constituent parts of an invention could be used, provided they do not incur in any violation of the claims contained and described in the patent. This procedure can lead to the attempt to develop competing products to those found in patent documents, by inventing more lucrative or more effective alternatives of use (Rivette& Kline, 2000).

Patent information, in addition to providing an excellent source of information to generate ideas, also has the advantage of being used as a source of inspiration when there is need to find the solution to assist in solving technology-related problems particularly in developing countries.

3 Advantages of Patents for Developing Countries

Sherwood (Sherwood, 1992) argued that "the protection of innovation has been the yeast of the economic development of many countries." This can be seen because "countries with advanced economies tend to be those who have property protection systems in which the public deposits a certain degree of confidence" (1992, p. 11).

Having said that, developing countries have to adopt effective measures of intellectual property (IP) protection in all aspects (patents, brands, utility models, designs, etc.) at a risk that they watch escape to other countries their great asset: the intellectual capital, because of lack of means to protect their inventions, making inventors to seek other countries for protecting their inventions. An economic outcome is that the generation of wealth instead of being in developing countries where they need most, will benefit just foreign countries, most likely in developed ones.

Thus, developed countries continue to develop themselves and emergent countries 'stagnate' without new ideas that could be channeled into new sources of wealth instead of exploiting their natural resources only. Also for the same reason, multinational companies do not invest heavily in these countries for fear of being dispossessed of their source of income due to the possibility of illegal appropriation of their discoveries and inventions, motivated by the weak property protection of intangible assets that characterize IP.

This position is also shared by Idris (Idris, 2003) defending the need to implement strict IP laws in developing countries in order to stimulate the creation of innovative companies, local or international ones. The creation of a secure institutional environment shall help those companies to set up new businesses locally because they feel safe and secure, therefore promoting technological development that will increase economic growth by the competition they promote in the market.

In developing countries, a much more safe and secure institutional environment could facilitate interactions among economic agents and therefore help to increase the process of technology transfers. In this sense, Hansen (Hansen, 1980) in her analysis of the economic aspects as a result from technology transfer in developing countries introduces the idea of 'absorption' of technology.

The term "absorption" of technology could be defined as the induction of technical progress based on a 'transferred' technology. For this phenomenon to occur, it is required the presence of several factors such as, adaptation, improvement and further development of the transferred technology according to the conditions of the economy such as resources, production factors and weather among others.

The mechanisms of absorption of new knowledge of a given economy stresses that the capacity to absorb such scientific and technical expertise,   contains three closely interrelated aspects, which are: i) the ability to recognize possibilities of adaptation of more advanced foreign technologies; ii) the ability to adapt the technology to the physical, social and economic contexts of the country; iii) the ability to adapt the social and economic conditions to the requirements of these new technologies and iv) the ability to provide economic growth and sustainable development.

4 Sustainable Development and Economic Growth

Patent information as a source for innovation is only justified when they generate an improvement of society and country as a whole. These improvements include economic, social and environmental dimensions. As mentioned before, since most of the patents are granted in developed countries, benefits from new technologies are felt only in these countries. In developing countries, on the other hand, due to the lack of policies to guarantee IP protection generate a huge inequality.

Just an example, according to a study held together by the European Patent Office (EPO), United Nations Environment Programme (UNEP), and the International Centre for Trade and Sustainable Development (ICTSD) in 2010, six countries hold about 80% of the innovations developed worldwide in the field of clean energy technologies. This finding came from an analysis of 400,000 patents from Espacenet database (Espacenet is a patent search tool in a digital platform with millions of patent documents).

Several other technologies using natural energy resources such as the energy of the sun, wind and sea waves and tides need to be implemented but face problems of lacking of financial investors; who still believe and bet on old natural sources of energy dominated by the coal and oil industries (Yeomans, 2006), two of the major causes of   environmental problems of the planet (Esty & Winston, 2008; Krupp & Horn, 2009).

Now with the start of oil scarcity and the environmental costs of unsustainable fossil materials, new solutions need to be found to meet the energy needs of humanity (Dresner, 2008), whereby hydrogen is a candidate to consider (Yeomans, 2006).

The development of patents in the clean energy technologies (CET) area shows that innovation may be focused on benefits to the environment and society. The increasing number of CET patents coincides with the adoption of the Kyoto Protocol in 1997, making it clear that political decisions could be a major factor in stimulating the development of key technologies to combat global warming and

climate change. Also, statistical analysis has shown that the number of patents in the mentioned technology areas increased by about 20% per year since 1997, surpassing patents of traditional fossil energy sources and nuclear energy.

Among the six countries leading the area, Japan is the one who developed and patented most technologies, followed by the United States of America, Germany, South Korea, France and the United Kingdom. China is fast approaching South Korea as far as patents in the solar photovoltaic area. Regarding technology licensing, there is a reduced licensing activity between organizations from developing countries, being these activities limited to countries like China, India and Brazil and more recently Chile.

Innovation with focus on sustainable development benefits not only developed and developing countries and society, but organization as well. As a matter of fact companies that invest in green technologies and adopt environmentally sustainable attitudes grow faster with better performances in the markets where they operate.

Because these companies are committed to the mission of making the world a better place through social and environmental management policies, they acquire an intrinsic advantage gained by the respect and trust that their reputation generates among informed and responsible consumers.

Sustainable environmental strategies generate competitive advantage to organizations, allowing lower costs with raw materials and energy necessary for the operation of some industrial activities (Esty & Winston, 2008). Investments in clean and green innovations reduce environmental degradation and at the same time impact positively organizations' public image, capturing greater number of customers and consumers without spending on advertising. Dresner (2008) argues that this is the result of the economy been immersed in sustainability issues. In Brazil a recent Private-Public initiatives gave rise to a very promising Solar Energy Program: Goias Solar.

Instead of wasting precious time and resources causing more environmental damages, the ideal strategy would be to search for existing solutions available in patent depositories to solve the current problems. In this case, patent information may contain the solution to adopt.

5 Where to Search Information for Sustainable Patents and Inventions

The Internet has brought many changes and advantages in the access to information. The amount, extent and speed in which we can access the required information make internet a privileged resource for the search and analysis of information. According to Idris (2003), the possibility of access to the information available in patent databases is the factor behind the creation of knowledge and increasing the growth of wealth.

According to the same author, it relies on the generation and management of what he means by 3 "**i**'s", namely, **I**nnovation, **I**nformation and **I**deas, supported by a fourth "**i**" which stands for **I**nternet. For him, these fuel powers the incredible current of the technological progress. The ownership or access to such source and the information conveyed by them are vital for any company that wants to keep on top of their area of expertise.

The use of this information allows the creation of innovative products and services or finds innovative ways of producing existing products with better cost effectiveness. According to Maia (1996), patent databases allow in a quick and efficient manner: i) be certain of the originality of planned research programs; ii) search inventions useful for further innovations; iii) get an overview of new trends in R&D activities in a particular area of technological development and iv) monitor the marketing strategies of competitors discovering the countries where they required patent protection.

The possibilities that modern technology have to offer with regard to patent information search can prove to be very useful for allowing discovering inventions with high economic potential that are not being properly exploited. Many inventions with environmental benefits have not yet been exploited because of the economic dominance of companies based on traditional energy sources such as coal, oil and nuclear energy that do have strong lobbys.

Companies such as IBM, Sony, Nokia and Pitney Bowes in collaboration with the World Business Council for Sustainable Development (WBCSD) launched in 2008 a digital platform so called Ecopatent Commons (http://ecopatentcommons.org/) for promoting information of environmental and sustainable inventions. Other platforms are as follow: i) WIPO GREEN, supported by the World Intellectual property organization (https://www3.wipo.int/wipogreen/en/) and The GreenXchange Project (http://creativecommons.org/), supported by Nike and Best Buy. An interesting paper, regarding Patent Commons by B. Hall and C. Helmers, suggest thinking on Open Collaborative Innovation alternatives, same as the case of the paper of R. Chafale and O Brian from the Oxford University for the

International Centre for Trade and Sustainable Development - ICTSD.   Actually more recently F. Tietze from The University of Cambridge made some comments regarding how Protectionism regarding Intellectual Property makes it harder to foster Sustainable Systems a overcome status quo; so we need a more Open IP to enable Sustainable Transitions, and that process needs to go faster.

Digital platforms could make available, to those who want to explore new technologies with focus on environment and sustainability of the planet, a set of patents from ecofriendly inventions to opportunities for partnerships and collaborations between companies who own the patents and entrepreneurs who have projects to use them. These initiatives must be cherished because lots of companies have several non-used patents that could be explored, in a useful and ecofriendly way, benefiting all humanity. An example of such a case is the Free Patents On line – FPO.

Besides these specific information resources, directed to the promotion of sustainable inventions, other solutions might arise from the analysis of patent information. The use of available inventions with other purposes that could be adapted for the solution of problems related to sustainable development and better management of natural resources.

Currently, almost all industrialized countries offer via Internet their patent collections for easy access and consultation. Usually the documents are in the countries official language, which is not always easy for those who perform the research. Hence, access to information provided by the World Intellectual Property Organization – WIPO since 1998, has large amounts of summaries (abstracts) in English, and in addition they provide support for research in key Asian offices. In fact, WIPO provides an Inventor Assistance Program (IAP) for developing-country inventors offering patent attorneys who give them free legal advice on patenting.

The advantage of all the sources of patent information presented in this work is that, besides they all being free, may have an easy open digital access. All these sources are of vital importance to obtain information in order to reduce costs and waste while increasing the chances of creating viable solutions to global problems.

6 Some Examples of Patent Information for Creating Sustainable Businesses

The 'Solar Oven' developed by Prof. Manuel Colares Pereira was inspired in a patent already expired, in public domain, of a similar invention called the '*Phyreheliophoro*' (See Figure 1) but used for different functions like melting metals and make fertilizers. The consultation of this patent showed that the invention belonged to a Portuguese priest, Father Manuel Antonio Gomes, better known as MAG Himalaya, that at the beginning of the 20th century, in 1904, won the 1st prize in a science competition in the Universal Fair in St. Louis, Missouri, USA (Rodrigues, 1999).   This invention uses only the sun energy, is non-polluting, eliminates the need to cut trees for firewood for cooking and reduce deforestation.

In the case of less developed countries, the "Solar Oven" (See Figure 2) could allow the creation of family businesses, like cooking to sell meals, enabling the realization of capital for the creation of other businesses and improve the quality of life of the local communities. Therefore, an ecological product allows sustainable businesses with inherent economic and environmental benefits.

Figure 1   The *'Phyreheliophoro'* in Portugal and in St. Louis, Missouri, USA, in 1904 (Rodrigues, 1999)

Figure 2   The Sun Cook – Solar Oven by Sun C℃ – Cia. de Energia Solar S.A
(http://www.sun-cook.com)

This new invention and innovation, inspired in a 1900 technology, is patentable itself, since the solution found is new, it is not contained in the technical characteristics at that time and is not intended for the same use of the previous invention.

If analyzing an invention created with a certain purpose and intention, like melting metals, made possible the cognitive jump to the creation of a solar oven for food confection. Visualizing patent information, which already has available inventions, may allow the insight necessary to create new businesses based on these inventions.

Dou (2004) cited other example of the use of patent information for sustainable businesses regarding the situation experienced in an Indonesian province without large economic resources but with great abundance of coconuts. The fruit was eaten and its juice drunk (coconut water), but the shells resulted in a serious environmental problem, as they were not given any use and constituted debris piles scattered around the island.

In order to face this situation people were trained to use computers in the local public library to conduct research in digital patent platforms such as Espacenet involving the use of coconut. Thanks to documents available in these platforms, they found new uses of coconuts in many different applications such as jams, sweets, cakes and liqueurs. Regarding shells, they may be used in many ways: as fertilizer, as raw material for furniture, building materials and insulation, toys and decorative articles or craft products. Such knowledge made possible a huge number of new successful family businesses. Most of the technologies and patents discovered were of Brazilian origin, not protected in Indonesia, and that could be used without any hindrance or payment of fees.

7 Conclusion

The examples above show the true value of information in these patent repositories and, also, emphasize the idea of using natural products and resources for solving problems in a sustainable way, eliminating waste that would otherwise be a problem to solve.

Undoubtly, the relationship between IP and sustainable economic development is feasible and closely related to the ability to access patent information in order to innovate and gain competitive advantage. Thus, it is possible to innovate without a high initial cost of R&D activities and sometimes, local natural resources could be used to solve complex problems just using information from unexploited inventions. Although patent information is available to all, not everybody benefits from it. Also, it is not sufficient to access it, but it is necessary to do something with this information such as innovative products and services.

Finally, patent information could be used to the development of clean technologies and its analysis is a task to be considered by entrepreneurs and researchers, because a monetization opportunity can be discovered for some invention that can be used or adapted for cost-effective sustainable practices.

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Study on the Punishment Mechanism of Residents' Waste Classification Based on Game Theory

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Abstract: Waste classification has become one of the necessary measures to solvethe rapid growth of China's waste.This paper believes that it is difficult to break the situation of waste siege by relying solely on the residents' self-consciousness. Therefore, this paper uses the game theory approach to construct the game between residents and residents, government and residents, and concludes that the introduction of government punishment mechanism can promote residents'waste classification. In the end, based on the results of the analysis, this paper proposes measures to encourage residents to classify waste.

Key words: Residents; Waste classification; Punishment mechanism; Game theory

1 Introduction

The problem of waste classification has aroused the attention of many scholars.From the perspective of research methods, the research methods for waste classification are mostly based on theoretical analysis and statistical analysis.In terms of theoretical analysis, there are mainly suggestions for China based on the problems existing in domestic waste classification and the experience of analyzing foreign waste classification (Hu Qianyu et al., 2013; Zhang Haodong, Li Zhen& Xiao Xin, 2017; Shi Xiangrong et al., 2017; Lü Licai& Chen Jiawei, 2017). In terms of statistical analysis, it mainly involves regression analysis, factor analysis, path analysis and covariance analysis, etc. Howenstine (Howenstine, 1993) constructed a factor analysis model to analyze 12 reasons for not classifying waste in the Chicago area.

Based on game theory, it is mainly reflected in the different players and the different types of games. In terms of players, researchersestablished the game model between government and property companies (Geng Yanhu, 2014), builders and the public (Yin Qianliang, 2013), college students and college students (Li Xiaofei&Li Da, 2018), college and college students (Li Da, 2017). In terms of game types, researchers constructed the incomplete information static game, complete information dynamic game and full information static game, etc.

At present, there are few literatures on the study of waste classification management using game theory methods at home and abroad. However, as a special kind of public goods, the use of game theory to explore the behavior of waste classification participants is also appropriate. In addition, the game between residents and residents with the largest proportion of waste classification is rarely involved. This paper constructs the game model between residents and residents, government and residents in the waste classification, anduses the research method of evolutionary game. Finally, this paper discusses the punishment mechanism that affects residents' waste classification and proposes suggestions tobreak the situation of waste siege.

2 The Construction and Analysisof Game Models

Residents tend to place waste freely. In order to encourage residents to classify waste, the government should take punitive measures to supervise the behavior of residents.

2.1 The game between residents and residents

If the government chooses to supervise, and give certain punishments f to residents who do not classify waste. In addition, suppose that if there exists waste classification by residents, the probability of the residents who do not classify waste were found by government is m. Other assumptions are as follows:(1) Players are resident A and resident B.(2) Decision set is {classification, non-classification}. (3)Players are not completely rational, and they choose strategies based on maximum utility.(4)All parameters are positive.

The parameters are explained as follows:Rrepresents the long-term returnof their community or urban environment that have been made by both residents' waste classification.$r$represents the long-term return of the community or urban environment that has been improved by the waste classification of only one resident$(r<R)$.Crepresents the time and physical cost that residents spend on waste

classification, and assumingthat the costs are high, so that$r<C<R, R-C<r$.The payment matrix between residents is shown in Table1.

Table 1   Game Payoff Matrix Between Residents

		Resident B	
		classification	non-classification
Resident A	classification	$R-C$, $R-C$	$r-C$, $r-mf$
	non-classification	$r-mf$, $r-C$	$-f$, $-f$

Assuming that the probability that residents choose classification strategy is$x$, the probability of choosing non-classification strategy is$1-x$.E_1represents the expected return of the classification strategy,E_2represents the expected return of the non-classification strategy, and$E$represents the average expected return of the two strategies.

$$E_1 = xR - xr + r - C \tag{1}$$

$$E_2 = xr - xmf - f + xf \tag{2}$$

The replicated dynamic equation of choosing classification strategy is:

$$dx/dt = x(E_1 - E) = x(1-x)[x(R-2r+mf-f)+r-C+f] \tag{3}$$

Finding possible stable points： $x_1^* = 0$, $x_2^* = 1$, $x_3^* = -(r-C+f)/(R-2r+mf-f)$

$$F'(x) = (1-2x)[(R-2r+mf-f)x+(r-C+f)]+x(1-x)(R-2r+mf-f) \tag{4}$$

$$F'(0) = r - C + f , F'(1) = -(R-C-r+mf) ,$$

$$F'(x_3^*) = -[(r-C+f)(R-C-r+mf)]/[(r-C+f)(R-C-r+mf)] \tag{5}$$

Analysis of $F'(x)$, and get the following three results.

①If$f<C-r$, then0 is the only evolutionary stable strategies. It shows that all residents will not classify waste when the government's punishment for residents is very small.

②If$C-r<f<(R-C-r)/m$, thenx_3 is the only evolutionary stable strategy. It shows that when the government's punishment is in a certain range, the residents classify waste with the probabilityx_3, and the government's punishment needs to be improved.

③ If$(R-C-r)/m<f$, then1 is the only evolutionary stable strategy. It shows that when the government's punishment reaches a certain level, residents can basically classify waste.

In real life, it is difficult to achieve the third situation. The second case is a common phenomenon. Therefore, it is necessary to improve the probability of residents' waste classification as much as possible. This probability is positively correlated with the government's punishment amount and punishment probability for unclassified residents.Therefore, the government cannot do nothing in the waste classification.The government needs to actively explore appropriate punishment mechanism to promote residents' waste classification. In addition to increasing fines, the government must increase supervision.

2.2 The game between government and residents

The government adopts fines to supervise the behavior of residents and punish unclassified residents. The following assumptions are made: (1) Players are government and residents, and both are not completely rational. (2) The government's decision set is {supervision, non-supervision}, and the residents' decision set is {classification, non-classification}. (3) All parameters are positive.

The parameters are explained as follows:r represents the long-term return of the residents' waste classification to improve the environment.R represents the return of the government when the residents classify waste. c_1 represents the physical and time cost of the residents for waste classification. C_1represents the government's supervision cost.c_2 represents the future environmental deterioration expenditure caused by residents not classify waste. C_2represents the reputation loss that the government does not supervise when residents do not classify waste. f represents the government's punishment for residents who do not classify waste.The payment matrix between government and residents is shown in Table 2.

Table 2   Game Payoff Matrix Between Government and Residents

		Government	
		supervision	non-supervision
Residents	classification	$r-c_1$, $R-C_1$	$r-c_1$, R
	non-classification	$-f-c_2$, $f-C_1$	$-c_2$, $-C_2$

Assuming that the probability that residents choose classification strategy is x, the probability of choosing non-classification strategy is $1-x$. E_1 represents the expected return of the classification strategy, E_2 represents the expected return of the non-classification strategy, and E represents the average expected return of the two strategies. And assuming that the probability that the government choose supervision strategy is y, the probability of choosing non-supervision strategy is $1-y$. U_1 represents the expected return of the supervision strategy, U_2 represents the expected return of the non-supervision strategy, and U represents the average expected return of the two strategies.

$$E_1 = y(r - c_1) + (1 - y)(r - c_1) = r - c_1 \tag{6}$$

$$E_2 = y(-f - c_2) + (1 - y)(-c_2) = -yf - c_2 \tag{7}$$

$$U_1 = x(R - C_1) + (1 - x)(f - C_1) = x(R - f) + f - C_1 \tag{8}$$

$$U_2 = xR + (1 - x)(-C_2) = x(R + C_2) - C_2 \tag{9}$$

The replicated dynamic equation of choosing classification strategy is:

$$dx/dt = x(E_1 - E) = x(1 - x)(r + yf - c_1 + c_2) \tag{10}$$

The replicated dynamic equation of choosing supervision strategy is:

$$dy/dt = y(U_1 - U) = y(1 - y)[f - C_1 + C_2 - x(f + C_2)] \tag{11}$$

Solve the replicated dynamic equations and find that the equilibrium point are: (0,0), (1,0), (1,1),(0,1),((f-C_1+C_2)/(f+C_2), (c_1-c_2-r)/f).

Finally, the Jacobian matrix is:

$$J = \begin{pmatrix} (1 - 2x)(r + yf - c_1 + c_2) & x(1 - x)f \\ -y(1 - y)(f + C_2) & (1 - 2y)[f - C_1 + C_2 - x(f + C_2)] \end{pmatrix} \tag{12}$$

Analysis of the Jacobian matrix, and get the following four results.

①If c_1-r<c_2, (1,0) is the evolutionary stable strategy. It shows that the residents choose waste classification, and the government does not choose supervision.

②If $c_2 \leq c_1$-r<f+c_2 and C_1<C_2+f, ((f-C_1+C_2)/(f+C_2), (c_1-c_2-r)/f) is the evolutionary stable strategy. It shows that the residents choose waste classification with the probability of (f-C_1+C_2)/(f+C_2), and the government chooses supervision with the probability of (c_1-c_2-r)/f.

③ If $c_2 \leq c_1$-r and $C_1 \geq C_2$+f, (0,0) is the evolutionary stable strategy. It shows that the residents choose waste non-classification, and the government chooses non-supervision.

④ If c_1-$r \geq f$+c_2 and C_1<C_2+f, (0,1) is the evolutionary stable strategy. It shows that the residents do not choose classify waste, and the government chooses to supervise.

In the real world, it is difficult to achieve the first situation, because residents always pay attention to immediate interests and ignore long-term interests. Many residents do not spontaneously classify waste. The third case is a common phenomenon, so it is necessary to improve the probability of residents' waste classification. This probability is positively correlated with the government's punishment for unclassified residents, so the government needs to increase punishment for unclassified residents.

From the above two games, it is found that the government's punishment mechanism can promote residents to classify waste.

3 Conclusion

Based on the behavior of residents in the process of implementing waste classification, this paper constructs the game models between residents and residents, government and residents. The analysis shows that the punishment will affect the residents' decision. When the punishment reaches a certain intensity, it can improve the residents' waste classification probability. In addition, it has also been found that the certain level of government supervision can also increase the probability of waste classification.

Based on the above research, the following suggestions are given. (1) The government needs to establish a strict punishment mechanism. In addition to providing direct economic penalties, the government can also record the behavior of residents' waste non-classification into the integrity system, conduct community broadcasting criticism for residents who do not classify and so on.(2) The government should implement effective supervision measures. First, the government should clarify the supervision responsibilities of various functional departments and formulate clear assessment rules. Secondly, the government can introduce professional third-party supervision or openly select social supervisors from the public. Finally, the government can consider the diversification of supervision

forms.

　　Promoting the residents' waste classification can also be seen as a process of promoting human cooperation. Human cooperation is a very complicated activity. Future research can be combined with some disciplines that have traditionally been considered impossible, such as statistical physics (Perc et al., 2017), to explore ways to implement waste classification.

Acknowledgement

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Political Instability and Economic Growth: Evidence from Madagascar (1996-2011)

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Abstract: The present paper aims to investigate the influence of political instability on Madagascar economic growth for the period 1996 to 2011. The theoretical study explores different models that explain the effect of political instability on growth while the empirical section discusses the evidence on the predictions generated by theoretical models. Despite its recent progress, Madagascar has faced by a cycle of profound political instability and, therefore, it deteriorates economic growth. To estimate its effects, we test the correlation between political stability and growth by using the ARDL model approach which is significantly positive. The results suggest that, in Madagascar with a high propensity of regime change, growth is significantly low. This implies negative effects of instability on growth.
Key words: Political instability; Economic growth and ARDL model

1 Introduction

In today's world, political instability remains the most questionable issues and hard to tackle especially in Sub-Saharan Africa (SSA). The relationship between political instability and economic growth has been debating for longtime among the economists. Madagascar, an Indian Ocean island country, has witnessed cycles of political instability for years (Andriamahery and Zhou, 2018). Political instability has its main factors including government instability, internal and external conflicts, corruption, democratic accountability and bureaucracy quality (Kaplan and Akçoraoğlu, 2017). We just focus on how instability affects economic growth in Madagascar.

Political stability plays a significant role in economic growth of a country in point of view of modern theory of political economy. Thus, an unstable political system could seriously hinder economic growth. Within the theoretical framework of modern political economy, a government is considered to be inefficient if policy objectives vary over a short period of time. Thus, coalition governments are a serious threat and to be more prone to the political stability.

Madagascar's long-term economic performance is a true enigma in which its GDP per capita has been declining steadily since independence in 1960. Hence, each time the country has found a path to growth, this has been hindered by some socio-political instability (Razafindrakoto et al, 2015). This negative growth has great effects in every parts of Madagascar economy and can hamper the goal of poverty reduction (Helal, 2013).

The year of 1996 marked a birth of Second Republic of Madagascar which ushered in what was expected to be enduring democracy. Since 1996, however, Madagascar has been enjoying uninterrupted democratic governance which presupposes political stability yet the growth of the economy seems illusionary. It is this reality that informed this study given the fact that democratic governance should ordinarily, among other things, usher in societal development, inclusion and participation of citizens in governance. Also, studies on the impact of political instability on economic growth in Madagascar are scarce in literature, even the few available ones in literature are more of content analysis. This study, therefore, differs from existing studies in that, it quantitatively investigated the relationship between political instability and economic growth in Madagascar using time series data over the period between 1996 and 2011. We only study the data from that period as they are considered most recent in terms of their availability and also involve the era of longest uninterrupted democratic regimes.

2 Literature Review

2.1 Conceptual Framework

In this paper, political instability is defined as the propensity of a change in the government, either by "constitutional" or "unconstitutional" means. Political instability has negative effect on economic development because it doesn't only disturb market activities and labor relations, but also it affects investment negatively (Chawdhury, 2016). We know that accountability and transparency on the government level as well as a stable political environment attract investment which leads to increase growth of the country. Indeed, the majority of academic research reveals that corruption impedes

economic growth and creates political instability which lowers the quality of public investment (Gaspar and Hagan, 2016).Higher political instability leads to lower GDP per capita growth rates via its effect on productivity growth as well as physical and human capital accumulation (Aisen and Veiga, 2013). Weak economic performance is one of the determinants of poverty and instability seems only to exacerbate poverty in Madagascar.

According to (Kindleberger in Jhingan, 2007), Economic growth as more output, while economic development implies both more output and changes in the technical and institutional arrangement by which it is produced and distributed. Friedman in his fashion defines growth as an expansion of the system in one or more dimension without a change in its structure, and development as an innovative process leading to the structural transformation of a social system. According to Iyoha (1999), economic growth is defined as a persistent rise in the national income over a range of time of not less than five years. In economic growth theory, growth is usually calculated in real terms, that is, inflation-adjusted terms, in order to obviate the distorting effect of inflation hence, the use of real gross domestic product in most growth literature.

2.1 Theoretical and empirical framework

Many researchers have developed the relationship between political stability and economic growth in various ways, however, most of their studies link political instability rather than stability with economic growth. For example, using cross-sectional analysis, (Barro, 1991) stated that economic growth is negatively affected by political instability.

Taking a panel data of four countries, (Bildirici, 2004) examined the relationship between political instability and economic growth which the study found out that there is a negative relationship between the variables under study. (Yunis et al., 2008) investigated the effects of various political instability factors on economic growth for selected Asian countries during 1990-2005. Their study found close relationship between political stability and economic growth and the results showed that the role of political stability is more important than economic freedom. (Aisen and Veiga, 2010) used GMM estimator for linear dynamic panel data models on a sample of 169 countries, and 5-year periods from 1960 to 2004 to investigate the link between political instability and economic growth and found that lower growth is associated with higher degree of political instability. Also, (Muñoz, 2009) used ARDL framework to investigate the link between political instability and economic growth for Venezuela for the period of 1983 to 2000. He found that political instability affects growth negatively but not through the channel of investment.

In terms of country studies, Campos and (Karanasos, 2007) used power ARCH framework with yearly data for Argentina for the period 1896-2000 and came up with the conclusion that both the informal political stability (assassinations and strikes) and the formal political stability (constitutional and legislative changes) have direct negative effect on economic performance. The effect of formal instability was stronger in the long run while the effect of informal instability was stronger in the short run in their study.

3 Research Methodology

In order to study the relationship between political instability and growth in Madagascar,the hypothesis of this study is stated like this follows: political stability affects positively on economic growth while there is a negative effect of political instability on Madagascar economic growth.

3.1 Development of model

Political instability, as opposed to political stability which is a description of a well-functioning government (Andriamahery and Zhou, 2018), is associated with greater uncertainty regarding future economic policy. It is likely to harmfully affect investment and, therefore, physical capital accumulation. In fact, (Alesina and Perotti, 1996) have identified a negative relationship between political instability and investment. Therefore, political instability may affect negatively human capital accumulation. To uncover this relationship, we adopted an augmented Solow production function (Solow, 1956) that, in general, makes output a function of physical capital, human capital, labor, and technology. In a Cobb–Douglas production function framework, we have:

$$Y = A(PK)^{\alpha} \ L^{\beta} \ (HK)^{\theta} \tag{1}$$

Where Y is total output, while PK, L, HK and A respectively express the physical capital, labor, human capital stock and technology.

The technology A is broken into constant a and country specific deviation ε and became $A=a+\varepsilon$ as stated in (Mankiw et al., 1992). With this, they successfully dump the effect of technology into the

regression error term. Considering logarithm and differentiating, equation (1) becomes:

$$Y = \alpha + 6PK + \beta L + \theta HK + \varepsilon \qquad (2)$$

(North, 1990) stated that institutions in a country determine its long-run economic performance. The institutions, that North mentioned here, are quality of government, political stability, independent judicial system, political rights, property rights and so forth. Political stability can directly affect the growth through affecting Total Factor Productivity (TFP) of Madagascar. Therefore, we can modify the augmented Solow model in equation 2 in line with his argument and the model for the study becomes:

$$Y = \alpha + 6PK + \beta L + \Phi PI + \delta GE + \Omega RC + \varepsilon \qquad (3)$$

Where *PI, GE* and *RC* stand respectively for Political Stability Index, Government Effectiveness and Regime Changes. While 6 and β are the estimated coefficients, *Φ, δ* and *Ω* are the Total Factor Productivity terms and ε is the intercept term.

3.2 Data

This paper used mainly secondary data on the Malagasy economy between 1996 and 2011 which is a period related to the availability of data. They were sourced from National Institute of Statistics of Madagascar (INSTAT), (International Monetary Fund (IMF), World Bank, 2011), Central Bank of Madagascar and World Bank's GlobalEconomy.com. Data from the above sourced were cross-checked and matched to ensure uniformity. The variable takes zero (0) for any change of government at the center and one (1) if otherwise which is constructed by the author.

3.3 Methodology

The Autoregressive Distributed Lag Model (ARDL) is used in this study to estimate the relationship between political instability and economic growth in Madagascar. (Pesaran and Shin, 1998) developed first the ARDL Bounds Cointegration Test and later extended by (Pesaran et al., 2001). Well, unlike the Johansen-Juselius cointegration test, this model allows for cointegration testing even when all variables are integrated of order I(0) or I(1), or a mix of the two. In addition, it is not sensitive to the values of error parameters hence making it ideal for small sample estimation. Lastly, the model is proven to provide unbiased long run estimates with valid t-statistics even when some of the cointegrated variables are endogenous (Amusa et al., 2009). The above features makes the ARDL Bounds approach to cointegration ideal for use in this paper particularly since the data sample is small and the variables are a mix of I(0) and I(1). Therefore, an ARDL representation of equation (2) can be specified in equations as follows:

$$\Delta Y = \alpha \sum_{i=1}^{p} \Psi \Delta Y_{t-1} + \sum_{i=1}^{p} 6\Delta PK_{t-1} + \sum_{i=1}^{p} \beta \Delta L_{t-1} + \sum_{i=1}^{p} \Phi \Delta PI_{t-1} + \sum_{i=1}^{p} \delta \Delta GE_{t-1} + \sum_{i=1}^{p} \Omega \Delta RC_{t-1} + \lambda EC \quad (4)$$

Where: EC is the residuals (the error correction term) obtained from equation 3. Ψ is the coefficient of the lagged total output and λ is the speed of adjustment parameter that is expected to be negative and statistically significant to further confirm the existence of a cointegrating relationship.

3.4 Estimation and discussion of results

The application of unit root tests in the ARDL method might still be needed in order to ensure that the regression is integrated of order one and none of the variables is integrated of order 2 or beyond because the computed F-statistics provided by (Pesaran et al., 2001) are valid for only variables that are I(0) or I(1). The first step in the estimation of time series data set is to verify the existence or otherwise of unit root. This is particularly important because, if an OLS regression is estimated with non-stationary data and residuals, the regression estimates are most likely spurious. To do this, the logged series were first plotted against time to observe their properties (Figure 1).

Madagascar Economic Growth   Madagascar Government Effectiveness
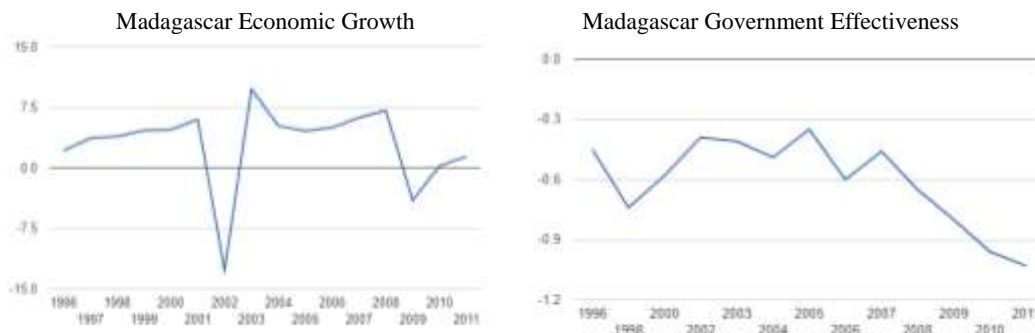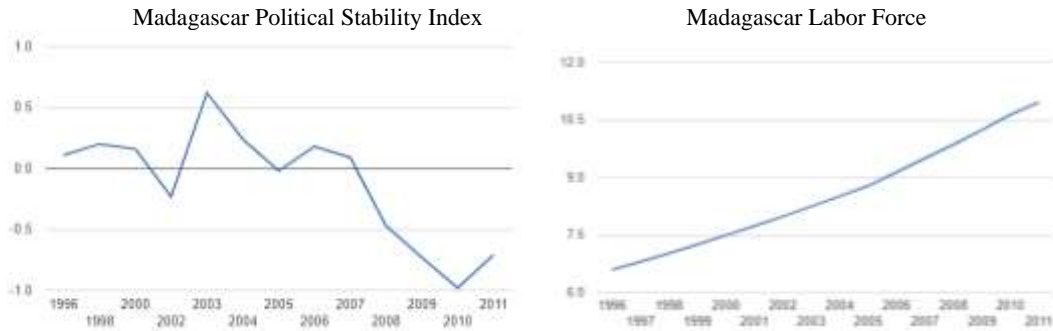
Figure 1   Line Plot of the Variables Used for the Study

The trends in Figure 1 revealed wide fluctuations likely to produce positive autocorrelation which makes a series non-stationary. For that reason, it is important to test for the stationarity and correct the non-stationary series. The best way to correcting the non-stationary series into a stationary series is through the method of differencing. And we use the Augmented Dickey Fuller Test (ADF) to verify the stationarity or otherwise of the original and the differenced series, based on 5% significance level. The table below shows us our result:

Table 1   ADF Unit-Root Test Result for the Series

Series	ADF T-Statistic @ Level	ADF T-Statistic @ 1st Difference	Decision
EG	-3.6936(-3.0810)	-	Stationary @ I(0)
PK	-0.8017(-3.0810)	-3.7695(-3.1199)*	Stationary @ I(1)
L	-1.0183(-3.1199)	-6.8739(-3.0889)*	Stationary @ I(1)
PI	-8.0127(-3.1199)*	-	Stationary @ I(0)
GE	-4.7091(-3.0810)*	-	Stationary @ I(0)
RC	-6.2450(-3.1199)*	-	Stationary @ I(0)

Source: Author's computation (Eviews 9.0) and number in brackets are the critical values at significance level of 5%.

Table 1 shows a mixed order of integration (I (0) and I (1)) among the variables. The variables EG, PSI, GE and RC are integrated of order zero (I(0)) while PK and L variables are integrated of order one (I(1)). Consequently, since the variables under the study are not integrated of the same order and none of the variables is stationary at I(2), the application of ARDL is justified. In addition, the use of bounds approach to cointegration over other conventional approaches need the variables to be integrated of the same order.

3.5 ARDL bounds test for cointegration

Taking a consideration of the use of annual data and a relatively small sample size, a lag length of 1 is used in the bounds test, (Pesaran and Shin, 1998). The critical values used in this paper are extracted from the ARDL results using Microfit software. And the bound test results are shown in table 2.

Table 2   ARDL Bounds Test for Cointegration

F-statistic	Critical Values	Lower bound	Upper bound value
	1%	3.7421	5.0614
5.21	5%	2.6051	3.9403
	10%	2.1077	3.2851

Remark: Critical Values are cited from (Pesaran et al., 2001: p.300), the last table CI (iii) which is no trend for K = 5.

F_{EG} (PK, L, PI, GE, RC) as the computed F-statistics value in Table 2 (5.21) is above the upper bounds of the critical value of 4.01 at significance level of 5%. This implies that there is cointegration (long run relationship) between Economic Growth, Capital Investment, Unemployment Rates, Political Stability Index, Government Effectiveness Index, and Regime Change. As a result, the null hypothesis of no cointegration between the variables is rejected and the alternative hypothesis is accepted implying that, a long run relationship exists among the variables of the study.

3.6 Estimated long run relationship

The existence of a long run relationship among the variables of the study suggests the estimation of long run coefficients and short run dynamic parameters. The estimation of the ARDL model is based on the Schwarz Bayesian Criterion (SBC). The table below shows the long-run results and the diagnostic test statistics of the estimated model:

Table 3   Estimated Long Run Relationship using ARDL Approach (0,1,1,1,1,0)

Dependent variable: EG

Regressor	Coefficient	Standard Error	T-Ratio	Prob
PK	5.3645	0.8745	6.1344	0.000
L	-2.0411	0.4452	-4.5847	0.001
PI	0.2541	0.0354	7.1780	0.000
GE	-5.6702	0.6354	-8.9238	0.000
RC	-0.1412	0.1052	-1.3422	0.245
INTP	4.3654	0.2411	18.106	0.000

The table 3 shows the result of the estimated coefficients of the long run relationship which indicates that capital investment (PK) and political stability index have a positive and significant effect on economic growth at probability level of 5%. Their estimated coefficients are respectively 5.3645 and 0.2541 which imply that a unit change in capital investment and political stability will affect economic growth positively by 5.3645 and 0.2541. However, unemployment rate (L), government effectiveness index (GE) and regime change (RC) affect negatively on economic growth in Madagascar. A unit change in each will affect respectively economic growth by 2.0411, 5.6702 and 0.1412. All the variables except regime change (RC) are significant at probability level of 5%. The short run relationship result is presented here below:

Table 4   Estimated Short Run Relationship using ARDL Approach

Dependent variable is d(EG)

Regressor	Coefficient	Standard Error	T-Ratio	[Prob]
d(PK)	2.1640	0.8291	2.6104	[.028]
dL	-4.4842	0.6454	-6.9479	[.000]
d(PI)	2.5653	0.3354	7.6574	[.000]
dGE	-10.095	0.6354	-15.888	[.000]
dRC	-0.2434	0.1052	2.3137	[.031]
ECM(-1)	-0.7851	0.2144	-3.6618	[.011]
R-Squared	0.88940	R-Bar-Squared		0.74194
S.E. of Regression	5.37650	F-Stat. F(5,9)	9.6500	[.002]
DW-statistic	1.79021	Schwarz Bayesian Criterion		-51.8288

Table 4 shows the results of the short run dynamic coefficients associated with the long run relationships obtained from the error correction model. The signs of the short run dynamic interactions are consistent with that of the long run relationship. The estimated error correction coefficient of -0.7851 with a probability value of 0.011 is highly significant. It has the correct sign, and implies a fairly high speed of adjustment to equilibrium after a shock. Approximately 78.5% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year. All the variables of the study were found to be significant at probability level of 5%.

3.7 Diagnostic tests

The Lagrange multiplier test of residual serial correlation outcome, Ramsey's RESET test, Jarque Bera normality test and Heteroscedasticity test indicate the model passed all the tests (Table 5). Hence, this implies that it has a correct functional form and its residuals are serially uncorrelated, normally distributed and homoscedastic.

Table 5   ARDL Model Diagnostic Test

| LM Test Statistics		Prob.
Lagrange multiplier test of residual serial correlation	$\chi^2(1) = 0.8323$	0.1422
Ramsey's RESET test using the square of the fitted values	$\chi^2(1) = 1.4152$	0.6337
Based on a test of Skewness and Kurtosis of residuals	$\chi^2(1) = 0.6496$	0.9852
Based on the regression of squared residuals on squared fitted values	$\chi^2(1) = 3.4512$	0.4851

4 Conclusion

The use of the Autoregressive Distributed Lag Model (ARDL) in this study helps us to find out the relationship between political instability and growth in Madagascar. The result of the estimated coefficients of the long run relationship indicates that capital investment (PK) and political stability index have a positive and significant effect on economic growth. In addition, using time series data on different variables from the bound testing approach to cointegration, the analysis result revealed that there is a positive and significant relationship between political stability and economic growth both in the long run and short run. However, political stability is the opposite of political instability, then, the study concludes that political instability affects negatively economic growth in Madagascar. In addition, a stable political environment is a key element for economic growth and the Madagascar government should find out the root causes of political instability and try to mitigate its effects in order to ensure sustained and inclusive economic growth in Madagascar. In future work, we propose examining investment, output and the composition of government change in a structural framework, which will give us a more precise understanding of the sources of this aspect of instability to growth.

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Study on Income Gap Between Urban and Rural Residents in Henan Province

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Abstract: In recent years, Chinese rapid economic development and the large income gap between urban and rural residents have become the most compelling issue in Chinese economic development. This article takes Henan Province as a research object and conducts an empirical research on the history, current situation, and future trends of income disparity between urban and rural residents in Henan Province. It also analyzes the four sources of household income as the starting point. Four income sources have different effects on the income gap between urban and rural residents.Finally, the conclusion is drawn that the income gap between urban and rural residents in Henan will slow down and how to reduce the income gap between urban and rural residents in Henan province.
Key words: Residence income; Urban-rural gap; Sources of income; Economic development

1 Introduction

China is one of the countries with the greatest gap between urban and rural areas. As is known to all, if the urban-rural income gap is too large, it will be detrimental to economic development and social stability and the reform process. According to relevant department statistics, the income gap between urban and rural areas in Henan Province ranks very high among the 34 provincial-level administrative units in the country. The income gap is due to the unreasonable distribution of income. In the past, many Western schools studied the theory of income distribution, including the Marx doctrine, neo classical economics, Keynes school and so on. Many scholars in China have also studied the theory. Among them, the "inverted U" theory put forward by Professor Chen Zongsheng was earlier known. Later, many studies on Henan province appeared, Dai Xiaoli pointed out that the absolute number of rural residents in Henan is far lower than the income of urban residents, but the annual growth rate is slightly higher than the annual growth rate of urban residents'income. Wang Chenxi thinks that if we want to narrow the income gap between urban and rural residents in Henan Province, we must first increase the income of farmers. Qin Buhuan pointed out that the gap between the living standard of urban and rural residents in Henan province has been narrowing year by year from the Engel coefficient alone, but its Gene coefficient is still high. Formerly, scholars have studied from the qualitative point of view, lack of quantitative proof, and have less research on the classification of income sources. This paper, based on the classification of income sources, combined with sufficient data to study the income gap between urban and rural residents in Henan province and draws a conclusion. Therefore, this research topic not only has important implications, but also reflects the actual policy reference value.

2 Analysis of Income Gap between Urban and Rural Residents in Henan Province

2.1 The status of income gap between urban and rural residents in henan province

The research data in this paper select the income of urban and rural residents in Henan Province from 1992 to 2016. The data analysis was conducted using the indicators of urban-rural per capita income difference and urban-rural income ratio. The former expresses the absolute income gap between urban and rural residents, while the latter expresses its relative gap. The trend of these two indicators is shown in Figure 1.

Since 1992, the per capita disposable income of urban and rural residents in Henan Province has significantly increased, but their respective increases have led to changes in the gap between the two. It can be seen from Figure 1 that the income gap between urban and rural residents in Henan Province has continued to widen over the years, indicating that the income of urban and rural residents in the region has grown rapidly while the absolute gap has also changed significantly. Figure 1 also shows that from 1992 to 2016, the urban-rural income ratio in Henan province fluctuates continuously and reaches a peak in 2003 and then steadily decreases. This trend shows that the rate of widening urban-rural income gap has slowed in Henan Province, but the urban-rural income ratio is still hovering at a high level. This situation is still very serious.
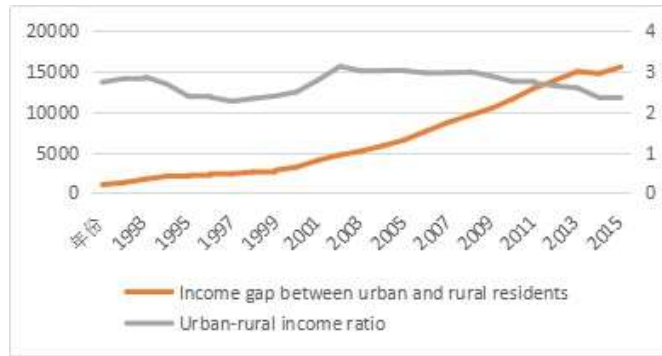
**Figure 1   Trends in Rates and Ratios of Urban and Rural Residents' Income
in Henan Province from 1992 to 2016**

2.2 Analyzing the income gap between urban and rural residents in Henan Province from the perspective of income sources

The source of residents' income basically consists of the following four blocks: wage income, operating income, property income, and transfer income. This article selected data from four income sources of urban and rural residents in Henan Province from 2006 to 2015 for a brief analysis. Figure 2 shows the average proportion of income from sub-items of urban and rural residents in Henan Province from 2006 to 2015.
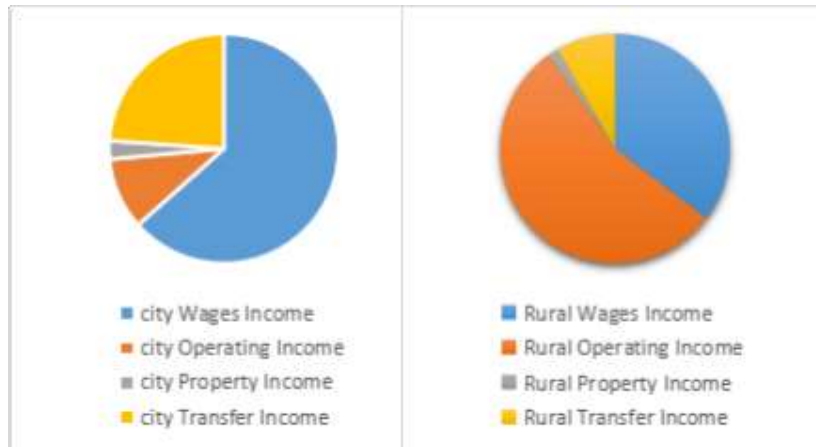
Figure 2   Average Income of Sub-items of Urban and Rural Residents in Henan Province from 2006 to 2015

As can be seen from Figure 2, the primary source of income for urban residents is wage income, which accounts for about 67%. The ranking of the other three sources of income in the total income is in descending order: transfer income, operating income, and property income; and for rural residents, operating income is its main source of income, and the other three the proportion of the income of the items in the total income from big to small is wage income, transfer income, and property income. Obviously, the factors that can affect the four residents' sources of income will inevitably lead to changes in the income gap between urban and rural residents. Based on the collected data, the following will briefly analyze its impact on the urban-rural income gap in Henan Province from these four aspects.
2.2.1 Wages income

Wages income occupies a large proportion of the income of urban and rural residents. It can be seen that the difference in wage income between urban residents and rural residents has the greatest effect on the overall income gap between the two. The main reasons are: 1. Wage income accounts for the largest proportion of urban residents' income and it also occupies a large proportion of the income of rural residents. 2. The wage gap between urban and rural residents is too large. In 2006, the ratio of per capita gross income of urban and rural residents in Henan Province was 3.01:1.00, and the ratio of wage income to income was 6.71:1.00. By 2010, the former was 2.88:1.00, and the latter was 5.56:1.00; in 2015, the former It is 2.36:1.00 and the latter is 4.19:1.00. We can conclude that the most important reason that has caused the excessive urban-rural income gap in Henan Province is wage income. In addition, we can generally see that the proportion of wage income in the total per capita income of

farmers shows an upward trend in the overall data. And the proportion of this income in urban residents' per capita total income has decreased. This change has made the impact of the wage income gap between urban and rural residents in Henan Province on their total income gap. However, although the impact of the wage-income gap has weakened, the gap has still had a large impact on the overall income gap between urban and rural residents in Henan.

2.2.2 Operating income

Operating income accounts for the largest proportion of rural residents' income in Henan Province, and it accounts for a relatively large proportion of urban residents' income. It can be considered that the difference in the operating income gap between urban and rural residents has a greater impact on the change in the overall income gap between the two. The following discussion on the specific impact of the relevant data, from 2006 to 2015, the average income per capita of rural residents in Henan Province accounted for an average of 54.7% of the total income, and this indicator in the total income of urban residents at this stage the average accounted for 10.6%, the former is much higher than the latter. On the other hand, from the standpoint of absolute indicators, rural residents have much higher operating income than urban residents. So we can draw a conclusion that operating income makes the overall income gap between urban and rural residents shrink, and this effect is very significant. In short, operating income has played an important role in reducing the income gap between urban and rural residents in Henan Province. The following comparison will illustrate how this effect will change: From 2006 to 2015, the average annual growth rate of urban residents' per capita operating income in Henan Province was 18.67%, while the average annual growth rate of rural residents in this indicator was only It is 6.55%; in 2006, the per capita annual operating income of rural residents in Henan Province was 2.74 times that of urban residents. In 2010, the ratio was 2.19, and by 2015, the ratio was reduced to 1.26. It can be seen that the operational income gap gradually reduces the effect of narrowing the income gap between urban and rural residents in Henan Province. The reason for this result is mainly because the city is much faster than rural areas in terms of the growth rate of operating income.

2.2.3 Property income

This indicator occupies a small proportion of the income of urban and rural residents in Henan Province. The annual average of the selected data was 2.7% and 1.4%, respectively. From this point of view, property income has very little impact on the urban-rural income gap in Henan Province. From these data alone, the difference in the income gap between urban and rural residents in Henan Province affected by this indicator is not clear. The reasons may be: First, due to the short selection year; Second, changes in the capital market. The sources of income have a greater impact, and changes in the capital market are due to a combination of factors. However, it can be determined that the proportion of property income in the total income of urban and rural residents will continue to increase with the continuous development of Chinese market economy and the increase in residents' property. More importantly, due to the cumulative nature of property income itself and the "Matthew effect", property income may grow faster and faster between urban and rural areas. Therefore, looking at this issue from a long-term perspective, we will find that the overall income disparity between urban and rural residents will continue to increase due to the impact of property income.

2.2.4 Transfer income

In 2006, urban residents received 28.7 times as much transfer income as rural residents. In 2010, it was 16.6 times. Until 2013, the ratio was far greater than the ratio of urban and rural residents' wage income. So far, it is precisely because of the transfer income policy of urban-rural division, that is, the impact of the income redistribution system with discrimination that has caused the transfer income gap between urban and rural residents in Henan Province to be so large. However, in the past two years this ratio has suddenly dropped. This may be due to the fact that in recent years, government policies have tended to improve the living conditions of rural residents and provided more and more favorable agricultural policies and policy support.For historical reasons, the long-standing fragmentation of urban and rural areas in China has led rural residents to enjoy some of the social benefits and protection that ordinary urban residents can enjoy. The expansion of the transfer income gap has widened the per capita gross income of urban and rural residents. On the whole, transfer income accounts for much less than wage income in the total per capita income of urban and rural residents. This indicator does not have the impact on income disparity between urban and rural residents in Henan Province as much as wage income. And due to policy tilt, the gap between this indicator will continue to narrow. Therefore, the impact of the transfer income gap between urban and rural residents on the gap between their per capita total income may weaken.

3 Conclusion

Based on the above four aspects, we can draw the following conclusions:

(1) The order of these four sources of income for the income gap between urban and rural residents in descending order is wage income, operating income, transfer income, and property income. Among them, operating income has the greatest impact, and property income has the least influence.

(2) The impact of these four sources of income on the per capita total income of urban and rural residents is also different. Among these, wage income, transfer income, and property income have all contributed to the increase in the total income gap. And operating income will lead to a reduction in the total income gap. The gap in per capita income between urban and rural residents can be narrowed by narrowing the gap between urban and rural residents' wage income, transfer income, and property income.

(3) The four sources of income have different trends in the impact of the per capita household income gap. First of all, in the aspect of widening the gap, there is a marked decline in wage income, followed by transfer income and property income. Second, the trend of operating income, which plays a major role in narrowing the income gap, is also weakening.

Because China is a big agricultural country and Henan province is a big agricultural province, the key to solve the problem of large gap between urban and rural areas is farmers, agriculture and rural areas. In order to further narrow the income gap between urban and rural residents in Henan Province, the following suggestions are put forward:

(1) Strengthen the government's macro-control, use the tax mechanism and reform the income distribution system to improve the income of the rural residents, and also make various preferential policies to encourage and support the input of various social resources to the rural social security through various media, so as to ensure the stability and harmony of the society, and indirectly reduce the income of urban and rural areas. Enter the gap. In addition, it is necessary to ensure that the state subsidies really enter the rural areas, fall into the real place, avoid the loss of funds, which requires the government to effectively regulate the part of the funds.

(2) To further improve the urbanization rate, to provide more abundant employment opportunities for the rural population to work in the city, and then increase the wage income of rural families to reduce the income gap between urban and rural areas. While restraining the excessive increase of urban residents' incomes, we should increase the income of rural residents, emphasize the common development of urban and rural areas, and take cities and towns with rural areas.

(3) Vigorously promote the development of agriculture, promote agriculture by science and technology, and increase the proportion of agriculture in Henan province. It will improve the living standard of farmers, raise farmers' income and narrow the income gap between urban and rural areas as a whole. We should increase the intensity of policy tilt and increase the corresponding public services in rural areas so as to truly benefit farmers.

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A Primary Exploration on the Super-network Model of Economic Development under the Restriction of Resources and Environment

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Abstract: With the theory of super-network and the variational inequality method, this paper establishes a super-network model of economic development in three aspects, builds a new indicator system for measuring economic development, and calculates the equilibrium conditions for the balance of economic development. Firstly, the economic development is divided into three parts: economic growth, ecological environment optimization and scientific and technological progress. Respectively, with the set of measuring indicators in three aspects as a point of super-network and the link between these indicators as a super edge, thus a super-network model is established. Secondly, the hierarchical variable clustering analysis method is used to analyze the tightness of the links among the nodes in the super-network; and the objective function is established by using the partial measurement index, which simplifies the model. Finally, the variational inequality and projection iterative algorithm are used to calculate the equilibrium condition of the whole model. The main conclusions in this paper are as follows: (1) The indicators of economic development are interrelated with each other. (2) It can contribute to the balanced development of the economy in satisfied certain conditions.

Key words: Super-network; Economic development; Clustering analysis; Variational inequality; Equilibrium condition

1 Introduction

In the current information age, the application of super-network theory has spread to various fields, and the introduction of mathematical related calculation methods has made the research of super-network gradually change from qualitative to quantitative, making the established model more scientific.The topology of the super-network is hypergraph, proposed by Claude Berge in 1970. He established the theory of undirected hypergraph systematically and defined the super-network with hypergraph. The vertices v_1, v_2, ..., v_n of the hypergraph form the set V, and the non-empty set e_i is used to describe the edge of the hypergraph, that is, the super edge, and the set of the super side is E, then the binary relationship H=(V, E) forms a super map (Claude Berge,1973). In addition, how to divide the complex network and the advantages and disadvantages of variational inequality algorithms remain to be studied. And how to more closely simulate the construction of objective functions is one of the issues that must be considered when applying this theory.

Initially, in the United States, the Ministry of Commerce calculated the GDP per capita to measure economic development. Later, the American association for overseas development proposed to ignore income and use the actual quality of life index including infant mortality, life expectancy and basic literacy rates in the same weight, which is a great progress compared to only GDP per capita to measure economic development. However, the income is neglected by this index reflection some respects such as the availability of goods and services. Hence, the United Nations Development Program built a Human Development Index (HDI) that also includes income considering health, knowledge and income per capita as factors contributing to measure the country's economic development. HDI adjusts the income per capita of countries by ignoring high incomes to emphasize the diminishing marginal utility of high-income levels. It indicates that higher incomes are not necessarily associated with higher living standards (Office UHDR,1998). However, the HDI measurement method includes the items and the manner they are given the same weight is not scientific, so it is not a perfect indicator.

In this paper, we focus on the three main aspects including economic growth, ecological environment optimization and scientific and technological progress in the various aspects of economic development, which have their own indicators. Since these indicators are closely interrelated to each other, the nesting relationship of the network can be analyzed by super-network theory. The purpose of this paper is to apply the super-network theory to the measurement of economic development, establish the index system and then use the variational inequality to study the equilibrium condition. The rest of the sections in this paper are organized as follows. Section II illustrates the model assumptions and descriptions. Section III describes the data and methodology. Section IV presents results of computation. And finally the paper is included in Section V.

2 Model Assumptions and Descriptions

The interrelationship between the indicators that measure economic development can be described by the network. In all aspects of economic development, this paper selects three main aspects of economic growth, ecological environment optimization and scientific and technological cultural progress. These three aspects have their own measurement indicators, and each indicator is related to each other. The nested relationship of the network including the network can be analyzed by the super-network theory, that is, the theory of super-network is used to analyze the measurement of economic development, and the relationship between each measurement index is described, so as to comprehensively analyze economic development. Then, based on the model establishment, the variational inequality is used to study the equilibrium condition.

The scope of economic development includes economic growth, economic structure optimization, people's living standards, the gap between rich and poor, ecological environment, sustainable development, technological progress and the development of civilization and other aspects. This paper focuses on three aspects consist of the economic growth, ecological environment and science and technology culture to measure, while assuming that these aspects of economic development are the decisive factors. These indicators are discussed in detailed as the following.

2.1 Economic growth

Generally, a country's economic growth is defined as the long-term increase in the ability to provide a growing variety of economic commodities for people, that is, an increase in economic output capacity.

The output capacity of the economy is determined by the factors of production and production technology, thus the capital, manpower, technology used and natural resources are the direct influencing factors (Mankun, 2000). In macroeconomics, the total expenditure is divided into four parts by expenditure: consumption, investment, government purchases and net exports, in which consumption is determined by income, investment is determined by interest rates, government purchases depend on government policies, net exports are directly related to the exchange rate (Xiang Rongmei, 1996). Therefore, GDP per capita, interest rates, government policies, exchange rates, investments and foreign trade can be used as a measure of economic growth. On the other hand, economic growth depends on savings, population growth, and technological progress according to the economic growth model of Solow (Solow, 2004). In addition, the economic growth capacity is affected by the economic structure (Liu Wei, 2008), so the proportion of the three industries to GDP is also one of the indicators that reflect economic growth. From the analysis mentioned above, there are a lot of factors that affect economic growth in the study of national economic growth, often with a series of described indicators. The most important of which are GDP, urban registered unemployment rate, the consumer price index, import and export trade, foreign exchange reserves, the total investment in fixed assets, the tertiary industry added value, disposable income per capita and the natural population growth rate. These indicators are labeled as $a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9$, the set of indicators is

$$A = \{a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8, a_9\}.$$
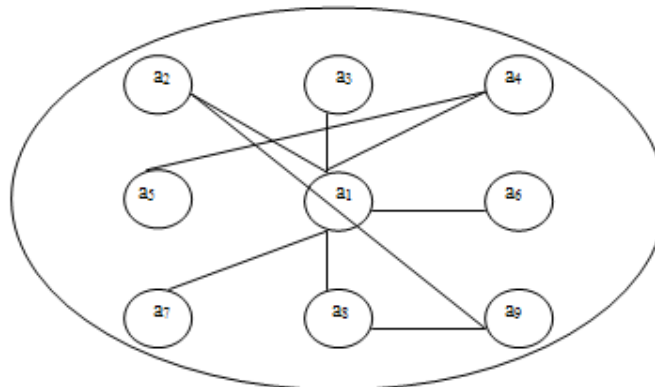
Figure 1   Indicator Network for Economic Growth

It is clearly shown that these indicators such as GDP, the natural growth rate of the population are not isolated but interrelated. Especially, there is a close relationship between the amount of import and export trade and foreign exchange reserves. In Okun's law, the change in GDP has a direct linear relationship with the unemployment rate. Concretely, the unemployment rate rises by one percentage

point while the growth of the real GDP is generally reduced by 2%. These relationships can be used to simulate the diagram, in which indicators act as the edge nodes, and the link presents the relationship between them, as shown in Figure 1.

2.2 Eco-environment optimization

With economic growth, the ecological environment problems tend to be more and more. Some countries blindly pursue GDP growth at the high expense of the environment, but this kind of way is clearly unsustainable for the economic development. In case of economic growth and environmental protection, we should also pay attention to the ecological environment optimization problem in the economic development.

The energy consumption per unit of GDP is a very common measure of eco-environmental benefits, and the negative impacts of economic growth on the environment are also reflections of economic development, such as industrial waste water waste and emissions, the number of environmental pollution and damage every year (Li Yongkui, 2010). The results of environmental protection are also the vane of ecological environment optimization. The investment in environmental management is determined by the degree of environmental damage and the factors that determine environmental protection and effectiveness. The treatment efficiency of the industrial emission determines the quality of air quality; forest coverage is also a scale; the establishment of nature reserves has played a significant role in the protection of ecological diversity; the use of clean energy has significantly reduced the traditional industry the pollution.

The ecological environment optimization index system can be expressed by

$$B = \{b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8\}$$
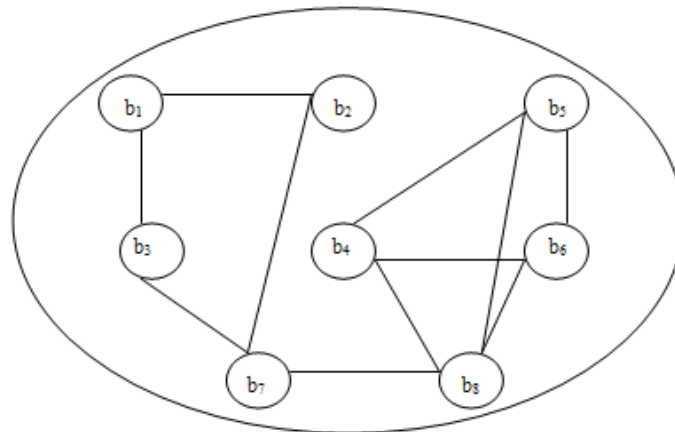
Figure 2   Eco-environment Optimization Indicators Network

Where b_1, b_2, b_3, b_4, b_5, b_6, b_7, and b_8 are the total energy consumption per unit of GDP, the total amount of industrial exhaust emissions, the rate of industrial wastewater discharge and the total area of afforestation, the total area of nature reserves, the total investment in environmental pollution control, the investment of industrial pollution control and the number of environmental pollution and destruction, respectively. Similarly, the topology can be used to approximate this relationship, as shown in Figure 2.

2.3 Technological and cultural progress

The progress of science and technology is to bring people more convenient production and lifestyle. Therefore, the production efficiency continues to improve. Obviously, the use of new materials and technology to reduce environmental pollution is more efficient economic development. In addition, cultural progress is the improvement of the quality of social civilization, spiritual civilization and material civilization is equally important.

In the actual production, the progress of science and technology is often reflected in the emergence of new products (Li Zibiao, 2006). The output value of new products is higher and higher in the whole industrial production value which to a certain extent reflects the welfare the production process of technological progress for people. The proportion of research inputs in GDP has affected the number of research projects, and the innovations by scientific research determine the species and quantity of new products adopted. The proportion of new products reflects the speed of scientific and technological progress. Research and development projects (R&D) expenditure and the number of employees in R&D reflect the degree of attention on the pursuit of scientific research and development progress. From the

aspect of cultural progress, education has a direct effect, so the proportion of cultural industries in GDP and the proportion of investment in education can be used to measure the development of culture Hence, the development of education is reflected in a series of indicators such as adult literacy rate, school-age children enrollment rate, the quality of enterprise employees, per capita education and etc.

The collection of scientific and technological progress indicators as
$$C = \{c_1, c_2, c_3, c_4, c_5, c_6, c_7, c_8, c_9\},$$
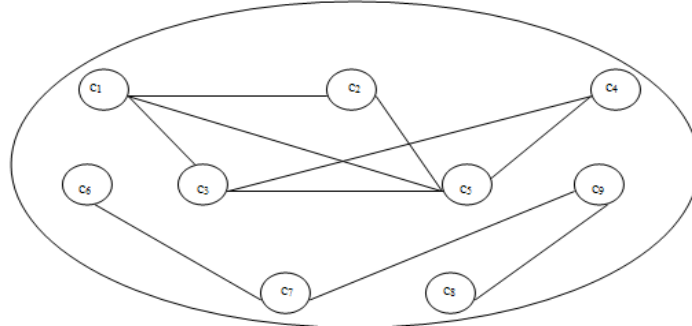
Figure 3   Scientific and Technological Progress Indicator Network

Where c_1, c_2, c_3, c_4, c_5, c_6, c_7, c_8, c_9 are the output value of new products, R&D funds internal expenses, R&D staff full-time equivalent, the technical market turnover, the number of scientific and technological achievements, cultural institutions, the total income of the performing arts group, school-age children net enrollment rate and education funding, respectively. The topological structure is shown in Figure 3.

2.4 Economic development super-network model

The measurement of economic development can be carried out mainly from three aspects: economic growth, ecological environment optimization and technological and cultural progress. These three aspects measure economic development from different angles and have a certain relationship between them and each other. The above three indicators are discussed separately, and these indicators and the linkages between them are now used to establish a super-network model for measuring economic development. As mentioned above, we discuss the three index systems, and we now use these indicators and the link between indicators to establish a super-network model to measure economic development.

From the perspective of economic development, this network can be used to construct a super-network. The economic development super network can be expressed as: $G = (V, E)$, where V is the set of nodes, and V = {A is the set of nodes of economic growth index, B is the set of nodes of ecological environment optimization index, C is the set of nodes of scientific and technological progress indicators, E is the set of edges, and $E = \{E_{A-A}, E_{A-B}, E_{A-C}, E_{B-B}, E_{B-C}, E_{C-C}\}$. Topology of the super-network is called hypergraph. It can use a plan to simply simulate the hypergraph, as shown in Figure 4.
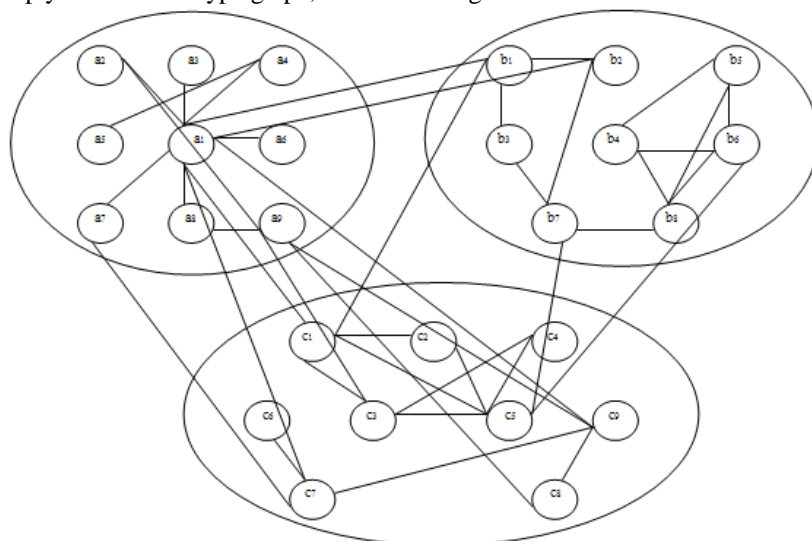
Figure 4   The Hypergraph Model Preliminarily Simulated of the Economic Development Index System

3 Data and Methodology

In the following, mathematical relations will be used to quantify the relationship between the strengths and weaknesses of these links in a more scientific way. Firstly, the quantitative analysis is carried out by using the statistical software to obtain the core indicators and the tightness of the links between the indicators, namely the cluster analysis. Then variational inequality is used to study the equilibrium conditions the model should meet.

3.1 Cluster analysis

There are total 26 indicators in the super-network model for economic development, and the degree of affinity among the indicators is different. When all the variables are taken into account to measure the economic development, the workload is too large and inefficient. Therefore, we can use cluster analysis method to select the core indicators with the tightness among indicators as a standard for further study. Cluster analysis is usually done by using statistical analysis software, thus, the SPSS software is used in this paper. With economic variables processed, they become indicators that can be compared to each other without a scale. To reflect the status of economic development fully, the annual growth rate index of each indicator is adopted. The calculation method is as follows: the index of this year's growth index = this year of the index value / index value of the previous year×100). The value of indicators from year 2004 to year 2015 can be found in the Chinese statistical yearbook. According to the calculation method above, the data can be processed to the growth index of 26 indicators in the ten years from 2005 to 2015, and then can use statistical software to analyze the data to achieve clustering.

From the third cluster analysis, it can be seen that the highest correlation between the other variables is the five variables in the first category as the following: a_1 (GDP index), a_3 (consumer price index), a_7 The three-industry added value index), a_8 (per capita disposable income index) and c_9 (education expenditure index), these variables are closely linked to each other, therefore, they are the most important indicators of economic development in the measurement; followed by higher correlation b_2 (total emissions of industrial emissions), c_4 (technical market turnover index), c_8 (net enrollment rate of school-age children) in category 2.

Table 1   The First Cluster

Cluster Membership

Case	3 Clusters
A1	1
A2	2
A3	1
A4	1
A5	1
A6	3
A7	1
A8	1
A9	3
B1	1
B2	1
B3	2
B4	2
B5	2
B6	1
B7	1
B8	3
C1	1
C2	3
C3	3
C4	1
C5	3
C6	1
C7	1
C8	1
C9	1

Table 2   The Second Cluster

Cluster Membership

Case	3 Clusters
A1	1
A3	1
A4	2
A5	2
A7	1
A8	1
B1	3
B2	1
B6	1
B7	2
C1	2
C4	1
C6	2
C7	1
C8	1
C9	1

Table 3   The Second Cluster

Cluster Membership

Case	3 Clusters
A1	1
A3	1
A7	1
A8	1
B2	2
B6	3
C4	2
C7	3
C8	2
C9	1

Table 4   Similarity Matrix for the Third Cluster
Proximity Matrix

Case	Matrix File Input									
	A1	A3	A7	A8	B2	B6	C4	C7	C8	C9
A1	.000	.423	.908	.740	.497	.237	.184	-.021	.515	.361
A3	.423	.000	.303	.829	.085	.617	.606	.180	.618	.515
A7	.908	.303	.000	.659	.402	.055	-.065	-.260	.288	.546
A8	.740	.829	.659	.000	.093	.623	.349	.139	.425	.644
B2	.497	.085	.402	.093	.000	-.019	.478	.282	.570	.139
B6	.237	.617	.055	.623	-.019	.000	.601	.654	.338	.456
C4	.184	.606	-.065	.349	.478	.601	.000	.656	.709	.269
C7	-.021	.180	-.260	.139	.282	.654	.656	.000	.357	.101
C8	.515	.618	.288	.425	.570	.338	.709	.357	.000	.100
C9	.361	.515	.546	.644	.139	.456	.269	.101	.100	.000

After the division of 26 indicators, it is possible to simplify the model. Namely, ignoring the indicators in Part III, we only consider the eight indicators in the part I and part II, and keep these important indicators as the core indicators of economic development.
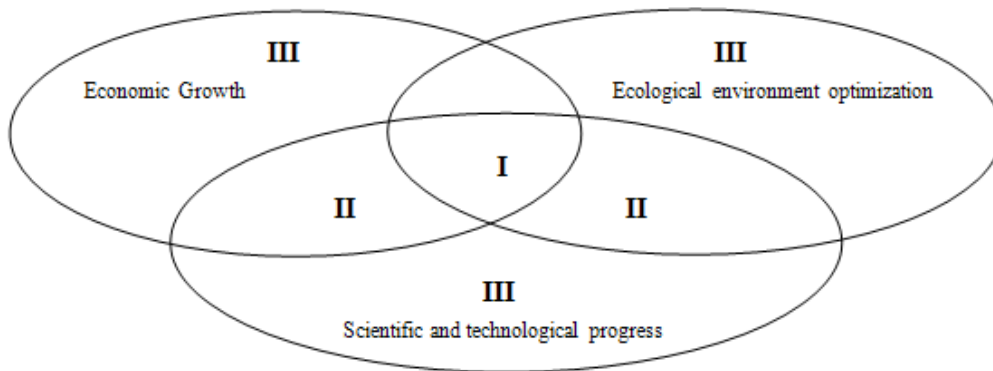
Figure 5   Simplified Model after Cluster Analysis

（Which I, including a_1, a_3, a_7, a_8, c_9 five indicators; II, including b_2, c_4, c_8 three indicators; III, including other indicators）

3.2 Objective function of the model

From the established super-network model of economic development measurement indicators, we can analyze the objectives of economic development from various indicator systems. When analyzing the objectives of economic development from three aspects: economic growth, ecological environment optimization, and scientific and technological cultural progress, each part should achieve coordinated development to achieve the optimization of the entire system, that is to achieve the most favorable economic development under the existing resource constraints while achieving the goal of optimizing their respective development by realizing the game trade-offs of economic growth, ecological environment and scientific and technological cultural progress. In the results of cluster analysis, the model is simplified to a system with only eight indicators by considering a_1, a_3, a_7, a_8 in economic growth, b_2 in the aspect of ecological environment optimization, and c_4, c_8, and c_9 in scientific and technological progress.

So we can get the objective function of the economic growth maximization as followed: Max $f(a_1, a_3 - p_0, a_7, a_8)$.

It can write the objective function to optimize the ecological environment: Min $g(b_2)$.

We can get the objective function to maximize the scientific and technological progress: Max $h(c_4, c_8, c_9)$.

The objective function maximizing the economic development can be obtained by the objective function maximizing the three aspects above:

$$\text{Max } \lambda f(a_1, a_3 - p_0, a_7, a_8) - \mu g(b_2) + \eta h(c_4, c_8, c_9)$$

Which, λ , μ , η , represent the weight of contributions the three parts making in the economic development.

The objective function maximizing the economic development obtained in the above can be transformed into the variational inequality form:

$$
\left(\begin{aligned}
&\sum_{i=1,3,7,8}[\mu\frac{\partial g(b_2)}{\partial a_i}-\lambda\frac{\partial f(a_1,a_3-p_0,a_7,a_8)}{\partial a_i}-\eta\frac{\partial h(c_4,c_8,c_9)}{\partial a_i}]\times(a_i-a_i^*)\\
&+\sum_{j=2}[\mu\frac{\partial g(b_2)}{\partial b_j}-\lambda\frac{\partial f(a_1,a_3-p_0,a_7,a_8)}{\partial b_j}-\eta\frac{\partial h(c_4,c_8,c_9)}{\partial b_j}]\times(b_j-b_j^*)\\
&+\sum_{h=4,8,9}[\mu\frac{\partial g(b_2)}{\partial c_h}-\lambda\frac{\partial f(a_1,a_3-p_0,a_7,a_8)}{\partial c_h}-\eta\frac{\partial h(c_4,c_8,c_9)}{\partial c_h}]\times(c_h-c_h^*)
\end{aligned}\right)\geq 0 \tag{1}
$$

3.3 Projection iterative algorithm

At present, there are three main methods for solving the variational inequality. They are projection algorithm, non-smooth equations and smoothing method. The projection algorithm is a simple algorithm that relies mainly on the projection iteration $x^{k+1}=P_{\Omega_k}(x^k-\alpha_k d_k)$, which Ω_k is the convex set containing X, d_k is the search direction, $\alpha_k>0$ is the step, $P_{\Omega_k}(\cdot)$ is the vector x to the projection on the set Ω_k, that is $P_{\Omega_k}(x)=\arg\min\{\|x-y\|,y\in\Omega\}$.

A typical modified iterative method with an initial solution in a feasible domain is commanding $x^{k+1}=P_{\Omega_k}(x^k-\alpha F(\overline{X}^k))$, where $\overline{X}^k=P_{\Omega_k}(x^k-\alpha F(x^k))$; α is a positive number.

We present the steps to solve the variational inequality by this method:

Step 1: Suppose $X^0\in K$, and command $0\leq\alpha\leq\frac{1}{L}$, Where L is the Lipsets constant, k is the number of iterations, and k = 1

Step 2: Iterative calculations. First calculate $(\overline{a}_1^k,\overline{a}_3^k,\overline{a}_7^k,\overline{a}_8^k,\overline{b}_2^k,\overline{c}_4^k,\overline{c}_8^k,\overline{c}_9^k)\in K$,so that:

$$
\left(\begin{aligned}
&\sum_{i=1,3,7,8}\overline{a}_i^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial a_i}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial a_i}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial a_i}]-a_i^{k-1}\}\times(a_i-\overline{a}_i^k)\\
&+\sum_{j=2}\overline{b}_j^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial b_j}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial b_j}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial b_j}]-b_j^{k-1}\}\times(b_j-\overline{b}_j^k)\\
&+\sum_{h=4,8,9}\overline{c}_h^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial c_h}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial c_h}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial c_h}]-c_h^{k-1}\}\times(c_h-\overline{c}_h^k)
\end{aligned}\right)\geq 0 \tag{2}
$$

And then through the iterative calculation $(a_1^k,a_3^k,a_7^k,a_8^k,b_2^k,c_4^k,c_8^k,c_9^k)\in K$, so that:

$$
\left(\begin{aligned}
&\sum_{i=1,3,7,8}a_i^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial a_i}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial a_i}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial a_i}]-a_i^{k-1}\}\times(a_i-\overline{a}_i^k)\\
&+\sum_{j=2}b_j^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial b_j}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial b_j}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial b_j}]-b_j^{k-1}\}\times(b_j-\overline{b}_j^k)\\
&+\sum_{h=4,8,9}c_h^k+\alpha[\mu\frac{\partial g(b_2^{k-1})}{\partial c_h}-\lambda\frac{\partial f(a_1^{k-1},a_3^{k-1}-p_0,a_7^{k-1},a_8^{k-1})}{\partial c_h}-\eta\frac{\partial h(c_4^{k-1},c_8^{k-1},c_9^{k-1})}{\partial c_h}]-c_h^{k-1}\}\times(c_h-\overline{c}_h^k)
\end{aligned}\right)\geq 0 \tag{3}
$$

Until the given $\varepsilon>0$,satisfies $|a_i^k-a_i^{k-1}|\leq\varepsilon,|b_2^k-b_2^{k-1}|\leq\varepsilon,|c_j^k-c_j^{k-1}|\leq\varepsilon$,where i=1,3,7,8;j=2; h=4,8,9, The convergence of the solution of the variational inequality is achieved and the loop is exited; otherwise, let $k=k+1$, return to step 2 to iterate.

4 Results of computation
4.1 Solution of the model

The final solution of the model can be obtained by the existence of the uniqueness of the solution and the iterative algorithm that using to solve the variational inequality.

$$\overline{a}_i^k = a_i^{k-1} - \alpha [\mu \frac{\partial g(b_2^{k-1})}{\partial a_i} - \lambda \frac{\partial f(a_1^{k-1}, a_3^{k-1} - p_0, a_7^{k-1}, a_8^{k-1})}{\partial a_i} - \eta \frac{\partial h(c_4^{k-1}, c_8^{k-1}, c_9^{k-1})}{\partial a_i}](i=1,3,7,8) ;\quad (4)$$

$$\overline{b}_2^k = b_2^{k-1} - \alpha [\mu \frac{\partial g(b_2^{k-1})}{\partial b_2} - \lambda \frac{\partial f(a_1^{k-1}, a_3^{k-1} - p_0, a_7^{k-1}, a_8^{k-1})}{\partial b_2} - \eta \frac{\partial h(c_4^{k-1}, c_8^{k-1}, c_9^{k-1})}{\partial b_2}] ;\quad (5)$$

$$\overline{c}_j^k = c_j^{k-1} - \alpha [\mu \frac{\partial g(b_2^{k-1})}{\partial c_j} - \lambda \frac{\partial f(a_1^{k-1}, a_3^{k-1} - p_0, a_7^{k-1}, a_8^{k-1})}{\partial c_j} - \eta \frac{\partial h(c_4^{k-1}, c_8^{k-1}, c_9^{k-1})}{\partial c_j}](j=4,8,9) ;\quad (6)$$

4.2 Description of the results

In the above mentioned, equation (4) is the condition that indicators of economic growth should solve, equation (5) is the condition that the indicators of the ecological environment should satisfy, and equation (6) is the condition that the indicators of science and technology culture should meet. While satisfying (4) (5) (6), we can achieve the goal of balanced development of the whole economy.

In the equilibrium conditions obtained above, we can see that economic development should be balanced and optimized. The indicators must be coordinated with each other, which are the same as that envisaged before establishing the model objective function, and is consistent with the original intention of building the model on the basis of the interrelationship between indicators. This means that the maximization of the objective of the economic development objective determines that the purpose is not to maximize the economic growth, the optimization of the ecological environment, and the advancement of the culture of science and technology, but to maximize the coordination of the overall objective function, which may be contrary to the maximization of a particular aspect, but through the coordination of the overall optimization can be achieved, that is, some of the best is not necessarily the overall optimal, and the overall optimal is not necessarily which contains all the parts of the optimal.

4.3 Equilibrium in change

In (4) (5) (6) the formula is the balance conditions of optimal economic development, in fact, in these conditions it can also see how other indicators to change accordingly to achieve the new equilibrium when a particular indicator changes, that is, to achieve the balance problem in the changes of the model.

Consider the change in gross national product (a_1), assuming that the change of a_1 is m (the increase is positive and the decrease is negative, only the increase is considered, the decrease is the opposite trend, that is, m is greater than 0), a_3, a_7, a_8 will be a corresponding increase seen from the (4), b_2 will increase seen from the (5), c_4, c_8, c_9 will be a corresponding increase seen from (6), but the degree of increase due to the relevancy of a_1 in the index system respectively, the greater the impact of the indicators the greater the impact.

This means that the indicators of economic growth, ecological environment and science and technology coordinate with each other under the constraints of economic development optimization, and the degree of mutual influence between the indicators is determined by partial derivative of the function, that is, by the interconnection between the degrees of tightness of indicators.

Therefore, we can analyze the influence of mutual restraint or interrelations on other aspects when the policy affects one aspect based on this super-network model, and combine with the correlation matrix between the economic indicators obtained in the cluster analysis. It is also possible to analyze the conditions that must be met in all other aspects when a goal of a particular economic development is achieved. In addition, it can also analyze how the other indicators should be changed to ensure the ultimate achievement of economic development when an indicator changes.

5 Conclusion

In this paper, the super-network theory is applied to the measurement of economic development, so as to study the super-network model of economic development measure. Firstly, the complex system with multiple indexes is simplified by cluster analysis, and only important factors are studied. Secondly, the objective function is established according to the contribution degree of each index. Finally, the maximization problem of objective function is analyzed by variational inequality.

Theoretical contribution and practical significance of the conclusions: In theory, a measurement index system is established to improve the one-sided deficiencies of the single indicator with the application of super-network theory in the measurement of economic development, thereby further expanding its research field. Finally, the results of the model analysis are used to propose corresponding policy recommendations for macroeconomic operation. In reality, a new indicator system for measuring

economic development is proposed. This is not a denial and substitution of GDP, but a promotion and improvement of it. It is to build a new indicator system to make up for the shortcomings and defects of the existing GDP. This is not only an inevitable requirement for the new era of ecological civilization and the construction of socialist ecological civilization, but also provides a new way for the government to evaluate economic development.

The super-network model of the economic development measure established in this paper is only preliminary, and there are still many aspects to be studied further in the future. Finally, how to give the weight more reasonable, that is μ, λ, η, the objective functions of this article, so that the objective function is more realistic economic life is also a problem to be solved.

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Sustainable Logging Management in the Brazilian Amazon Forest: Local Responses to Global Challenges

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Abstract: This paper discusses the sustainable forest management plan in Brazilian context. The theory shows that is relevant in the development of local policies with global impact. These are factors that have been widely promoted by the international community and the mechanism to combat amazon deforestation. This research utilized was the methodological approach of qualitative method and the data collection was through semi-structured interviews, observation and document analysis. We conclude that integration between actors (government, manager forests resource and community) is important for positive results in sustainable environmental.
Key words: Deforestation; Management forest; Brazilian.

1 Introduction

Local crises are of concern to all part the word today. Each region presents specific local problems, but these problems have an impact on a large scale (Ostrom, Burger, Field, Norgaard and Policansky, 2009). The case of problems with the management of forest resources is more serious because the problem is not local; the impact is global (García-Ruiz, López-Moreno, Vicente-Serrano, Lasanta–Martínez and Beguería, 2011). Fearnside (2012, p. 70) states that the Brazilian "Amazon rainforest provides an important environmental service with its storage of carbon, thereby reducing global warming".

Many are the causes of Amazonian deforestation, but logging has relevant participation (Pires and Costa, 2013). Brazilian Legal Amazon has about 5 million square kilometers, occupying approximately 59% of the national territory. It has 510 million hectares of vegetation cover equivalent to one third of the Tropical Forests of the world and approximately one billion cubic meters of sawn wood of high quality that could be worth trillions US dollars (Amin, Motel, Combes, Kere, Olinga and Schwartz, 2014). The rich biodiversity of the Amazon rainforest may be scaled evaluating each hectare of forest. It is estimated the presence of 150 species of trees, which corresponds to an average total biomass is 300 tons / ha. The species are commercially usable only 6 to 10 trees / ha, or wood volume ranging from 20 to 50 m³. The rational forestry takes 10% of the trees (Amin et al, 2014).

Therefore, the administration of the forest to obtain economic, social and environmental benefits must respect the mechanisms sustaining ecosystem with forest management (Brazilian Law 11.284/2006). Is necessary to the preservation of the Amazonian biome and define a boundary between natural resources that should remain untouched and management areas that can generate economic and social benefits for the region (Ministry of the Environment, 1998).

Management of sustainable production in Tropical Forests is a way to keep the main environmental functions of forests. But is the issue of forest management only was importance after the publicity of the acts of imports of unsustainably produced timber (i.e. TV, scientists, Internet, and others actors). Forest management for multiple uses means the administration of an area with forest cover, with different use purposes (e. g. the protection of watersheds and watercourses, recreation, scenic beauty) and maintenance of habitat for wildlife, including logging production (Robinson, 2013).

This study indicates that a solution is a set of elements based on interactions among the actors involved. Furthermore, the positive nature of collaboration between the actors that control and use the forests resources is solution for best outcomes. Nevertheless, previous studies on solutions have not focused exclusively on investigating the involvement of the professional administrator in the management of forest resources and adoption of forest concessions policy how viable alternatives. Therefore, the issues in the interplay of relationships between actors (i.e. private administrator of forests and government or legal agents) are few explored.

To address this gap, this paper show that is possible in solution networks of actors integrate resources in interaction to develop solutions in the forest resources, and identify the related benefits for

the two or more part involved . The theoretical point of departure for the study is that interaction between actors and the resource integration is the primary characteristic successful in the management of forest resources.

2 Professional Administrator in the Management of Forest Resources

The science of management has how characteristic the participation of several areas in your structure of formation (transversal) (Taylor, 1911). Actually the administrators have work in positions of quite unusual sectors, including forests manager (Regi, Schuch, Gomes and Kneipp, 2014). The professionalization of managers of parks and forests is essential for the conservation and proper use of natural resources (Mulkey and Day, 2012). Basso et al. (2011, p. 160) claim that other aspect important in this process is the forest certification. It forces managers to seek qualification to meet the requirements of certifying agencies and governments. The contribution from the professional administrator in this process is important in preservation of the environment, the social contribution to local communities (native) and economic development (Roberts and Gilliam, 1995).

Thus, the role of the forests manager may include educator, technician, mediator, conflict manager, public relations and others competencies. In the relationship collaborative among managers, scientists, government agents and the public general to address the institutional barriers and incentives to local strategies for forests management can be the solution for global problems. This important role for manager (administration) of resources environmental in a bridge for conflict solutions of interest in different objectives (i.e. social, economic and environmental, state, local community, legal policies, private sectors) (Cortner, Wallace, Burke and Moote, 1998; Danielsen, Skutsch, Burgess, Jensen, Andrianandrasana, Karky, and Zahabu, 2011).

Back Office
Activity planning and control in the extraction of trees;
Sales and evaluation of results;
Administration of internal teams;
Learning about new technologies, knowledge and legislation;
Zoning and categorization of trees in managed forest areas;

Integration Solutions
Evaluate the best strategies to lower impact on the consumption of resources and implement measures for the revitalization of forest resources in the long run;

Interaction Area
Relationship with the community, governments and researchers;
Negotiating with environmental groups and unions worker;
Dialogue with banks and lenders;
Present results proving the preservation of forest resources in the extraction of trees in forest management;

Figure 1   Activity Manager Forests Resource

For this reason, multiple competences and roles may be needed of forests manager professional. Your mission is to work with balance at different context and diverse people through internal activities (office) and externals (in locus - forests and community native) (Nijnik and Bizikova, 2008). But, your contribution big is the ethical work, transparency in action, dialogue with local institutions and global commitment , decision, planning for future with base in actions relevant for next generations (Sewpaul and Jones, 2005). This work to can divides in three independent areas (back office, interaction between stakeholders and integration solutions), but integrated by collective and social interests.

Then, notes (figure 1) that the work of the forests manager has a key role in the balance between the use of natural resources and environmental conservation. Its function is to establish connection with the various sectors of society in order to promote sustainability in the conscious use of renewable natural resources and non-renewable.

3 Adoption of Forest Concessions Policy in Brazil

The sustainability of management brings the assurance quest for continuous improvement of the systems used and the development of new systems, considering the high number of variables found in

Amazonian forests (IMM 2002; Amin et al, 2014). The plan for sustainable forest management refers to the management of the forest to obtain economic and social benefits, respecting the mechanisms sustaining ecosystem. This definition shows that to be sustainable it must be economically viable, environmentally sustainable and socially just (IBAMA, 2013; Amin et al, 2014).

At this point, it should be noted that the Legal Amazon is divided into western and eastern Amazonia. The Western Brazilian Amazon consists of the states of Acre, Amazonas, Rondônia and Roraima, having total area of 2.18 million square kilometers, equivalent to 42.8% of the Brazilian Amazon area and 25.6% of the national territory. The eastern Amazonia consists of the states of Pará, Maranhão, Amapá, Tocantins and Mato Grosso, with an area of about 3.0 million km2

The history of commercial logging in the Amazon has more than three hundred years. Since the sixteenth century, hardwoods were removed from the forests nearby riverbanks and exported in logs for European metropolises. There was no legal protection for the forests in the extraction of trees. That changed because the operation plans of extracting trees must conform to the norm of the State Decree No. 12,447 of October 10, 2006 (Based on CONAMA Resolution No. 406 and Ordinance 186).

Rondônia is one of the Brazilian states that more deforestation. It is the fourth-ranked (Pará, Mato Grosso, Maranhão and Rondônia). However, in proportional terms Rondônia had greater deforestation. Among the identified key factors that contributed to growth of deforestation in the state are: the opening of roads, infrastructure investments, growth of cattle, expansion of mechanized agriculture, the timber industry migration to frontier areas, land grabbing and lack land regularization[1].

The Government intends to tackle this problem through the Plan for the Prevention, Control and Alternatives to Deforestation in Rondônia. The aim is gradually reduce deforestation in Rondônia State. He wants that in year 2015 the indicators of annual increment is zero. The plan is organized into four themes: spatial planning and land regulation, encouragement for sustainable production, command and control actions to prevent deforestation and capacity building for decentralization of environmental management. The Government will use as strategy development social inclusion, integrating society, economic actors and politicians (data analysis of documentary research).

Studies IMAZON-Institute of Man and Environment in the Amazon shows that in the years 1998 to 2004 there was a fall in consumption of raw material (logs trees) in the Amazon region. The reasons identified were intensifying enforcement against illegal logging and the cancellation of hundreds of the management plan in 2003 for reasons of irregularity. However, survey data from Mercoeste / SENAI-2005 show that players of low production and development of Forest Bases industry factors could be reduced in the short term. The segment demonstrates positive trend to expand its participation in the regional economy and has the potential to expand their participation in markets.

4 Local Solutions for Global Benefits

The main objective of the Brazilian Federal Government to the policy of forest concessions is to conserve the green cover of forests by improving the quality of life of people living in its surroundings and stimulating the formal economy with products and services from managed forests. The Law of Public Forest Management (Law 11.284 / 2006), which established the Forest Service, created the possibility of concession of public forests[2].

The government can grant companies and communities the right to manage public forests to extract trees and provide tourism services. The counterpart to the right of the sustainable use is the payment to the government of amounts that vary according to the price proposal submitted during the bidding process. The forest concession policy allows federal, state and local governments to manage their forest assets in order to combat the invasions of public lands for the predatory exploitation of existing resources (e.g. livestock and agriculture). The contracts only allow obtaining the forest resource by the techniques of forest management and reduced impact logging. The forest granted remains standing and is used in a rotation system that allows continuous and sustainable timber production. Only four to six trees per hectare are removed and the return to the same area will occur every 30 years.

Municipalities and communities neighboring the concession area being favored by generating jobs,

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[2] Brasil. Ministério do Turismo. Turismo Sustentável e Alívio da Pobreza no Brasil: Reflexões e Perspectivas. Brasília, 2005. Disponível em: <http://Www.Slideshare.Net/Melfigueredo/Turismo-Sustentvel-E-Alvio-Da-Pobreza-No -Brasil>. Acesso em 19 de junho De 2013.

investment in services, infrastructure, financial returns arising from the payment for the products that have been granted and benefits guaranteed by the concession contract. All citizens could benefit with the conservation of forest resources and the certainty of buying products that respect the forest. The concession agreement prohibits access to genetic resources, the use of water resources, exploitation of mineral resources, fisheries or wildlife and commercialization of carbon credits. The ownership of the land remains with the government throughout the concession period and the buyer receives the right to conduct forest management in the area. Law 11.284 / 2006 is the legal framework for the realization of the concessions. It is describing how the process that involves the lifting of the concession areas suitable for the preparation of the notice, public hearings with the population and monitoring the activity occurs.

Table 1   Local Solutions for Global Benefits

Standard	Factor	Group (Local/Global)
Environmental impact	Monitoring of growth dynamics and forest recovery.	Local and Global
	Reducing damage to the remaining forest during harvesting.	Local and Global
	Investments in infrastructure and services for the local community.	Local
Direct social benefits	Generation of local jobs	Local
	Employment generation of forest concession	Local
	Diversity of products exploited in the management unit (Consumption and exports)	Local/Global
Efficiency	Diversity of exploited species in the management unit (Consumption and exports)	Local/Global
	Diversity of services operating in the management unit	Local
Adding value	Degree of local processing the product	Local/Global

5 Methodological Approach

The methodological approach, empirically based, was through qualitative research, descriptive typology; with application of the case study. The focus of this study is to explore management sustainable logging in Brazilian Amazon Forests: local responses to global challenges. The methodological approach was through qualitative research, descriptive typology; with application of the case study how empirical based. The focus of this study is to explore management sustainable logging in Brazilian Amazon Forests: local responses to global challenges. The study has been carried out during 2013-2014 when 13 personal interviews were carried out with representatives from both sides of the dyad (government agents and forests private manager).

Additional data was gathered through participant observation and document analysis. The time span of the case is about nine months, from September 2013 to May 2014. The data has been analyzed through content analysis of the interview transcripts. The analysis has been ongoing since the first interview. Partial participant observation has been an important way to gather data. This has been possible due to good access to the case. The adductive research process used enables to go back and forth between theory and practice as the research process evolves. The research method applied can be defined as a qualitative, exploratory case study. This choice rules out direct applicability on other country. However, this choice allows the researcher to go deeper into the subject and explore something new and unique.

6 Data Analysis

This section is divided into three parts. The first part presents a synthesis of the content analyzed the interviews, the second part presents the photographic records of the work locus of observation and, finally, to analyze documentary. A summary of the discussion containing the interview analysis may be seen in Table II. The table includes four theses about sustainable management of forests, which according to our analysis provide an understanding of the important process of preserving forests.

These are focal issues in management sustainable logging. Furthermore, they offer a help for researchers and practitioners to understand the various roles of important actors in value for local and global action of Amazon forest preservation and to analyze opportunities for professional manager beyond its conventional borders (professional new sector).

The contemporary literature emphasizes the role of manager in preservation forests. It also stresses the importance of interaction with others actors (government, community, certificate organs, researchers

and scientists, legal system). From an environmental point of view, this means that human elements are the focus. Consequently, as the first thesis implies, the goal for the low environmental impact is to support the decision and action of use coordinated and controlled resource in forests explore.

Table 2 Synthesis of the Content Analyzed the Interviews

Theses	Comments
The goal for sustainable management of forests support the lower impacts environmental;	When there is control by the government; an educational system aimed to raise awareness of the value of preserving the environment; the local community realizes the value of forest resources for subsistence get without destroying, the degradation impacts are smaller. The professional manager of public forests has an important role in all these local actions have global scope.
The sustainable management of forests is a global responsibility;	The natural resources of the forests are removed to be consumed by distant buyer extraction area. When local communities understand the value of the forest, they act as protectors against degradation scale. Thus, even if the buyer wants to buy without knowing the origin, the native community avoided the removal of the forest well into the illegal sale.
The local effects of the sustainable management of forests can be achieved globally;	The results of preserving forests positively affect the global climate, preserves the symbiosis of fauna and flora, allows the use of renewable resources with global distribution, creating new forms of interaction between people (ecological tourism) and provides hope for continuity of the planet.
The positive effects of sustainable management of forests are perceived in economic, social and environmental determinants.	The community must work and incomes, the industry can use without destroying the environment that renews its resources for future use (as photographic records).

The Figure 2 show the community inserted in place forest work with sustainable management. The effect of employment generates dignity of life and improved the health and education through professional engagement.

Figure 2 Field Staff

Forest is mapped and selected the trees that can be removed. The spaces left by trees harvested favors the development of new trees by inserting the sunlight and forest regeneration is faster when there is no disorderly devastation. The government issues and environmental certification makes police surveillance, but the main tax is the community that may or may not report irregularities.

Figure 3   Measurement to Harvest Trees

Documentary analysis demonstrates that the private manager of public forests has an obligation to comply with legislation. When errors are found is criminally punished and must indemnify the State. However, was observed during the interviews that there are still many gaps in oversight. The main problem is the amount of police for surveillance.

Figure 4   Environmental License

Each property has geodesic mapping. It serves to state control of compliance with legal obligations. It is also a security administrator for the forest resource.
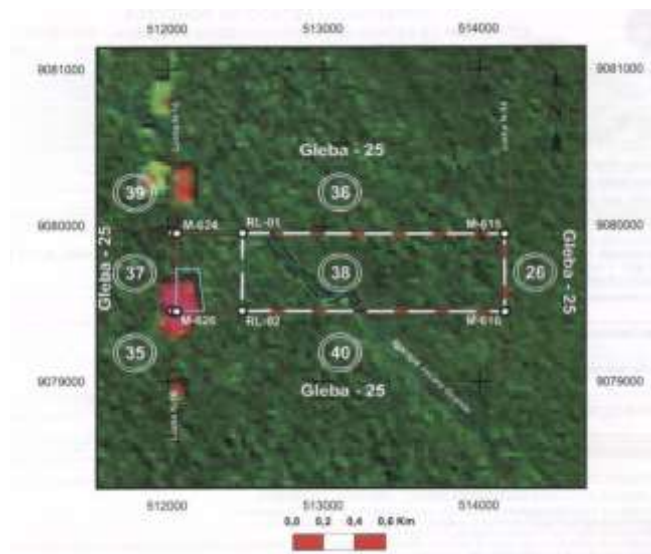
Figure 5 Geodesic Mapping

Our approach is managerial, and in a forest resource context, we study the relation between professional manager and control of forests resource in study analysis. To be able to understand and manage the forests resource the manager need integrated effort together community and government agents for to get the goal of preserve the environment.

This means, as implied by the third thesis, that the sustainable management of forests is a global responsibility. This conclusion is important because it makes it possible to first analyze the role of the government as legal provider in a context of forest protection. This is in line with the underpinning understood of the management perspective, because the manager has a duty to contribute to the environmental protection compliance process. Second, a distinct meaning of concept participative manager in protection environmental may be developed.

7 Conclusion

We conclude that the issues can be resolved through integration between government policies (legislation, control and punishment for irregularities) and developed competencies in the management of forests. The local community plays have important role in preserving and monitoring of legal compliance. When all stakeholders are involved in the same goal is easier to preserve the environment and used of natural resources in a forests.

Note that the environmental preservation of forests is based on a set of elements that are cared for by governments, administrators and community. Each actor plays a role in the expected results and only with the alignment of roles and commitment to the individual responsibilities can to preserve forest resources. When results are achieved all of humanity and the planet has benefits. Therefore, no matter if the forest is in America, Asia or Europe, because the planet will always win with the best environmental outcomes generated by human protection to the natural resources of forests.

The predation modifies the structure of forests with changes in land use. Forest management is the instrument recognized worldwide as a mechanism capable of maintaining tropical forests sustainably. For it is necessary for surveillance, monitoring, research, dissemination of knowledge and incentives of the various spheres of society and the government to adopt continuously.

With the implementation of forest concessions, the supervision and monitoring are the weakest elements of the system. Need a strong action in education and responsiveness of local people (government officials, administrators, and community) with the goal of not compromising sustainability forests under concession. Therefore, the limit for illegal logging is of paramount importance in order to reduce deforestation and increase the competitiveness of wood originated from areas under forest management. At this point the administrator of forest management plans can contribute to the development of integrated solutions with government and the community.

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Research on Discovery of Urban Waste Crisis Transformation Path Based on Bayesian Evolution

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Abstract: The continuous development of society brings great benefits, but it also has many social problems. The process of urban waste disposal from "landfilling" to "burning" has encountered huge obstacles, resulting in "Not in My Backyard (NIMBY)" incidents. The conventional solution to the "NIMBY" incident approach treats the cause of it in isolation and did not form a complete solution. Based on the Bayesian network, this paper analyzes the evolution path of the "NIMBY" event comprehensively and carefully, and forms a complete "NIMBY" crisis event solution. This scheme can effectively reduce the probability of occurrence of "NIMBY" events and provide decision support for relevant decision makers.

Key words: NIMBY incidents; Bayesian network; Waste incineration; Decision

1 Introduction

In the process of urbanization in China, the amount of garbage generated is increasing. According to statistics, China's municipal solid waste production is growing at an annual rate of 8% to 10% and is expected to reach 323 million tons by 2020. 95% of China's waste disposal methods are landfills, but existing landfills are no longer able to meet the demand in the foreseeable future.

The municipal solid waste incineration treatment has the advantages of occupying a small area, shorter time for site selection, significant reduction (weight reduction is generally 80%, volume reduction is generally 90%), the harmlessness is more thorough and waste heat can be recovered. However, China's waste incineration started late. During the process of project implementation, residents are reluctant to allow waste incineration plants to be built in the local place. In many places, there were also "NIMBY" incidents, which seriously endangers social stability.There is an urgent need for a solution to the "NIMBY" event.

Many scholars have studied the issue of "NIMBY" in different aspects. Gao Junbo (Gao Junbo, 2016) found that the essence of the "NIMBY" dilemma stems from the inconsistencies between the interests of the government, the market, and the society. Wu Yunqing (Wu Yunqing, 2012) analyzed the research progress of "NIMBY" facilities at home and abroad, he summarized the progress of domestic and foreign "NIMBY" facilities' types, size, location selection, coordination with surrounding environment, predicament, "NIMBY" conflict, and the shortage of solutions. Wang Xiaoli (Wang Xiaoli, 2012) conducted a comprehensive analysis of domestic and foreign scholars from the aspects of the meaning, reasons, characteristics, countermeasures, and reflections of the "NIMBY" problem, and clarified the context of research on "NIMBY". Although scholars have done a lot of research on the "NIMBY" incidents and revealed the causes of them. However, scholars often cut in from one side, but did not comprehensively consider the connection between various factors andso failed to provide a set of solutions to solve the "NIMBY" incident.

This article is to solve this problem. Bayesian Networks (BN) is a powerful knowledge representation and reasoning model with the ability to describe event polymorphisms and non-deterministic logical relationships, which is very effective in solving the "NIMBY" problem. Based on the Bayesian network, this paper analyzes the classic cases of successful processing of "NIMBY" events and evolves the optimal Bayesian path. It is hoped to promote the "harmless" and "reduction" process of domestic waste disposal, thus providing scientific and reasonable decision support for decision makers.

2 Urban Garbage Crisis Bayesian Evolution

2.1 Bayesian evolution

Bayesian network is a decision analysis tool based on probability and statistics. It is an organic combination of graph representation method and probability knowledge, reflecting the potential dependencies among variables and reveals the intrinsic relationship of domain objects. It is a compact expression method of complex full probability distribution. Bayesian network has a great advantage in

dealing with uncertainties.

A Bayesian network with N nodes can be represented by B=<G, P>, which includes two parts. (1) G denotes a Directed Acyclic Graph (DAG) with N nodes, where nodes are in one-to-one correspondence with random variables, and two nodes in G are connected by connecting arcs in a certain direction to represent variables relationship. (2) P represents a set of Conditional Probability Distribution (CPD) associated with each node, which can quantitatively describe the effect of all parent nodes on their child nodes.

Bayesian network is essentially a concise method of representing the joint probability distribution of variable sets. Bayesian network inference is based on conditional independence and conditional probability distribution, using Bayesian probability method to calculate nodes of interest. The probability of occurrence is based on the following inference algorithm formula:

$$P(X_i = e_i | X_j = e_j) = \frac{\sum_{except X_i, X_j} P(X_k = e_k, X_i = e_i, X_j = e_j)}{\sum_{except X_j} P(X_j = e_j) P(X_m = e_m | X_j = e_j))}$$

2.2 Bayesian-based urban garbage crisis expression

2.2.1 Data Sources and Node Selection

This article uses web crawler technology to obtain data from major websites. Based on the keyword list of urban garbage crisis, it analyzes the chapter structure of key articles to obtain web articles with the highest correlation with the urban garbage crisis. After obtaining the article, the natural language processing technology is used to split the article into various keywords, and the frequency of occurrence of each keyword in the text is counted to realize the effect of the article structure.
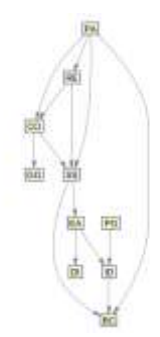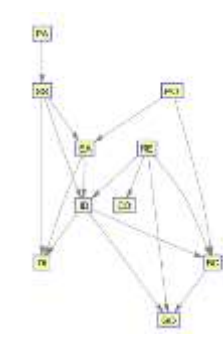
A suitable node can ensure that Bayesian path evolution can provide reasonable advice for decision makers. Therefore, the selection of nodes is very important, and it should fully reflect the characteristics of the "NIMBY" events and cover the basic aspects of the "NIMBY" events. At the same time, nodes should be as simple and representative as possible. The choice of nodes in this paper is mainly from macroscopic to microscopic, from top to bottom, including the core elements of participating entities and government strategies. The establishment of high-tech in China lacks consideration of institutional factors. Therefore, in the node selection process, not only the "government" factor but also the institutional factors such as "consultation" and "regulation" have been selected. These factors are closely related to the theme of "NIMBY" and basically constitute the whole picture of the "NIMBY" incident. This option makes the Bayesian evolutionary path more representative.

2.2.2 Case Application

The Pearson correlation coefficient is used to measure the linear correlation between the two variables X and Y. It is suitable for the population showing positive distribution. The "NIMBY" event belongs to the social events and has the characteristics of positive distribution. Therefore, the Pearson algorithm is suitable for this paper. After the structured article, this paper first uses the Pearson algorithm to cluster all the urban garbage crisis events, and obtains the correlation between each event. We found that the successful cases and the failed cases were separated from each other and gathered together.

After calculating the similarity of cases, first, the basic topological structure of Bayesian network is constructed by referring to the experts' opinions of the urban neighborhood. Then we use MATLAB software to construct Bayesian conditional probability table to get Bayesian evolution path. Through the analysis of the evolutionary path, we iterate the initial basic topology, train the Bias network repeatedly, and finally get the result(As shown below).

Table 1 Bayesian Structure

Residents	RE		
Site selection	SS		
Pollution	PO		
EIA	EA		
conflict	CO		
participate	PA		
Information disclosure	ID		
Dioxins	DI		
make up	BC	Success type event Bayesian structure	Failed type event Bayesian structure

3 The Discovery of the Transformation Path of Urban Garbage Crisis

According to the Bayesian principle, its network structure shows the relationship between key factors of urban garbage crisis events. The Bayesian network structure evolved from the successful case reveals the potential law between the advanced experience and experience of successful cases. The evolution to the optimal Bayesian structure is essentially a solution that draws on the best types of events.　Based on this, we have obtained the transformation path of the urban crisis.

Optimal Bayesian structure　　　　Current Bayesian structure　　　　Current type optimization path
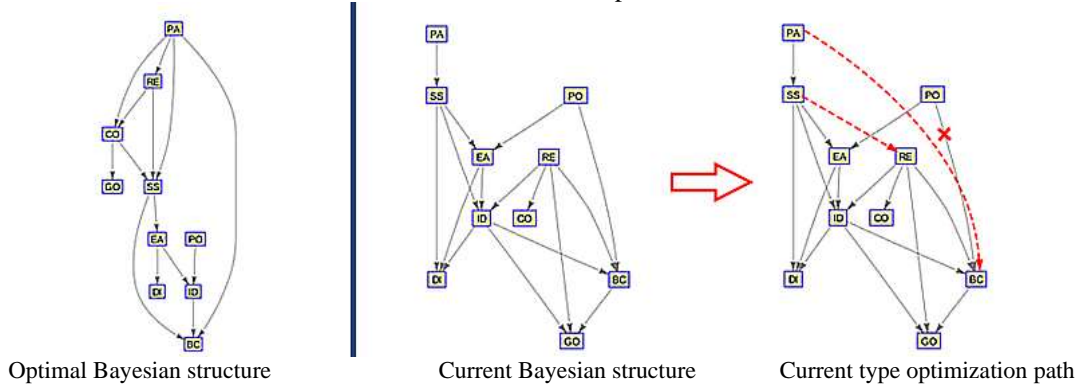
Figure 1　Bayesian Path Conversion

Through the Bayesian path transformation, we get the solution:

Increase the correlation between PA and BC: When formulating the compensation plan, the participation of the public should be fully guaranteed to ensure the residents' understanding and support for the compensation plan.　Highlight the association between RE and SS, indicating that the site selection process should fully guarantee residents' participation.　Weakening the correlation between PO and BC: It is necessary to formulate a scientific and reasonable compensation mechanism for the pollution caused by the "NIMBY" project.

The main strategy of this program is: in the process of formulating compensation plans and project site selection, the decision-makers must ensure the full participation of the people and obtain the people's full understanding and support for decision-making; the decision-makers should eliminate the possibility that the "NIMBY" project may bring Pollution and minimize unavoidable pollution. They should formulate scientific and reasonable compensation mechanisms.

4 Conclusion

At present, large-scale public security incidents caused by improper disposal of urban waste incineration projects still occur frequently in China. This shows that China has not yet formed a set of scientific urban waste incineration crisis conversion plans.　This article expounds the current crisis of urban waste incineration in China and introduces the significance of Bayesian evolution theory in solving the "NIMBY" incident.　The original data is obtained by the web crawler, the natural language processing technology is used to vectorize and categorize the case articles, and the Bayesian path evolution is performed by using the MATLAB tool.　Finally, through the analysis of the differences between the successful path and the failed path, this study has obtained a scientific and complete solution to the "NIMBY" event which comprehensively considers the various factors that cause the "NIMBY" incident.

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Construction of Word List for Municipal Waste Incineration Crisis

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Abstract: Domain word list is important in text mining and data analysis in certain specialized fields. It can vectorize textual information and is the basis for further mathematical analysis. Waste incineration and the group incident crisis it poses are an important social issue in our country. This paper takes the crawler to capture the text data of waste incineration on the Internet, uses natural language processingtechniqueswith manual analysis methods to process the data, and then designs the keyword selection algorithm according to the principle of combination and stability to extracts the word list of waste incineration fields, which lays a solid foundation for subsequent research to solve theabove social issue.
Key words: Waste incineration; Crisis management; Domain word list; Natural language processing

1 Introduction

With the growing of urban population in China, the output of urban waste and the amount of waste clean-up are also increasing dramatically.   Nowadays, more than 440 cities in China are faced with the problem of "garbage siege". As a "harmless, reduced, and resource-based" waste treatment method (T Sabbas, APolettini, R Pomi, 2003), waste incineration and power generation has attracted national attention.   However, in the process of advancing the waste incineration technology, it often encounters resistance from the public. How to successfully implement the waste incineration project has become a major social issue facing the government today.

In the process of studying such issues, we found that relevant data and information are often presented in the form of government reports and news reports.   For this type of unstructured text data, the traditional empirical research and data analysis methods are often difficult to work on, and due to the large amount of data and extensive coverage, manual methods cannot be the main analytical tools. Therefore, in virtue of computer tools, text mining with natural language processing technology has become the best way to study this issue (Wang Zhanyi, 2012). Text mining is a technology that uses computer tools like natural language processing techniques to extract effective information from unstructured text data.

Domain word list is a basis for using text mining when studying text data in the corresponding domain, and is also a basis for building knowledge and rules (Fred J. Damerau,1993).Cai Guozhen (Cai Guozhen, 2010) used WorldNet to calculate the similarity between nouns and designed a search clustering method based on semantic knowledge(Cai Guozhen, 2010).Wang Aihua (Wang Aihua, 2013) conducted a text mining study(Wang Aihua,2013) on the corruption of engineering projects by constructing a list of engineering corruption terms. Yan Dong (Yan Dong, 2015) finally clearly demonstrated the shale gas field (Yan Dong, PanYi, ChenXiaohong, et al, 2015) by constructing domain ontology in the field of shale gas.

In the field of waste incineration, there is a lack in targeted domain vocabularies at this stage, hindering the development of text mining research in this field. But the methods used in previous studies are not general applicablein the field of waste incineration, and because of the particularity of Chinese text, such as there is no natural separator between words and words, the method of constructing the English word list have to adapt for the new situation. This research aims to construct a vocabulary list of waste incineration fields through web crawlers and natural language processing techniques, supplemented by expert consultations, and provide data analysis entry points and research foundations for in-depth research on waste incineration projects and social issues to resolve groups resisting crises.

2 Waste Incineration Crisis Features

The waste incineration project involves a wide range of areas and affects a large number of people. The causes of the mass incidents are also complicated.   Analyzed from the perspective of reasons, the root causes of dissatisfaction among the public mainly stem from the following three aspects: 1. Poor communication of information among government, individual, and company; 2. Unfair feelings of residents caused by unbalanced distribution of benefits; 3. Civil civic awareness and The rising demand for environmental protection (Bai Wentao, DuZhihong, He Rui, 2018). This reflects the higher demands

of the public for satisfaction when the food and clothing problem has been solved (Maslow A. H., 1943).

For the main body of waste incineration projects, namely government and enterprises, the final project construction results can be measured from the following two dimensions. The first dimension is reputation and the second dimension is interest.   The behavior of government and enterprises in the process of project design and implementation often directly leads to the final outcome of the project, gaining or losing reputation and trust, and earning or losing benefits.

3 Construction of City Waste Domain Word List
3.1 Data acquisition
In order to obtain text data in the waste incineration field, it is necessary to design a web crawler to crawl relevant information on the Internet, mainly including news reports and government reports. Web crawler refers to a program that automatically crawls Internet information according to established rules, directed or not (Liu Jinhong, Lu Yuliang, 2007). Web crawler can capture large amounts of data at a high efficiency and when the amount of data is large enough, a small number of atypical data will not affect the overall statistical law. In view of the fact that the related information of waste incineration is distributed on the Internet, we have designed a generic crawler that crawls content on the Internet through link tags. The web crawler uses Scrapy framework design and elaborately constructs a two-tier filtering mechanism, as shown in Figure 1.
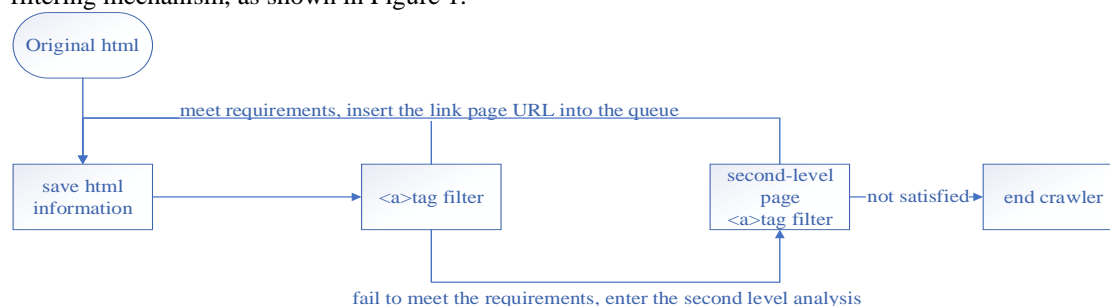
Figure 1   Two-tier Filtering Mechanism

3.2 Data cleaning
The text data in the waste incineration domain can be obtained by performing text extraction on the crawled web page raw data (HTML format).   In the text extraction process of this study, two layers of data cleaning filters were designed. One is to segment the titles of web pages, and to screen out titles that have no practical meaning or inductive keywords (such as suppliers, tenders, merchandise, etc.). The second is to design the HTML structure for web pages from the perspective of the text level and text length. The screening algorithm is used to filter, and finally a web page file with a relatively high relevance key page is obtained and its text data is extracted.

3.3 Data processing
In order to know the keywords that are most closely related to the waste incineration field, in the first place we need to segment the text data obtained in the above process.   Because people often use different words to express the same meaning in written records, this will lead to deviations in the statistics of word frequency and word relationships. Therefore, before the analysis, we must first analyze the similarity between word meanings, and replace the similar words with similar contents. Table 1 is the excerpt of our word similarity substitution table, and the similarity is obtained based on the Baidu natural language processing open interface.

Table 1   Word Similarity Substitution Table

Word A	Word B	Similarity Value
Local Government	Government	0.84623
Citizens	Residents	0.844015
Rubbish	Living Garbage	0.836175
National	Government	0.836481
Environmental Impact	EIA	0.834894
Landfill	Landfill Site	0.826828
Secondary Pollution	Pollution	0.825864
Standard	Emission Standards	0.817001

Continual Table 1

Word A	Word B	Similarity Value
Municipal Committee	Government	0.816235
Country	Government	0.814586
Oversight	Supervision	0.824241
Emissions	Emission Standards	0.812505
Contradiction	Conflict	0.807780
……	……	……

3.4 Word list construction

Based on past experience, we can know that an important keyword in a field must appear in a relatively high frequency in the textual information of the field, and should follow the basic principle of "combination and stability" (Beijing University of Aeronautics and Astronautics,1993). For this principle, we have designed a high-probability keyword filtering algorithm as shown below. W(word times) represents the total number of times a keyword appears in all articles, and E(essay times) represents the number of article texts where the keyword appears. R (ralevance times) represents the number of times the keyword appears with other high frequency words (less than 15 Chinese words).

$$P_i = \left(\frac{W_i}{W_{max}} * 0.5 + \frac{E_i}{E_{max}} * 0.25 + \frac{\sum_{j=1}^{n} R_{ij}}{Max(\sum_{j=1}^{n} R_{ij} | 1 < i < n)} * 0.25 \right) * 100\%$$

The algorithm divides the key probability into three different weight components. The first part examines the frequency of keyword occurrences. The second part examines the stability of keywords in different articles. The third part examines the keywords. The correlation with other keywords is the degree of closeness.   Through this algorithm, we can use computers to initially screen more important keywords.   However, due to the variety of Chinese text expressions and the complex grammar, we selected the first 50 keywords of computer screening to perform manual selection.   Manual selection is conducted in the form of consulting experts and government reports, and follows the five basic principles of "scientific, comprehensive, representative, feasible, and dynamic".   In the end, we got the word list of waste incineration fields, as shown in the table below.

Table 2   Waste Incineration Domain Word List

Living Garbage	Residents	Site Selection	Government	Emission Standards
Participate	Information Disclosure	Supervision	Dioxins	Risk
Pollution	EIA	Landfill Site	Conflict	Opinion
Protest	Compensation	Negotiate	Solicit Opinions	Trust

3.5 Results analysis

After we got the word list of waste incineration domain, we mapped the domain word list from the perspective of the keyword distance in the original text, as shown in the figure below.
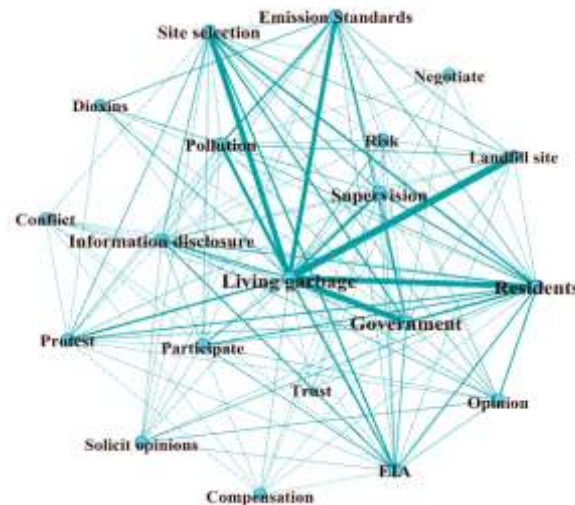
Figure 2   Keyword Distance Map

In the relational network diagram, the degree of connection between the nodes represents the degree of connection between the nodes, that is, the frequency of occurrence of the two keywords in the original text is less than 15 Chinese words.

The keyword distance map show some important thing of the domain of waste incineration, and can by exam of our keyword list building work. Through the distance map, we can see that "living garbage" is the core vocabulary of the keyword list in the field of waste incineration, which also meets our subjective knowledge of this issue.　Some of the key words most closely linked to "Living garbage" are "Residents",　"Governments",　"Landfills site" , "Emission standards " and "Site selection", which are the most important points in rubbish Incineration project as well .

4 Conclusion

Waste incineration, as the best way to deal with urban waste nowadays, is developing rapidly and faces many challenges.　Text mining has a wide range of applications in text classification, analysis and key information extraction. It is mainly used in the fields of news, finance, biology and information retrieval (Huang M L,Ding S L,Wang H N,et al,2008). With this method, the analysis and research on the past cases and experiences of garbage incineration is also an effective way for the government and enterprises to face and solve these challenges.

In this study, related web pages of the waste incineration on the Internet were crawled, cleaned and processed, and a Domain word list of waste incineration fields was constructed.　The construction of this vocabulary makes it possible that social issues in the field of waste incineration can be further studied through the form of text mining. For example to vectorize the text and use similarity algorithm to find connection between cases and case, and even to research the deep causes of the abovesocial issueby Bayesian network based on the word list. Finallyproviding more scientific solutions for quantitative analysis.

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Research on Industrial Production Efficiency of Hubei Based on Three-stage DEA-Malmquist Index Method

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Abstract: By constructing the three-stage DEA-Malmquist index model, this paper made an empirical study on the production efficiency of 28 industries with manufacturing scale and above in Hubei province from 2011 to 2015. The research results demonstrated that government subsidy, the level of opening to the outside world and the cost of financing increase the redundancy of enterprises input, which has negative effect on the efficiency of production. The expansion of industry has a positive effect on the improvement of production efficiency. At the same time, the technology efficiency and scale efficiency were underestimated because of the environmental factors and random error, and the difference of technology progress and pure technology efficiency was more obvious. After removing external environmental factors, the total factor productivity of most of the manufacturing industries in Hubei province increased and the total factor productivity of the industry as a whole increased by 13 %. Further, according to pure technology efficiency and scale efficiency, these industries were divided into four types. Before adjustment, most industries were in the "two-level" type, after adjustment, most industries were in the "two-level" type, which showed that most industries in Hubei province are mature in technology and management. Finally, according to the research results, the corresponding countermeasures were put forward to improve the production efficiency of various industries.
Key words: Industrial production efficiency; Three-stage DEA-malmquist; Total Factor productivity

1 Introduction

Manufacturing industry is the foundation of a country and occupies an extremely important position in our national economy. The level of manufacturing development in a region directly determines the level of science and technology and the level of economic development in the region. For the old industrial base in Hubei Province, the role of manufacturing is even more pronounced. In the past five years, the role of Hubei manufacturing in the development of the national economy has become increasingly significant.

Foreign scholars took the extensive and in-depth research on the measurement methods of production efficiency at first. Farrell (Farrell, 1957) used data envelopment analysis (DEA) to study the efficiency of production agricultural first and put forward a frontier measurement method of technical efficiency for the first time. The DEA method is a deterministic frontier method that does not consider the impact of random factors on productivity and efficiency. Stochastic Frontier Analysis (SFA) solved this problem. Subsequently, many scholars began to use the Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) to study the issue of production efficiency. However, DEA model can only evaluate the static efficiency of the research object, and cannot reflect the dynamic efficiency in a period of time. Therefore, Malmquist proposed the Malmquist index in 1953. Caves D W, Christense L R and Diewert W E began applying the Malmquist Index to the calculation of production efficiency in 1982. But for a long time, the empirical research on this theory almost disappeared. Until 1994, Rolf Fare et al. combined a non-parametric linear programming method of this theory with data envelopment analysis (DEA) theory, which made the Malmquist index widely used. Today, this method is widely used in the calculation of productivity in the financial, industrial, and medical sectors. Han (Han, 1994), Kloos (Kloos, 2004), Hsiao (Hsiao, 2005) applied the DEA model and SFA model to study the efficiency of industrial production in various countries. Shi G M et al. (Shi G M et al., 2010) and Gong S et al. (Gong S et al., 2017) used the DEA model to study energy efficiency.

Domestic scholars mainly apply data envelopment analysis (DEA) based on nonparametric analysis and stochastic frontier production function method (SFA) based on parameter analysis and Malmquist index to study industrial production efficiency. Guo Yajun (Guo Yajun, 2012) used the three-stage DEA model to study the industrial production efficiency of China in 2009. Zhang Yali (Zhang Yali, 2014) used the three-stage DEA model to evaluate the industrial efficiency of 31 provinces and municipalities

in China in 2013. Zhu FuYun et al. (Zhu FuYun et al., 2016) used the three-stage DEA-Malmquist index model to analyze the changes in total factor productivity of China's light industry from 2000 to 2010. Zeng Yuandong (Zeng Yuandong, 2017) selected the three-stage DEA-Malmquist index method to measure the industrial production efficiency of Yunnan Province from 2010 to 2014, and analyzed the reasons for the differences in industrial production efficiency in various cities. In general, they selected different input-output indicators (and environmental variables) from various angles to analyze the overall status and influencing factors of industrial production efficiency, and put forward targeted countermeasures to improve efficiency.

The research on industrial production efficiency in the existing literature is gradually improving and perfecting from the method model to the research object, which has certain reference significance for the development of this research. However, there are also some shortcomings. On the one hand, the selection of environmental variables. The factors influencing industrial production are multifaceted. In addition to the input of the most basic factors of production, there are many internal and external environmental factors. These factors of production and environmental factors change with the development of the times. For example, during the industrial revolution, industrial input factors mainly included manpower, material resources, and financial resources. Now, with the advent of the knowledge economy era, resources such as knowledge, big data, and the Internet have become important inputs for industrial production. Although the later three-stage DEA method can eliminate the influence of environmental factors and the productivity of random errors, the selection of environmental variables varies from person to person due to the differences of specific research objects. Starting from the actual situation of Hubei industry, it is very necessary to select appropriate environmental variables for analysis and to study industrial production efficiency from a new perspective in the new historical period. On the other hand, Hubei is an old industrial base with a wide variety of industries and large differences. If the overall efficiency of the industry is analyzed in general, the expected results will not be achieved. Therefore, it is more appropriate to conduct analysis in different industries. Based on the actual situation of industrial development in Hubei Province, the appropriate input and output and environmental variables will be selected to analyze the industrial production efficiency of Hubei Province from the perspective of industry, and then make recommendations.

2 Research Methods and Data Description
2.1 Three-stage DEA-malmquist index model
The three-stage DEA-Malmquist index model can effectively eliminate the impact of operating factors (external environment and random errors) on efficiency, and can also reflect the dynamic changes in efficiency over a period of time, so that the calculated efficiency values can more faithfully reflect the internal management level of the decision units. Its construction and application are mainly divided into three phases:

The first stage: the traditional DEA model. The DEA model was proposed by American operations researchers A. Chames, W. Cooper, and E. Rhodes in 1978 to evaluate the relative effectiveness of decision-making units in the "multiple inputs, multiple outputs" model. This method has been produced and developed to this day, and the theory is relatively mature, and will not be repeated here.

The traditional DEA model can only evaluate the efficiency statically, but not the dynamic change of the efficiency of the decision unit over a period of time. The Malmquist index just makes up for the shortcomings of the CCR model and the BCC model. It can be used not only for panel models, but also for vertical analysis and comparison.

The Malmquist index was originally proposed by Malmquist (Malmquist,1953) as a consumer index. Based on the extension of Sten Malmquist's ideas, Caves et al applied it to the measure of productivity change, which reflects the productivity of the decision-making unit (DUM). Changes can be used to measure productivity growth and can be broken down into technological changes and efficiency changes.

The second stage: similar SFA regression model. The input slack variable obtained in the first stage is affected by three factors: environmental factors, random errors and management efficiency. In order to obtain a real efficiency value, it needs to be separated. Taking input orientation as an example, there are no decision units. Each decision unit has m inputs. Suppose there are p environmental variables. SFA analysis is performed on the input variables of each decision unit. The SFA equation can be constructed as follows:

$$S_{ik} = f^i\left(z_k; \beta^i\right) + v_{ik} + u_{ik}$$

Among them, $_pS_{ik}$ denotes the slack variable of the i input of the k decision unit, $i=1,2,...,$ $=1,2,...$; $z_k=\left(z_{1k},z_{2k},\cdots,z_{pk}\right)$ represents p environmental variables, β^i is an underestimate parameter of the environmental variable; $f^i\left(z_k;\beta^i\right)$ represents the impact of the environmental variable on the input slack variable , $f^i\left(z_k;\beta^i\right)=z_k\beta^i$. $v_{ik}+u_{ik}$ is the mixed error terms, v_{ik} is the random interference, suppose $v_{ik}\sim N\left(0,\sigma_{vi}^2\right)$; u_{ik} indicates that management is inefficient, assuming it is subject to a truncated normal distribution, that is, $u_{ik}\sim N^+\left(u^i,\sigma_{ui}^2\right)$; u_{ik} and v_{ik} is independent. $\gamma=\dfrac{\sigma_{ui}^2}{\sigma_{ui}^2+\sigma_{vi}^2}$ for the proportion of technical inefficient variance to total variance, when the value of γ approaches 1, the management factor dominates; when γ approaches 0, the effect of random error dominates.Using the SFA regression results to adjust the input, so that each decision unit is in the same environment and luck, the formula is as follows:

$$\hat{x}_{ik}=x_{ik}+\left[\max_k\left\{z_k\,\beta^i\right\}-z_k\beta^i\right]+\left[\max_k\left\{\hat{v}_{ik}\right\}-\hat{v}_{ik}\right]$$

Among them, x_{ik} represents the actual value of the k input of the i decision unit, $i=1,2,...,=1,$ $2,...n$, $\hat{x}_{ik}$ is the adjusted value; β^i is the estimated value of the environmental variable; and $\hat{v}_{ik}$ is the estimated value of the random disturbance.

The third stage: adjusted DEA model. The input data adjusted after the second stage replaces the original input data, and the output is still the original output, calculate the efficiency with the DEA-Malmquist index model again, and the efficiency value after eliminating external environmental factors and random errors is obtained.

2.2 Selection of input indicators, output indicators, environmental variables and data sources
2.2.1 Selection of Input and Output Indicators

The industrial output index selected in this paper is the total industrial output value above the scale. From the existing literature, the measurement of output indicators is generally selected from industrial output value, industrial added value and main business income. Through the comparative analysis of related literature and the availability of data, this paper finally selected the total industrial output value as the output index. This article used Pearson correlation test to calculate the correlation between total industrial output value, main business income, and input indicators. The results showed that the correlation between total industrial output value and input indicators is stronger. Therefore, this article chose the total industrial output value as the output indicators. This is consistent with the selection of Guo Yajun (Guo Yajun, 2012) and Zhao Shuang(Zhao Shuang,2016).

Three indicators were selected as the industrial input indicators, which were the average number of employees, net fixed assets and R&D expenditure. They respectively represented the company's investment in labor, capital and R&D investment. This is consistent with the selection of Guo Yajun (2012).As shown in Table 1, the input and output variables both pass the two-tailed test at the 1% level of significance.

Table 1   Pearson Correlation Coefficient of Input and Output Variables of 28 Industries Above Designated Size in Hubei Province from 2011 to 2015

Input	Average number of employees	Net fixed assets	R&D expenditure
Total industrial output	0.892** （0.000）	0.839** （0.000）	0.671** （0.000）

Note: ** indicates significant at 1% significance (bilateral); p values in parentheses.

2.2.2 Selection and Description of Environmental Variables

Environmental variables generally refer to factors that have an impact on industrial productivity but are not subjectively controlled. Considering politics, economy, and technology factors, the availability of data into account, five environmental indicators were selected: government grants, export delivery value divided by industrial sales output value, financial expenses, number of industrial enterprises, and electricity consumption of 10,000 yuan output value.

In terms of policy, government subsidies (100 million yuan) were selected to measure the government's support for various industries.

In terms of economy, the export delivery value divided by industrial sales output value were selected to measure the export status of the industry, with the research of Li Peng (Li Peng,2014). When the export delivery value accounts for a large proportion of the industrial sales value, the degree of market opening is relatively high, which is conducive to promoting production. This is consistent with the study by Xu Wei (Xu Wei,2016). Financial costs (billion yuan) were selected to measure the financing costs of the company, with the research of Li Hongwei (Li Hongwei,2012) and Fu Bingjun (Fu Bingjun,2017).

In terms of technology, the use of 10,000 yuan in electricity consumption (kWh/million) was used to measure the level of resource utilization, with the research of Guo Yajun (Guo Yajun,2012).

2.2.3 Source and Selection of Data

The input and output indicators of this article and the related raw data of environmental variables are all derived from the "Hubei Statistical Yearbook" for 2012 to 2016, and are calculated and collated then, so it is true and reliable. The reasons for selecting the period from 2010 to 2015 as the study period are: Since 2010, the automobile manufacturing industry was not listed as a separate industry, and the automobile manufacturing industry occupies a very important position in the industrial economic development of Hubei Province and cannot be ignored. Therefore the research period of this article started in 2010. In addition, R&D expenditures for various industries are lacking, so the research period ends in 2015. The reason for selecting 28 industries is that the manufacturing industry in the Statistical Yearbook of Hubei Province from 2010 to 2016 includes 31 industries, but due to three industries (leather, fur, feathers and their products and footwear, comprehensive utilization of waste resources, Metal products, machinery and equipment repair industry) lack of data, 28 industries (as the note shown)are measured.

3 Empirical Results Analysis

3.1 The results of first stage traditional dea empirical results

Using DEAP 2.1 software, the traditional DEA-Malmquist index was calculated the production efficiency of 28 industries in Hubei Province from 2010 to 2015. The results are shown in Table 2.

Table 2   Traditional DEA-Malmquist Index and Its Decomposition

Industry number	Malmquist index	Effch	Techch	Pech	Sech
4	1.279	1.002	1.277	1.000	1.002
8	1.236	1.123	1.100	1.000	1.123
26	1.181	0.964	1.224	1.164	0.828
11	1.156	0.963	1.200	1.000	0.963
6	1.076	1.042	1.033	1.086	0.959
10	1.071	0.880	1.217	0.924	0.952
20	1.050	0.824	1.274	0.976	0.845
21	1.043	0.842	1.239	0.987	0.853
17	1.039	0.981	1.059	1.077	0.911
16	1.037	0.872	1.189	1.008	0.865
22	1.025	0.803	1.276	0.919	0.874
25	1.005	0.824	1.220	0.988	0.834
9	0.981	0.935	1.049	0.938	0.998
13	0.980	0.871	1.124	1.035	0.842
15	0.968	0.842	1.150	1.000	0.842
23	0.965	0.850	1.135	1.000	0.850
14	0.960	0.797	1.204	0.911	0.876
1	0.954	0.843	1.131	1.000	0.843
24	0.953	0.778	1.224	0.790	0.985
28	0.952	0.739	1.289	0.920	0.803
18	0.950	0.905	1.050	0.870	1.040
2	0.941	0.874	1.077	1.009	0.867
5	0.941	0.900	1.046	1.040	0.865

Continual Table 2

Industry number	Malmquist index	Effch	Techch	Pech	Sech
7	0.941	0.880	1.069	0.872	1.009
27	0.937	0.756	1.240	0.855	0.884
3	0.934	0.850	1.099	1.017	0.835
12	0.919	0.948	0.969	1.000	0.948
19	0.897	0.755	1.188	0.842	0.897
mean	1.009	0.876	1.152	0.969	0.904

From Table 2, we can see that without removing environmental variables and random factors, the overall efficiency of Hubei's industry is on the rise, with an average productivity of 1.09, an average annual increase of 0.9%, and the growth rate is not obvious. The main reason is that the rate of technological progress has increased by 15.2%, while technical efficiency has shown a downward trend with a decrease of 12.4%. Among the 28 industries, the production efficiency of 12 industries shows an upward trend, which is mainly attributed to technological progress; the production efficiency of 16 industries shows a downward trend, which is mainly attributed to the decline of technical efficiency. The technical efficiency of 25 industries shows a downward trend, which is mainly due to the decline of pure technical efficiency and scale efficiency. Because this result includes the interference of environmental factors and random factors, it cannot reflect the actual efficiency of each industry, so further adjustments and calculations are needed.

3.2 The results of the second stage SFA regression

Table 3   The Results of the Second Stage SFA Regression

Dependent variable Independent variable	labor input slack variable	Capital investment slack variable	R&D investment slack variable
Constant term	6.6035*** （6.1346）	40.4906** （2.1824）	9.4368** （2.8034）
Government support	-0.1609 （-1.0322）	10.0712* （2.0571）	2.1918*** （5.8440）
Open to theoutside world	5.4916 （1.0842）	51.0512 （0.3391）	50.5705*** （4.2115）
Financing costs	-0.0592 （-1.6226）	14.0493*** （15.4518）	0.5276*** （5.7897）
Industry scale	0.0035** （2.6077）	-0.1811*** （-5.2583）	-0.0178*** （-5.0194）
Resourceutilization level	0.0010 （1.2527）	0.0134 （0.5000）	-0.0018 （0.9541）
σ^2	27.9188*** （3.3478）	12477.396*** （823.5326）	100.3601** （2.6405）
γ	0.7863*** （10.9498）	0.3904*** （4.8931）	0.6391*** （3.9090）
Log likelihood	-351.0709	-837.0607	-468.1749
LR test of theone-sided error	47.7710	9.4154	13.2169

Note: *, **, and *** are significant at the significance levels of 10%, 5%, and 1%, respectively; the number in brackets is the corresponding estimator t statistic.

Table 4   Adjusted DEA-Malmquist Index and Its Decomposition in Hubei from 2011 to 2015

Industry number	Malmquist index	Effch	Techch	Pech	Sech
8	1.368	1.273	1.075	1.000	1.273
11	1.334	1.241	1.075	1.000	1.241
10	1.276	1.187	1.075	1.000	1.187
27	1.266	1.178	1.075	0.999	1.179
7	1.223	1.137	1.075	1.000	1.137
2	1.183	1.101	1.075	1.001	1.100
28	1.182	1.100	1.075	1.000	1.100
22	1.180	1.096	1.076	0.998	1.098
16	1.179	1.096	1.075	1.003	1.093
21	1.158	1.074	1.078	1.003	1.071
14	1.157	1.074	1.077	0.999	1.075
1	1.151	1.039	1.107	1.000	1.039
3	1.143	1.057	1.081	1.001	1.056
26	1.143	1.056	1.082	1.004	1.052
25	1.132	1.047	1.081	1.000	1.047
17	1.128	1.038	1.086	1.005	1.033
20	1.128	1.047	1.078	1.000	1.047
13	1.124	1.030	1.091	0.999	1.031
24	1.112	1.035	1.075	0.998	1.036

Continual Table 4

Industry number	Malmquist index	Effch	Techch	Pech	Sech
4	1.109	1.031	1.075	1.000	1.031
9	1.109	1.031	1.076	1.001	1.030
5	1.098	1.004	1.094	1.000	1.004
15	1.052	0.978	1.075	1.000	0.978
23	1.035	0.971	1.066	1.000	0.971
6	1.027	0.961	1.069	1.001	0.960
19	1.009	0.937	1.077	0.999	0.938
12	1.001	0.931	1.075	1.000	0.931
18	0.977	0.901	1.084	0.996	0.905
mean	1.139	1.056	1.079	1	1.055

The slack variables of the input variables separated in the first stage are used as the explanatory variables, and the environment variables are used as explanatory variables. The Frontier4.1 software is used to perform SFA regression analysis. The calculation results are shown in Table 3. It can be seen from the above that most of the coefficients of the variables of the environmental variables on input slack can pass the significance test, indicating that external environmental factors have a significant impact on the redundancy of industrial production inputs. Further, the γ of the labor input slack variable and the R&D investment slack variable are 0.7863 and 0.6391, respectively, which are close to 1, and all reach a significant level of 1%, which indicating that the influence of management factors in these two inputs accounts for the dominant position; for the capital investment slack variable, the γ value is 0.3904, which is close to 0, and reaches a 1% level of significance, which indicating that the impact of random errors dominates the capital investment. This result shows that management factors and random errors have a significant impact on industrial production efficiency. Therefore, it is necessary to apply SFA to separate management factors and random errors.

3.3 The DEA empirical results after the third stage adjustment

The adjusted input variable and original output were calculated again using the traditional DEA-Malmquist index model, and the efficiency values after eliminating environmental variables and random factors were obtained. The results are shown in Table 4.

The technical efficiency index, technical progress index, pure technical efficiency index, and scale efficiency index before and after adjustment are compared respectively (Figure 1 to Figure 4). It can be seen that from the overall situation, the industrial efficiency of Hubei Province The scale efficiency was underestimated before the adjustment, and the technological progress index and pure technology index fluctuate even more. After the adjustment, the industrial technology efficiency and scale efficiency of Hubei Province increased, and the technical progress index and pure technology index of various industries fluctuate less and more stable. This shows that environmental factors and random errors have caused the technical efficiency and scale efficiency of various industries in Hubei Province to decrease, and the gap between technological progress and pure technological efficiency in various industries has become even greater.
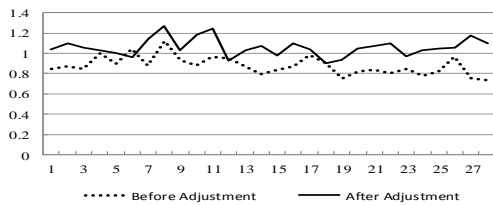
Figure 1 Changes in Technical Efficiency Indexbefore and after Adjustment
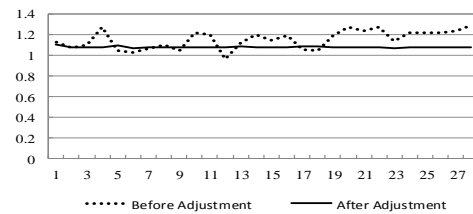
Figure 2 Changes in Technical Progress Index before and after Adjustment
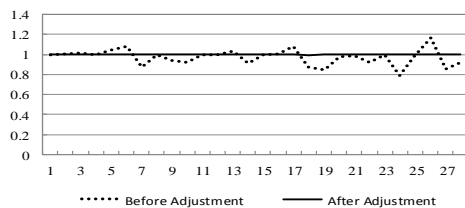
Figure 3 Changes in Pure Technical Efficiency
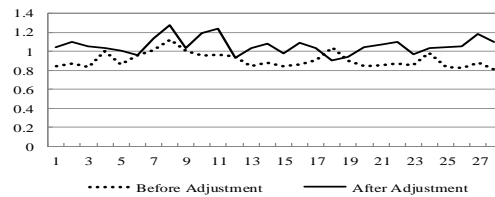
Figure 4 Changes in the Scale Efficiency

Index before and after Adjustment

Indexbefore and after Adjustment
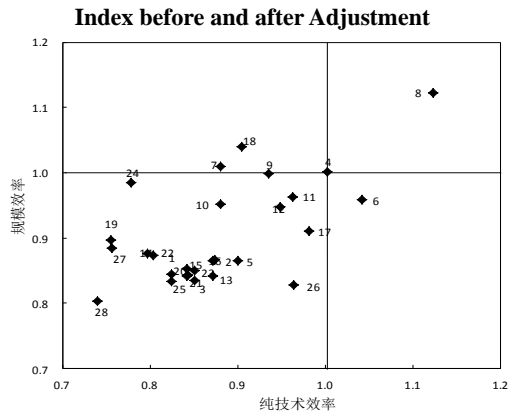
Figure 5   The First Stage Efficiency before Adjustment   **Figure 6 The Third Stage Efficiency After Adjustment**
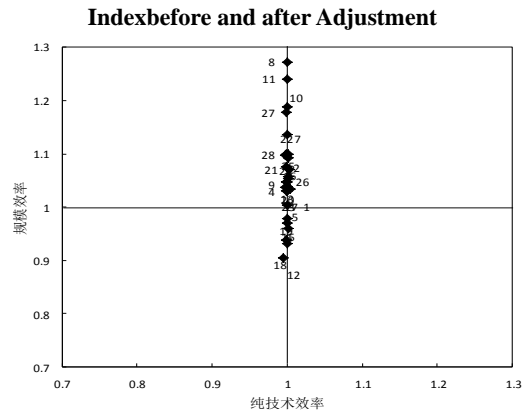
4 Conclusion

Based on the above analysis, the following conclusions can be drawn:

(1) After the second stage of environmental factors and random error adjustment, the production efficiency of various industries has changed significantly. This shows that environmental factors and random errors do have an important impact on the industrial production efficiency of Hubei Province. After the adjustment, the industries of total factor productivity above 1 increased from 12 to 27, and only one industry of ferrous metal smelting and rolling and processing industry is less than 1 before and after the adjustment, indicating that the efficiency of the industry needs to be improved. Both technical efficiency and scale efficiency need to be improved.

(2) The industrial total factor productivity achieved rapid growth during the five years from 2011 to 2015 in Hubei, with a growth rate of 13.9%. It is mainly due to the combined effect of technological efficiency and technological progress.

(3) Through the second-stage regression analysis of SFA, it can be seen that government subsidies may lead to over-investment of enterprises and thus reduce production efficiency; the improvement of opening-up level will increase the ability of enterprises to innovate in science and technology, but it may also cause hidden problems in information security; the increase of financing costs will lead to a reduction in fixed assets and R&D investment, which will reduce outputs. The blind expansion of the industry scale may also increase the blind increase in fixed asset investment and R&D investment, resulting in unreasonable allocation of funds and thus lower production efficiency.

(4) The presence of environmental factors and random errors has led to the underestimation of technical efficiency and scale efficiency, making the gap between technological progress and pure technical efficiency of various industries more obvious. It shows that the removal of environmental factors and random errors is very necessary.

(5) It can be seen from figure 6 that the pure technical efficiency value of each industry in the third stage of adjustment has approached 1 and the scale efficiency value of most industries is greater than 1, indicating that scale efficiency is the main factor affecting industry efficiency and enlarging or reducing the scale of the industry reasonably will help reduce the waste of input elements and increase the efficiency of resource utilization.

In order to improve the industrial productivity of Hubei Province further, this article will propose the following suggestions for reference:

(1) Considering the importance and uncontrollability of the external environment and random error, this paper believes that external environmental factors should be used reasonably to improve efficiency. The state should reasonably control the support and give appropriate government subsidies to avoid situations that are too far behind; enterprises should adhere to the combination of going out and introducing, focusing on improving the level of science and technology and the competitiveness of the international market, preventing the leakage of technology and information; and rationally selecting financing channels. Reduce the cost of financing; appropriately increase the number of enterprises, control the scale of the industry, and make full use of the benefits brought by the scale effect while avoiding its potential risks.

(2) The efficiency level of each industry is different. The low-efficiency industry should actively reflect on it, clearly recognize its own situation, rationally allocate input resources, strengthen

innovation, make full use of various external conditions favorable to the development of the enterprise, seize opportunities, and transform and upgrade. Focus on improving the technical level and management level. High-efficiency industries should be aware of their key to success, enhance their core competitiveness, and maintain a positive development trend.

(3) Adhere to the combination of production, education and research to improve the quality of employees. Enterprises should actively absorb the high-level talents of higher education institutions, and carry out scientific entry and training, and regularly carry out management skills and technical skills training in the course of work, and cultivate comprehensive talents.

(4) Both the government and enterprises should perform their duties, clarify their responsibilities in the market economy and their social responsibilities. The government should actively carry out macroeconomic regulation and control under the conditions of market failure to create a good development environment for enterprises. It should also have a development vision and be based on long-term development.

Of course, the research in this paper is also insufficient. It does not accurately analyze and grasp the characteristics of various industries, so as to analyze the underlying causes that affect the efficiency of various industries. This is also a research difficulty. On the basis of the research of this paper, taking a specific industry as the research object, studying its efficiency status, and proposing countermeasures based on the in-depth analysis of the characteristics of the industry, will be solved.

Acknowledgement

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Note:

28 industries include:

1. Agriculture and Non-staple Food Processing Industry;
2. Food Manufacturing Industry;
3. Wine, Beverage and Refined Tea Manufacturing Industry;
4. Tobacco Manufacturing Industry;
5. Textile Industry;
6. Textile, Garment and Clothing Industry;
7. Wood Processing and Wood and Bamboo , Rattan, Brown, Grass Product Industry;
8. Furniture Manufacturing Industry;
9. Paper and Paper Products Industry;
10. Printing and Recording Media Copying Industry;
11. Culture, Education, Engineering, Sports, and Entertainment Product Manufacturing;
12. Petroleum Processing , coking and nuclear fuel processing industry;
13. Chemical raw materials and chemical manufacturing industry;
14. Pharmaceutical manufacturing industry;
15. Chemical fiber manufacturing industry;
16. Rubber and plastic products industry;
17. Non-metallic mineral products industry;
18. Black metal Smelting and rolling processing industry;
19. Nonferrous metal smelting and rolling processing industry.
20. Metal products industry;
21. General equipment manufacturing industry;
22. Special equipment manufacturing industry;
23. Automobile manufacturing industry;
24. Railway, shipbuilding, aerospace and other transportation equipment manufacturing industry;
25. Electric machinery and equipment manufacturing industry;
26. Computer, communications and other electronic equipment manufacturing;
27. Instrumentation and manufacturing;
28. Other manufacturing industries.

An Empirical Study on the Effect of Executive Compensation Structure on the Voluntary Disclosure of Environmental Information of Listed Companies

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Abstract: The frequent occurrence of environmental pollution issues has made investors increasingly concerned about the disclosure of environmental information of listed companies. This article selects 148 listed companies that voluntarily disclosed environmental information during the period of 2012-2016 from Shanghai and Shenzhen Stock Exchanges as research samples, and uses Logistic regression model to analyze the composition, proportions, gaps, and other sides of executive compensation. The study found that short-term remuneration ratio, long-term remuneration ratio, and executive remuneration gaps have a significant impact on the voluntary disclosure of environmental information of listed companies.

Key words: Executive compensation structure; Voluntary disclosure of environmental information; Heterogeneity of top management teams; Listed companies

1 Introduction

As an important part of corporate governance, executive compensation designs a scientific and reasonable executive compensation structure, which can coordinate the interests of executives and enterprises, effectively alleviate the agency problem, encourage executives to fulfill the corporate social responsibility, and further improve the disclosure system of the company's environmental information. Discussing the relationship between executive compensation structure, team heterogeneity and voluntary disclosure of environmental information can optimize the rational allocation of senior management team, ensure the incentive effect of salary structure, and improve the voluntary disclosure of environmental information of listed companies.

The research question in this articleis: How does the executive compensation structure affect the voluntary disclosure of environmental information? In view of the above problem, this article analyzes the impact of executive compensation structure on voluntary disclosure of environmental information from the aspects of composition, proportion and gap of executive compensation.

2 Literature Review and Research Hypothesis

2.1 Effect of executive short-term compensation on the voluntary disclosure of environmental information

Barnea and Rubin (Barnea and Rubin, 2010) found that companies with low insider control and leverage ratios tend to be socially responsible for rent-seeking behavior. Executives tend to overinvest in corporate social responsibility activities because the agency costs and financial costs of undertaking similar activities are lower. In view of this, opportunism in environmental information disclosure leads senior executives to prefer compensation structures with high proportion of short-term remuneration and low uncertainty in the future, rather than long-term compensation structures such as equity incentive plans. It is assumed that:

H1: The higher the short-term salary of senior executives, the less likely the company's environmental information will be disclosed voluntarily.

2.2 Effect of executive long-term compensation on the voluntary disclosure of environmental information

Milbourn (Milbourn, 2003) found that there is a positive correlation between the reputation of senior executives and the sensitivity of the stock options granted to senior executives. Based on the above analysis, it can be introduced that the implementation of equity incentives and other long-term remuneration for senior executives in China can closely combine the personal interests of senior executives and shareholders to reduce agency costs, thereby effectively avoiding the short-sighted behavior of senior executives and urging them to be motivated. Actively perform social responsibility activities such as environmental information disclosure. So assume that:

H2:The higher the long-term salary of senior executives, the more likely the company's environmental information will be disclosed voluntarily.

Firth's (Firth, 2006) research shows that increasing the proportion of long-term compensation in the compensation structure is beneficial to reducing agency costs and has a significant long-term incentive effect for senior executives, thus continuously improving the corporate environmental information disclosure system. So assume that:

H3: The higher the proportion of long-term executive compensation, the more likely it is for the company to disclose environmental information voluntarily.

2.3 Influence of executive remuneration gap on the voluntary disclosure of environmental information

Lu Haifan's (Lu Haifan, 2007) study found that the widening remuneration gap would cause pressure and discomfort of non-core management personnel, thus deepening the psychological and even hostile attitudes of high-remunerationing executives, and breaking the unity, harmony, and friendly competition of the team. When the remuneration gap among senior executives gradually widens, the low-paid executives will experience negative completion and adverse selection. They believe that they are unfairly treated or even exploited by the company, which is detrimental to the establishment of a corporate environmental information disclosure system. So assume that:

H4: The smaller the remuneration gap between executives, the greater the possibility of voluntary disclosure of company environmental information.

3 Research Design

3.1 Sample selection and data sources

This article uses Shen Hongtao's (Shen Hongtao, 2010) environmental information disclosure evaluation method in the Shenzhen and Shanghai A-share listed companies during the period of 5 years from 2012 to 2016.The sample companies ultimately acquired 148 listed companies. The data used in this article comes from the database of corporate governance structure of the CSMARDatabase, the China Securities Regulatory Commission website, the WIND database, and the CNINFO website. The data of this article mainly use Excel, SPSS20.0 software to complete statistical analysis.

3.2 Variable selection

In the A-share listed companies in Shenzhen and Shanghai during the 5-year period from 2012 to 2016, this article adopts the enterprise environmental information disclosure evaluation method proposed by Shen Hongtao (Shen Hongtao, 2010), and selects the listing company of voluntary disclosure of environmental information in the annual report and social responsibility report. In order to ensure the validity of the data, in the screening of samples, the A-share listed companies that issued B shares or H shares at the same time were excluded, the total short-term compensation data of executives, the number of executives and the background characteristics of executives were unclear or not disclosed. The company eventually won 148 listed companies, including 5 samples in 2012, 7 samples in 2013, 18 samples in 2014, 44 samples in 2015, and 74 samples in 2016. At the same time, this article selected another 148 companies with similar industry and asset scales as control samples.

The data used in this article comes from the company's corporate governance structure executive database dynamic database and environmental information disclosure database of CSMAR database, China Securities Regulatory Commission website, WIND database and Juchao information network, etc. Some data are incomplete, need to refer to the annual report of the listed company and processing calculation Acquired. In order to effectively avoid the impact of intra-group transactions, the data used is the data in the consolidated report. The data in this article mainly uses Excel and SPSS20.0 software to complete statistical analysis.

The meaning of variables is shown in Table 1:

Table 1   Study Variable Definition Table

Variable Type	Symbol	Variable Name	Calculation Formula
Dependent variable	VED	Voluntary disclosure of environmental information	There is a voluntary environmental information disclosure =1, otherwise =0
independent Variable	X_1	Short-term remuneration for top management	ln(Total annual salary of directors, supervisors and executives / top management's number)
	X_2	Long-term remuneration for top management	top management share ratio / top management's number
	X_3	The ratio of long-term compensation of top management	top management stock holdings * year-end stock price / (top management short-term salary + top management shareholding * stock price at end of year)

Continual Table 1

Variable Type	Symbol	Variable Name	Calculation Formula
Moderating Variable	X_4	Top management remuneration gap	ln[Core top management compensation /3-noncore top management remuneration / top management's number -3]
	AGE	Top Management Team Heterogeneity	$\sqrt{\sum_{i=1}^{n}\left(A_i - \overline{A}\right)^2} / \overline{A}$
	TEN	Top Management Team Tenure Heterogeneity	$\sqrt{\sum_{i=1}^{n}\left(B_i - \overline{B}\right)^2} / \overline{B}$
	EDU	Top Management Team Educational Heterogeneity	$1 - \sum_{i=1}^{n} P_i^2$
Control Variable	LEV	asset-liability ratio	Total liabilities / total assets
	SIZE	scale of the enterprise	ln（The book value of the company's total assets at the end of the year）
	INDUSTRY	industry	High pollution industry =1, otherwise =0

3.3 Model design

Based on the above assumptions and variables, the article establishes the following logistic regression model based on the research on the executive compensation structure and environmental information voluntary disclosure of companies at home and abroad.

Model 1：

$$\ln\left(\frac{\Pr(VED=1)}{1-\Pr(VED=1)}\right) = \sigma + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \beta_1 LEV + \beta_2 SIZE + \beta_3 INDUSTRY + \varepsilon_1$$

Model 2：

$$\ln\left(\frac{\Pr(VED=1)}{1-\Pr(VED=1)}\right) = \sigma + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \mu_1 TMT + \beta_1 LEV + \beta_2 SIZE$$
$$+ \beta_3 INDUSTRY + \varepsilon_2$$

4 Empirical Analysis

4.1 Descriptive statistical analysis

This article makes descriptive statistics on sample groups: one group is listed companies that voluntarily disclose environmental information, and the other group is listed companies that do not voluntarily disclose environmental information. The results of the descriptive statistics analysis are shown in Table 2 and Table 3.

Table 2 Descriptive Statistics of Voluntary Disclosure of Environmental Information Sample Companies

	N	Min	Max	Mean	Standard Deviation
X_1	148	10.840	14.83	12.725	.833
X_2	148	.000	.063	.007	.016
X_3	148	.000	.999	.546	.477
X_4	148	10.250	14.320	11.471	1.007
AGE	148	.066	.240	.138	.0404
TEN	148	.000	1.341	.531	.469
EDU	148	.000	.750	.556	.1393
LEV	148	.060	62.57	1.232	7.215
SIZE	148	17.280	25.19	21.953	1.509
INDUSTRY	148	0	1	.70	.462

Table3   No Descriptive Statistics of Voluntary Disclosure of Environmental Information Sample Companies

	N	Min	Max	Mean	Standard Deviation
X_1	148	11.330	14.040	12.646	.539
X_2	148	.000	.067	.009	.016
X_3	148	.000	.999	.411	.418
X_4	148	-12.83	12.43	9.327	6.694
AGE	148	.061	.28	.159	.048
TEN	148	.000	1.140	.606	.264
EDU	148	.000	.731	.532	.135
LEV	148	.070	63.731	1.512	7.432
SIZE	148	16.120	25.290	22.072	1.409
INDUSTRY	148	0	1	.75	.454

4.2 Correlation analysis

In order to judge the direction and extent of correlation between executive compensation structure and environmental information disclosure, this article also conducts Pearson correlation analysis on each variable. Theoretically speaking, the correlation coefficient exceeds 0.8, indicating that the correlation is strong. It can be seen from the results in Table 4 that there is no strong correlation between the variables.

Table 4   Result of Correlation Analysis

	VED	X_1	X_2	X_3	X_4	AGE	TEN	EDU	LEV	SIZE	INDUSTRY
VED	1										
X_1	-.046	1									
X_2	.061	-.120	1								
X_3	.162**	.018	.654**	1							
X_4	-.423***	.212**	.067	.123	1						
AGE	-.120	-.242	.261**	.346**	.157	1					
TEN	.178**	-.232**	-.391**	-.287**	.143	.042	1				
EDU	.176**	-.020	.248	.185*	.1410	.037	-.127	1			
LEV	-.189	-.183*	-.063	-.092	.218	.187*	.164	-.145	1		
SIZE	.029	.344**	-.185*	-.150	.124	-.341**	-.039	.040	-.265**	1	
INDUSTRY	.062	-.170	.063	.123	.039	.124	-.123	.183*	.251	-.143	1

4.3 Multicollinearity test

In this article, a multi-collinearity test was performed on all variables before binomial regression analysis. As shown in Table 5, the tolerance between each variable is higher than 0.1, and the variance expansion factor VIF is also between 0-10, indicating that there is no multicollinearity problem between the variables, and the latter logistic regression analysis can be performed.

Table 5   Multicollinearity Analysis of Related Variables

	Varible	Tolerance	VIF
Control variable	LEV	.750	1.452
	SIZE	.469	2.280
	INDUSTRY	.753	1.46
Independent variable	X1	.537	1.889
	X2	.251	4.249
	X3	.544	2.353
	X4	.178	5.870
Moderator	AGE	.66	1.722
	TEN	.494	1.784

Continual Table 5

	Varible	Tolerance	VIF
Interaction variable	*EDU*	.689	1.531
	$AGE \times X_1$	.715	1.519
	$AGE \times X_2$	.342	3.110
	$AGE \times X_3$	.383	2.647
	$AGE \times X_4$	.572	1.879
	$TEN \times X_1$	.775	1.407
	$TEN \times X_2$	.314	3.392
	$TEN \times X_3$	.531	1.820
	$TEN \times X_4$	.355	2.802
	$EDU \times X_1$	.787	1.355
	$EDU \times X_2$	.315	3.287
	$EDU \times X_3$	.342	3.019
	$EDU \times X_4$	.426	2.504

4.4 Regression analysis on the effect of executive compensation structure on the voluntary disclosure of environmental information

Binomial logistic regression was used to test the impact of executive compensation structure on voluntary disclosure of environmental information. It can be seen from Table 6 that the observed value of the Hosmer-Lmemshow statistic is 5.380, and the associated probability p is 0.735, which is significantly greater than the significance level of 0.05, indicating that the actual value equation fits the data well.

Table 6   Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.380	8	.735

From the regression coefficient in Table 4,The regression coefficients of executive short-term compensation (X_1), executive long-term compensation (X_2), executive long-term compensation (X_3), and executive compensation gap (X_4) are -1.860, 0.216, 0.016, - 2.609, respectively. The short-term salary (X_1), the long-term salary ratio of executives (X_3), and the executive compensation gap (X_4) have p-values of 0.003, 0.017, and 0.000, respectively, which are less than the significance level of 0.05, indicating the short-term salary and long-term salary of executives. There is a significant correlation between the ratio of compensation and the gap between wages and voluntary disclosure of environmental information.

1. The impact of short-term remuneration of senior executives on the voluntary disclosure of environmental information passed a significant test. The assumption H1 is established. The main reason is that higher short-term salary is likely to cause short-term behavior of the senior management team, which in turn hinders the establishment and improvement of corporate environmental information disclosure system.

2. The effect of long-term salary of senior executives on the voluntary disclosure of environmental information did not pass the significance test. The assumption H2 is not established. The reason for this is that the composition of executive compensation for listed companies in China is mainly short-term. The role and role of long-term remuneration has not been taken seriously by companies, which has led to the lack of effective long-term incentives in the disclosure of environmental information in listed companies in China.

3. The influence of long-term salary proportion of senior executives on the voluntary disclosure of environmental information passed a significant test. The assumption H3 is established, that is, the larger the long-term remuneration ratio of senior executives, the more likely the company is to voluntarily disclose environmental information. In conclusion, simply increasing long-term remuneration does not help companies establish an environmental information disclosure system, but increasing the proportion of long-term remuneration can significantly promote companies to voluntarily disclose environmental information.

4. The impact of executive remuneration gaps on the voluntary disclosure of environmental

information passed a significant test, the assumption H4 is established. This means that the small remuneration gap between executives is conducive to promoting team cooperation, mobilizing the enthusiasm of the senior executives, and encouraging them to build a more complete environmental information disclosure system for the company.

Table 7　Regression Analysis of Executive Compensation Structure on the Voluntary Disclosure of Environmental Information

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
X_1	-1.860	.60	9.75	1	.003	.151	.052	.485
X_2	.216	.178	1.360	1	.255	1.239	.878	1.750
X_3	.016	.008	5.646	1	.017	.994	.971	.997
X_4	-2.609	.485	28.957	1	.000	13.297	5.851	32.173
LEV	-1.287	1.268	.999	1	.327	3.615	.299	42.339
SIZE	.091	.242	.134	1	.825	1.095	.789	1.808
INDUSTRY	-.075	.553	.019	1	.892	.928	.314	2.739
Constant	-6.973	4.845	1.522	1	.333	.003		

4.5 Robustness analysis

In order to ensure the reliability of the research conclusions, the article carries out the following robustness test. According to the principle of correlation, comparability, qualitative and quantitative, combined with the requirements of the "Guidelines for Environmental Information Disclosure of Listed Companies" issued by the Ministry of Environmental Protection, the environment is constructed. The information disclosure indicator system was scored by the "content analysis method", and 148 companies were provided with the Environmental Disclosure Index (EDI). Using EDI as an alternative to environmental information disclosure VED, the above regression test was repeated, and the test results (Table 8) were basically consistent with the conclusions of this article, which verified the robustness of the conclusions of this article.

Table 8　Regression Analysis of Executive Compensation Structure on EDI

Variable	Dependent variable: Environmental Information Disclosure （EDI）	
	Regression coefficients	T
Constant	-6.768***	-4.123
X_1	-1.456***	-2.301
X_2	.201	-.012
X_3	.126***	.247
X_4	-1.863***	-4.120
LEV	-2.013	-1.213
SIZE	.471	.241
INDUSTRY	-.165	-.204
Adjusted R^2	0.087	
F	2.769	

5 Conclusion

This article concludes the following conclusions by analyzing the influence of the composition, proportion, and gap of executive compensation on the voluntary disclosure of environmental information:

First, there is a negative correlation between short-term remuneration and the level of environmental information disclosure, which shows that when executives' short-term remuneration is high, their emphasis on environmental information disclosure is reduced. Secondly, the effect of long-term salary of senior executives on the voluntary disclosure of environmental information of listed companies fails to pass the significance test, but the proportion of long-term compensation is more obvious for the voluntary disclosure of environmental information of listed companies. This shows that although long-term remuneration has not yet exerted its proper incentive role, increasing the proportion of long-term remuneration of senior executives in total remuneration can prompt the company's

environmental information disclosure system to be closely related to the business behavior of senior executives. Finally, the relatively small remuneration gap has also had a significant impact on the voluntary disclosure of environmental information by listed companies.

Acknowledgement

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Empirical Research on Performance of Listed Companies in Coal Industry of China

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Abstract: Empirical research is carried out in this thesis by virtues of the factor analysis method of STATA software, with the financial indices of listed companies in coal industry of China between 2014 and 2016 published by CSMAR Database as data. 12 financial indices are taken as the initial basic variables based on the solvency, operation capacity, profitability and development capacity, to extract three factors, including profit and sustainable growth, debt repayment and operation, build up the evaluation system for the performance of listed companies in coal industry, and calculate the scores and ranks of each listed company based on it. The results show that the profit and sustainable growth factors have significant positive correlation with the financial conditions of the listed companies; further researches show that listed companies in coal industry generally have the problems about excessive idle assets and low fund utilization rate. On a basis of it, the significance of efficiently using idle assets and expanding profit channel for the listed companies in coal industry is deduced, and related recommendations for the sustainable and sound development of the coal industry are proposed.
Key words: Coal industry; Factor analysis; Performance level; Sustainable and sound development

1 Introduction

The current situation of resources in China determines that coal is dominant in the energy production and consumption (Chen Guangsheng, 2012), and the coal industry is the cornerstone for the development of the energy industry in China, and also the basic industry of national economy. In China, coal is the major supply resource of four downstream industries, namely iron and steel, power, chemical engineering and building material; taking the power sector for an example, currently thermal power generation depending on coal accounts for 70% gross generation (Wang Meiling, 2013). Therefore, the sound development of the coal industry is closely linked with the construction of people's livelihood.

On the other hand, as "ten-year golden cycle" of the coal industry in China came to an end in 2013, the coal industry in China has been depressed once (Wang Meiling, 2013), the market supply and demand have changed, the price has continued to decrease and the industrial production capacity has been excessive, which greatly reduced the benefits of listed companies in coal industry. Therefore, it is critical to seek for the sustainable and sound development of listed companies in coal industries.

The performance of listed companies in the coal industry is evaluated. On the one hand, it provides a comparison between the performance of a certain enterprise and other enterprises in the industry, so asto find out the gap between them and the enterprise's competitive advantage. Then the business operation status can be improved on this basis. On the other hand, the main factors affecting the performance of the coal industry is analyzed, which is helpful to conduct relevant reforms in the coal industry in a targeted manner and promote its sustainable development.

The study of industry performance evaluation mainly starts from the DuPont analysis system. Combined with the characteristics of the industry and the needs of the enterprise itself, the DuPont analysis system is revised, and relevant financial indicators are selected for factor analysis. However, most of the existing papers take the performance analysis as part of the overall evaluation. They roughly select two or three indicators representing the financial capabilities of a certain aspect to construct the indicator system; while the reasons for the indicator selection are not explained. As a result, these papers have no persuasion but poor practicability.

2 Empirical Research on Performance of Listed Companies in Coal Industry

2.1 Selection of research object and evaluation indices

According to Flush Software statistics, there are totally 33 listed companies in coal industry in China, and special treatment of cancellation is carried out in this thesis based on the reliability principle of the data analysis, to remove three companies, namely Pingzhuang Energy (Inner Mongolia Pingzhuang Energy Co., Ltd.), Zhengzhou Coal Industry (Group) Co., Ltd. and Henan Dayou Energy Co., Ltd., and take the remaining listed companies as the analysis objects, take the financial data

published by CSMAR Database in 2014, 2015 and 2016 as sources, and to finally obtain 90 samples.

In the existing related literature, Luo Xun (2006) built a financial quality index evaluation system for listed companies in China's coal industry, based on the previous research and combined with DuPont analysis system as well as current China's securities evaluation system. He selected 14 evaluation indicators from four aspects including profitability, operational ability, solvency and sustainable development ability. Sheng Lin (2009) took the financial indicators of the "Evaluation Rules on State-owned Enterprise Performance" as the main body and screened relevant financial indicators using the highly irrelevant method. Finally 7 financial indicators were obtained. On this basis, the factor analysis method was used to establish a financial evaluation model. Thus, starting from the four aspects of solvency, operational ability, profitability and development ability, relevant index variables are selected in this paper. Eventually, according to the principle of relevance, 12 index variables are determined as the initial basic variables for statistical analysis, depict the quantitative relation among factors, apply dimensionality reduction concept to classify the observational variables, find out representative common factors, build up related mathematical models based on it, set up comprehensive evaluation index system, measure the performance level of listed companies in coal industry of China(Zhu Wenli and Yang Xiaoyuan, 2016), and so as to analyze the major factors affecting the development of listed companies in coal industry; specific variables are defined in Table 1.

Table 1　Table of Variable Definition

Financial capacity	Name of index	Symbol	Definition of index
Solvency	Asset-liability ratio	X_1	Total liabilities/assets; measurement of long-term solvency
	Equity ratio	X_2	Total liabilities/owner's equity; measurement of long-term solvency
	Liquidity ratio	X_3	Current assets/current liabilities; measurement of short-term solvency
Operation capacity	Turnover of fixed assets	X_4	Operating income/net amount of fixed assets at the end of the period
	Total assets turnover	X_5	Operating income/balance of total assets at the end of the period
Profitability	Return on assets	X_6	(Total profits and financial expenses)/total assets
	Rate of return on total assets	X_7	Net profits/total asset balances
	Net assets returns ratio	X_8	Net profits/balance of stockholder's equity
	Return ratio of long-term capitals	X_9	(Total profits and financial expenses)/long-term asset amounts
	Net operating profit ratio	X_{10}	Net profits/operating income
Development capacity	Growth rate of basic earnings per share	X_{11}	（ (Single-quarter amount of basic earnings per share in current period of the year- amount of basic earnings per share in previous single quarter)/ amount of basic earnings per share in previous single quarter
	Growth rate of owner's equity	X_{12}	(Closing value of owner's equity in current period-opening value of owner's equity in current period)/ opening value of owner's equity in current period

2.2 Factor analysis and its results

2.2.1 Index system inspection

STATA Software is used to carry out Kmo inspection on the selected indices to judge the suitability of factor analysis. Generally, when Kmo statistics is more than 0.9, the factor analysis will achieve the best effect, and when it is below 0.5, factor analysis is improper. The inspection results are listed in Table 2, and Kmo is 0.6729, and thus the results of factor analysis are acceptable.

Table 2　KMO Inspection Results

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	Overall
kmo	0.6541	0.536	0.4477	0.294	0.5118	0.6794	0.8371	0.7324	0.8422	0.7926	0.3969	0.7556	0.6729

2.2.2 Eigenvalue and accumulated variance contribution rate

Specific results are shown in Table 3.

Table 3   Eigenvalue and Accumulated Variance Contribution Rate

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	6.1934	4.21901	0.6209	0.6209
Factor2	1.97439	0.76115	0.1979	0.8189
Factor3	1.21324	0.93941	0.1216	0.9405
Factor4	0.27383	0.03383	0.0275	0.9679
Factor5	0.24	0.13407	0.0241	0.992
Factor6	0.10593	0.02939	0.0106	1.0026
Factor7	0.07654	0.05588	0.0077	1.0103
Factor8	0.02067	0.02543	0.0021	1.0124
Factor9	-0.00477	0.0093	-0.0005	1.0119
Factor10	-0.01407	0.01446	-0.0014	1.0105
Factor11	-0.02853	0.04741	-0.0029	1.0076
Factor12	-0.07594	0.033	-0.0076	1

Principal factor method is used for analysis in this thesis to get the eigenvalue, explained variance and accumulated variance contribution values of each common factor listed in Table 3. In general, the extraction standard for principal factor is: eigenvalue no less than 1. The results show that the eigenvalues of the first three common factors are more than 1 and the accumulated variance contribution rate reaches 94.05%, which explains most of information about the sample index, and thus the first three common factors are selected as the principal factors for factor analysis. Among them, F1 explained variance contribution rate reaches 62.09%, becoming a key factor affecting the performance of listed companies in coal industry.

2.2.3 Component matrix

The typical representative variables of principal factors have been initially shown in the component matrix listed in Table 4, but the logical relation among factor is not obvious now, and thus it is necessary to rotate and re-distribute the explained variance proportion of each factor, to make its load coefficient closer to 1 or 0 and to achieve better explanation and naming.

Table 4   Component Matrix

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Uniqueness
X_1	-0.7513	0.1753	0.5242	0.2159	0.0404	0.0601	0.0911	-0.0458	0.0677
X_2	-0.749	0.3103	0.5359	0.0962	-0.0913	-0.0972	-0.0099	0.0479	0.0261
X_3	0.3218	0.1341	-0.5616	0.2766	-0.1015	-0.1207	0.109	-0.0036	0.4498
X_4	-0.1332	0.9246	-0.1507	0.0473	0.1447	-0.0091	0.0174	0.027	0.0803
X_5	-0.272	0.806	-0.2705	-0.027	-0.0602	0.1349	-0.0721	-0.0075	0.1753
X_6	0.9328	0.1518	0.2819	0.0127	-0.1411	-0.0769	0.0116	-0.0297	0.0004
X_7	0.9742	0.0882	0.1187	-0.0131	-0.107	0.0235	0.0312	0.0961	0.0066
X_8	0.9332	0.0322	0.1293	-0.0362	0.0928	0.157	0.162	-0.0033	0.0506
X_9	0.8816	0.2746	0.3476	-0.0097	-0.038	-0.0009	-0.0671	-0.0055	0.0206
X_{10}	0.9406	0.1633	0.0174	0.1287	-0.0993	0.0186	-0.0889	-0.0603	0.05
X_{11}	0.0953	-0.431	-0.0289	0.3435	0.0529	0.127	-0.0949	0.0409	0.6567
X_{12}	0.7152	0.0715	0.0883	0.0469	0.3756	-0.1115	-0.0447	-0.0012	0.3178

2.2.4 Factor load rotation

The rotation component matrix obtained from factor load rotation is shown in Table 6, in which F_1 has larger load in X_6 return on assets, X_7 rate of return on total assets, X_8 net assets returns ratio, X_9 return ratio of long-term capitals, X_{10} net operating profit ratio and X_{12} growth rate of owner's equity, and the first five items reflect the profitability of listed companies, and the last one reflects the growth rate of the retained incomes, representing the sustainable growth capacity of companies, and thus F_1 may be called the profit and sustainable growth factor; F_2 has larger load in X_1 asset-liability ratio, X_2 equity ratio and X_3 liquidity ratio; therefore, F_2 is named as solvency factor; F_3 has larger load in

X_4 fixed assets turnover and X_5 total assets turnover, and these two indices are used to measure the operation capacity of listed company, and thus F_3 may be called operating factor.

Table 5   Eigenvalue and Accumulated Variance Contribution Rate upon Rotation

Factor	Variance	Difference	Proportion	Cumulative
Factor1	5.02141	2.77988	0.5034	0.5034
Factor2	2.24153	0.30814	0.2247	0.7281
Factor3	1.93338	1.63115	0.1938	0.922
Factor4	0.30224	0.02291	0.0303	0.9523
Factor5	0.27933	0.08458	0.028	0.9803
Factor6	0.19475	0.09256	0.0195	0.9998
Factor7	0.10219	0.079	0.0102	1.01
Factor8	0.02319	0.0247	0.0023	1.0124

Table 6   Rotation Component Matrix

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8	Uniqueness
X_1	-0.3916	-0.8676	0.0966	-0.0294	-0.0027	0.0632	0.0961	0.053	0.0677
X_2	-0.3452	-0.8852	0.2032	-0.0549	-0.0733	-0.0826	-0.1105	-0.0485	0.0261
X_3	0.1114	0.4857	0.2237	0.4966	-0.0157	0.0705	-0.0074	0.0001	0.4498
X_4	0.0379	-0.1475	0.9368	0.0601	0.1125	-0.044	0.0155	-0.0218	0.0803
X_5	-0.1378	-0.0673	0.8804	-0.0114	-0.1538	0.016	-0.0337	0.0292	0.1753
X_6	0.9797	0.1512	-0.0726	0.0596	0.0101	-0.076	-0.0444	0.0191	0.0004
X_7	0.9309	0.3299	-0.0746	0.0382	-0.0095	0.0002	0.0286	-0.1002	0.0066
X_8	0.8634	0.3306	-0.1043	-0.041	0.1081	0.0273	0.2636	-0.0072	0.0506
X_9	0.98	0.0691	0.0492	-0.0661	0.0727	-0.0102	-0.0448	0.0103	0.0206
X_{10}	0.8853	0.3538	0.0302	0.1274	0.0168	0.1148	-0.0657	0.0783	0.05
X_{11}	-0.0216	0.0938	-0.393	0.1429	0.0601	0.3941	0.0133	0.0027	0.6567
X_{12}	0.6321	0.2515	-0.0239	-0.018	0.4651	0.0401	0.0229	0.0014	0.3178

2.2.5 Calculation of integrate score

Factor scores are shown in Table 7. According to Table 7, the integrate score can be calculated.

Table 7   Factor Score Coefficient Matrix

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
X_1	0.18568	-0.3514	-0.10043	1.32896	-0.24052	0.31856	0.78316	0.15189
X_2	-0.01442	-0.91989	-0.07328	-1.34697	-0.52028	1.51376	-0.10944	-1.94802
X_3	-0.03912	-0.04166	0.02798	0.17253	0.03571	0.23179	0.05135	-0.12946
X_4	0.07189	0.20519	0.68014	0.93902	0.75818	-1.2423	-0.0666	0.74185
X_5	-0.00615	0.00334	0.26958	-0.41371	-0.72278	0.5253	0.18413	-0.33432
X_6	0.74066	-0.04686	-0.32519	3.79838	0.69782	-6.709	-1.09686	5.07103
X_7	0.1995	0.12203	-0.15734	0.60844	-2.53837	3.30813	1.16426	-6.11505
X_8	0.01436	-0.25366	-0.00458	-1.38196	0.33488	0.52209	1.55068	0.1293
X_9	0.15521	-0.19103	0.37246	-2.99426	1.23065	1.15064	-0.89352	0.72756
X_{10}	0.00284	-0.08251	0.09801	-0.16516	-0.52174	2.65665	-0.22706	-0.48156
X_{11}	0.02083	-0.02506	-0.03615	0.162	0.14718	0.02621	-0.09888	0.22096
X_{12}	-0.02664	-0.05495	-0.06599	-0.06589	0.41247	0.41292	0.012	-0.53304

$$F_1 = 0.18568X_1 - 0.01442X_2 - 0.03912X_3 + 0.07189X_4 - 0.00615X_5 + 0.74066X_6 + 0.19950X_7$$
$$+ 0.01436X_8 + 0.15521X_9 + 0.00284X_{10} + 0.02083X_{11} - 0.02664X_{12}$$
$$F_2 = -0.35140X_1 - 0.91989X_2 - 0.04166X_3 + 0.20519X_4 + 0.00334X_5 - 0.04686X_6 + 0.12203X_7$$
$$- 0.25366X_8 - 0.19103X_9 - 0.08251X_{10} - 0.02506X_{11} - 0.05495X_{12}$$

$$F_3 = -0.10043X_1 - 0.07328X_2 + 0.02798X_3 + 0.68014X_4 + 0.26958X_5 - 0.32519X_6 - 0.15734X_7$$
$$- 0.00458X_8 + 0.37246X_9 + 0.09801X_{10} - 0.03615X_{11} - 0.06599X_{12}$$

The variance value and accumulated variance contribution rate corresponding to each principal factor shown in Table 5 are used to obtain the integrate score function for the performance of listed companies in coal industry:

$$F = (0.5034F_1 + 0.2247F_2 + 0.1938F_3)/0.9220$$

Now therefore, the score rank and integrate score rank of each principal factor of listed companies in coal industry may be obtained.

Table 8   Score Rank and Integrate Score Rank of Each Principal Factor of Listed Companies in Coal Industry

	factor1	Rank	factor2	Rank	factor3	Rank	F	Rank
Jingyuan Coal Industry and Electricity Power	0.749026	4	0.760118	9	0.540825	7	0.707885	3
Jizhong Energy	0.23417	15	1.02445	3	1.47269	2	0.687074	4
Xishan Coal Electricity	0.009303	19	0.520674	12	-0.24882	13	0.079671	17
Lutian Coal Industry	0.568588	7	-0.40228	21	-0.43158	19	0.121685	15
Shanxi Lanhua Sci-Tech Venture	1.480281	2	0.799553	6	-0.36141	17	0.927107	2
Yongtai Energy	-0.69194	25	0.484815	13	-0.53157	24	-0.37137	25
Yanzhou Coal Mining	1.311298	3	-1.6478	28	-1.03065	29	0.097729	16
Yangquan Coal Industry	0.665567	5	-0.45473	22	1.012011	3	0.465289	6
Guizhou Panjiang Refined Coal	0.553961	8	-0.04038	20	0.717571	5	0.443443	7
Anyuan Coal Industry	0.157041	16	1.002468	4	0.155766	11	0.362794	8
Shanghai Energy	-3.124	30	0.557794	11	0.990811	4	-1.36146	28
Shanxi Coal International	-1.9284	29	-1.16373	27	-0.50141	21	-1.44189	29
Jinrui Mineral	-0.15492	22	1.214407	1	-0.34469	16	0.138926	14
Liaoning Hongyang Energy	0.498739	9	-2.40004	30	3.764369	1	0.478645	5
Hengyuan Coal	0.595295	6	0.285638	14	-0.45867	20	0.298227	10
Kailuan Energy	-0.59694	24	-1.01615	26	-0.58692	26	-0.69694	27
Datong Coal Industry	0.33087	12	-0.765	25	-0.66725	27	-0.14604	22
China Shenhua Energy	-1.12996	27	0.988889	5	0.569371	6	-0.25626	23
Beijing Haohua Energy Resource	-1.37949	28	0.779825	8	-0.2823	15	-0.62247	26
Shaanxi Coal Industry	0.25458	14	0.081658	17	0.29446	9	0.220793	13
PingdingshanTian'an Coal Ming	-0.25654	23	0.134827	16	-0.02741	12	-0.11297	20
Shanxi Lu'an Environmental Energy Development	0.291149	13	0.788136	7	-0.54637	25	0.236196	12
China National Coal	0.060157	18	-0.00747	19	0.211106	10	0.075398	18
Xinji Energy	1.761954	1	0.741392	10	-0.42871	18	1.052576	1
Meijin Energy	-0.05447	20	1.143428	2	0.320016	8	0.316189	9
Antai Group	0.461442	10	0.282126	15	-0.26271	14	0.265478	11
Shanxi Coking	-0.1229	21	-0.69318	23	-0.52177	23	-0.34571	24
Yunnan Coal Energy	0.459584	11	-0.717	24	-0.5061	22	-0.03019	19
Baotailong	0.072818	17	-0.00394	18	-0.77888	28	-0.12492	21
Shaanxi Heimao	-1.07625	26	-2.2785	29	-1.5318	30	-1.46489	30

3 Result Analysis

Xinji Energy has the best rank and the highest performance level. In the rank of three factors, F_1 profit and sustainable growth rate factor ranks the first, F_2 solvency factor and F_3 operating factor are at the midstream level. On the one hand, the experimental results fully show F_1 profit and sustainable growth rate factor is of strong promoting function on the integrate rank; on the other hand, it also shows this enterprise is of lower operating risk and better development prospect.

Shanghai Energy ranks last in F_1 profit and sustainable growth rate factor; although it reveals stronger fund utilization efficiency and performance development capacity, it ranks the fourth in F_3 operating factor and at the midstream level in F_2 solvency factor; but its integrate rank still ranks the third from bottom, and is not greatly improved due to good performance of F_2 and F_3. The example of Shanghai Energy also demonstrates that F_1 profit and sustainable growth rate factor has an important effect on the performance of listed companies in the coal industry.

Jinrui Mineral ranks the first in F_2 solvency factor, showing the Company has stronger solvency and internally sufficient disposable current assets available. But another two factors ranks at the mid-low level, especially F_1 profit and sustainable growth rate factor ranking the 22nd, which result ranks the 14th finally in the integrate ranking. It is a common situation of listed companies in the coal industry; Meijin Energy, China Shenhua Energy and Beijing Haohua Energy Resource have similar problems, such as many idle assets and low fund utilization rate, resulting in poor profitability and the absence of sustainable development motivation.

4 Recommendations for Economic Development of Listed Companies in Coal Industry

4.1 Expanding profit channel and enhancing sustainable development capacity of the industry

It is found in the researches of this thesis that F_1 profit and sustainable growth rate factor has significant positive correlation with the performance of listed companies in the coal industry, and it is important to start from profit and development to enhance the financial capacity of the listed companies. On the one hand, supply and demand imbalance of coal industry in the market remains and the coal price continues to decrease; under such background, enterprises rather need to continuously strengthen its own construction, carry out technological innovation, update business development mode, enhance industrial concentration and develop economies of scale. Longitudinally, the development to downstream industries such as power and chemical industry is necessary; horizontally, expansion of business and penetration into transportation, building materials and other fields are in need. Economies of scale can be formed through mergers and shareholdings; on the other hand, listed companies need to further adjust their production capacity structure, accelerate the technical innovation and reform of clean coal, improve coal's energy utilization rate and control the harm to the environment in the mining and combustion process. These measures will enhance the sustainable development capacity of the industry.

4.2 Efficiently using idle assets to improve the fund utilization rate

Low fund utilization rate becomes a common problem of listed companies in the coal industry, and thus it is critical to efficiently use idle assets and enhance the circulation and utilization of internal funds and other assets of companies. Try to re-utilize and efficiently use the idle assets, externally lease unneeded assets. Idle houses and equipment can be reutilized through leasing and investment, thus increasing the amount of current assets; carry out resource allocation, and re-distribute the idle resources in the enterprises, thus improve the production capacity of the enterprise; the third is to technically transform the idle resources. Transforming the eliminated coal mining equipment is able to re-establish production capacity. Full utilization of internal idle resources of the companies will enable the enterprises to effectively operate and provide more authentic and reliable financial information.

5 Conclusion

Through the measurement and comparison among performances of listed companies in the coal industry, it is shown that F1 profit and sustainable growth rate factor has significant positive correlation with the performance of listed companies in the coal industry, and companies with higher F1 score will have the advantages in the comprehensive competition. Further researches show that listed companies in the coal industry have common problems about low utilization rate of fund or other assets, which severely affects the operation, profitability and sustainable development capacity of the companies. Therefore, it is necessary to start from profit and sustainable development to enhance the development of listed companies in the coal industry, and at the same time consider the utilization efficiency of internal resources of enterprises, enhance the competitiveness and vitality of the industry, and thus to drive the sustainable and sound development of the coal industry.

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Analysis on Comprehensive Benefit Evaluation System of New Energy Bus: Based on Stakeholder Dimension

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Abstract: Based on the concept of total cost of ownership and GREET model, the evaluation indexes of economic and environmental benefits are established in this paper. The social benefit evaluation indexes are constructed considering the interests of bus stakeholders: the government, residents, passengers, public opinion.This paper establishes a comprehensive benefits evaluation index system ofNEBs from the perspective of stakeholders and provides a comprehensive basis for busoperators to make rational decisions onwhether to introduceNEBs.
Key words: New energy bus (NEB); Stakeholders; Social benefit; Total cost of ownership; GREETmodel

1 Introduction

Recent years saw the spreading ofnew energy bus(NEB), the increase of government subsidy and the prevalence of green consumptionphilosophy. In this social context, bus operators are faced with the decision whether to introduce NEBs. Only considering economic benefits directly does not necessarily guarantee the maximization of their interests. Therefore, before introducing and operating NEBs, bus operators should take theeconomic, environmental and social benefits into account.

Scholars have three different perspectives on the benenfits of NEBs operation: economic benefits, environmental benefits and social benefits.

From the research on the economic benefits of introducing NEBs, some foreign scholars believe that the implementation of government subsidy policy plays an important role in reducing the purchase cost of NEBs, and indirectly promotes the development of NEBs. Most scholars mainly use the concept of total cost of ownership to compareand analyze NEBs and ICV, and put forward some suggestions for improving the economic benefits of NEBs.

To sum up, although purchase subsidies and tax exemption can reduce the purchase cost of NEBs, when comparing with ICV, it is the consensus that the total cost of ownership should be basis method to compare their economic profit.Based on that point and the operation practice of NEBs in China, the total cost of ownership of NEBs can be divided into four parts: purchase cost, government subsidy, energy consumption cost, maintenance cost, which will be considered as evaluation indexes of economic benefits.

Table 1　Economic Benefit Index Table of NEBs

Project	Speific Indexes	Literature Sources
Economic Benefit	Purchase Cost	Christian Thiel et al.(2010); V.Gass et al.(2014)
	Government Subsidy	Kuniaki Yabe et al.(2012);Reinhart Kiihne(2010)
	Energy Consumption Cost	Chengtao Lin et al.(2013);Deng Yuting(2017); N.Whitehouse(2009)
	Maintenance Cost	EVANTHIA A N et al.(2013);WanJian,et al.(2015)

As for the research on the NEBs environmental benefits, based on the fact that although there areno any emissions in the driving phase of NEBs, the NEBs actually incurred emissions in the production of its electric energy, scholars have proposed to measure environmental benefits more comprehensively and accurately between ICV and NEBs from a life-cycle perspective.

In measuring the environmental benefits of NEBs, GREET model is the well-accepted method to measure the CO_2 emissionsand other conventional pollutants (NO_x, SO_2, PM)in the life cycle. The GREET model, which was developed by Agonne National Laboratory in 1995, was used to evaluate the environmental benefits of the bus throughout its life cycle (WTW, Well.To Wheels). The carbon dioxide emissions for the whole cycle of a bus consist of two parts, namely, the amount of carbon dioxide emitted during the operation of the vehicle (PTW, Pump To Wheel) and the amount of carbon dioxide emitted in other stages (WTP,Well To Pump).

Table 2   Environmental Benefit Index Table of NEBs

Project	Speific Indexes	Literature Sources
Environmental Benefit	CO2	Caulfield et al.(2010); Kliucininkas et al.(2012) R.Sharmaa et al.(2013);Nanaki et al.(2014)
	NOx	McKenzie et al.(2012);R.Sharmaa et al.(2013)
	SO2	Sanchez et al.(2012); R.Sharmaa et al.(2013); Nanaki et al.(2014)
	PM	McKenzie et al.(2012);Nanaki et al.(2014)

At present, there are few researches on the social benefits of NEBs operation. Liu Wei believes that for the surrounding residents, the implementation of clean and renewable energy projects will affect the quality of life and health care[18].At the same time, for the whole city and society, the introduction of NEBs will help the government to obtain public support, improve the image of the city, and upgrade the urban infrastructure. Mingming Chen et al. and Gu Jieweipoint out that the social benefits of NEBs on passengers mainly are travel time and travel safety.

Table 3   Social Benefit Index Table of NEBs

Project	category	Speific Indexes	Literature Sources
Social Benefit	Resident	Public quality of life	Liu Wei（2009）
		Public health care	Liu Wei（2009）
		Real estate appreciation	Hao Cheng(2008)
	Passenger	Travel safety	Mingming Chen(2012); Gu Jiewei(2017)
		Save passenger time	Mingming Chen(2012); Gu Jiewei(2017)
	Government	Public support	Liu Wei（2009）
		Government image	Liu Wei（2009）
		Urban infrastructure	Liu Wei（2009）
	Public Opinion	Energy conservation	Hao Cheng(2008)
		Public consciousness	Hao Cheng(2008)
		City image	Mingming Chen(2012); Gu Jiewei(2017)
		Impact on other regions	Mingming Chen(2012); Gu Jiewei(2017)

To sum up, researches on the measurement ofeconomic benefits of NEBs' operation are relatively mature. However the measurement of environmental benefits is mainly considering CO_2, which also needs to consider conventional pollutants. In addition, the research on social benefits is still relatively few and has not formed a satisfactory evaluation index system.

3 A case study of NEB in Wuhan 295 Road

Wuhan Bus Company plans to adopt NEB on the 295 bus, which results in the decision of synthetically considering the benefits ofBYD K9 and Yutong ZK6128HG.

3.1Analytic hierarchy process to determine weights

Scored by experts and tested for its consistency, get the relative weight of final indexes. The AHP was adopted to calculate the composite weight as follows:

Table 4   Synthetic Weight of Comprehensive Benefit Evaluation Index for NEB

Criterion layer	Index layer	Sub index layer	Composition weight
Economic benefit 0.724	purchase cost 0.493	Purchase cost 1	0.3569
	Government subsidy 0.35	Government subsidy 1	0.2534
	Energy consumption cost 0.106	Energy consumption cost 1	0.0767
	Maintenance cost 0.051	Maintenance cost 1	0.0369
Environmental benefit 0.193	CO_2 0.444	CO_2 1	0.0857
	NO_2 0.222	NO_x 1	0.0428
	SO_2 0.222	SO_2 1	0.0428
	PM 0.112	PM 1	0.0216

Criterion layer	Index layer	Sub index layer	Composition weight
Social benefit 0.083	Resident 0.288	Public quality of life 0.54	0.0129
		Public health care 0.297	0.0071
		Real estate appreciation 0.163	0.0039
	Passenger 0.532	Travel safety 0.667	0.0295
		Save passenger time 0.333	0.0147
	Government 0.068	Public support 0.333	0.0019
		Government image 0.667	0.0038
	Public opinion 0.112	Urban infrastructure 0.092	0.0009
		Energy conservation 0.25	0.0023
		City image 0.548	0.0051
		Impact on other regions 0.042	0.0004
		Public consciousness 0.067	0.0006

3.2 Scoring criteria

According to the actual situation of bus operation in China, after soliciting expert opinion, the index scoring standard is obtained as table 5. In order to make the indicators comparable, the evaluation score is set at 0-1.

Table 5   Indicator Scoring Standard Table

Specific indicators	Similar buses Possible range of values	Criterion
Purchase cost(C1)	min0.5million yuan, max2.5 million yuan	The highest selling price 2.5 million yuan is set to 0 and the lowest selling 5 million yuan is set to 1, according to the linear function assignment
Government subsidy(C2)	min 0million yuan, max0.6 million yuan	Minimum allowance 0million yuan set at 0 and maximum allowance 0.6 million yuan set at 1,according to the linear function assignment
Energy consumption cost(C3)	min0.35million yuan, max1.2 million yuan	The maximum energy consumption 1.2 million yuan is set to 0 and the minimum energy consumption 0.35million yuan is set to 1,according to the linear function assignment
Maintenance cost(C4)	min0.08millionyuan, max0.6 million yuan	The maximum cost 0.6 million yuan is set to 0 and the minimum cost 0.08 million yuan is set to 1, according to the linear function assignment
CO_2(D1)	min384.8t,max456t	Set maximum emission 456t to 0 and minimum 384.8t to 1, according to the linear function assignment
NO_x(D2)	min0.92g,max2.85g	Set maximum emission 2.85g to 0 and minimum 0.92g to 1,according to the linear function assignment
SO_2(D3)	min1.57g,max3.9g	Set maximum emission 3.9g to 0 and minimum 1.57g to 1, according to the linear function assignment
PM(D4)	min0.008g,max0.030g	Set maximum emission 0.03g to 0 and minimum 0.008g to 1,according to the linear function assignment
Public quality of life(F1)	Subjective index	To be rated by an expert or an investigation.
Public health care(F2)	Subjective index	To be rated by an expert or an investigation.
Real estate appreciation(F3)	Subjective index	To be rated by an expert or an investigation.
Travel safety(G1)	Subjective index	To be rated by an expert or an investigation.
Save passenger time(G2)	Subjective index	To be rated by an expert or an investigation.
Public support(H1)	Subjective index	To be rated by an expert or an investigation.
Government image(H2)	Subjective index	To be rated by an expert or an investigation.
Urban infrastructure(I1)	Subjective index	To be rated by an expert or an investigation.
Energy conservation(I2)	Subjective index	To be rated by an expert or an investigation.
City image(I3)	Subjective index	To be rated by an expert or an investigation.
Impact on other regions(I4)	Subjective index	To be rated by an expert or an investigation.
Public consciousness(I5)	Subjective index	To be rated by an expert or an investigation.

3.3 Evaluation Results

Table 6   BYD K9 and Yutong ZK6128HG Total Score Table

Specific indicators	Synthetic weight	Index score BYD K9	Index score ZK6128HG Yutong	Weighted score BYD K9	Weighted score Yutong ZK6128HG
Purchase cost(C1)	0.3569	0.2780	0.0000	0.0992	0.0000
Government subsidy(C2)	0.2534	0.8330	0.0000	0.2111	0.0000
Energy consumption cost(C3)	0.0767	0.5840	0.6440	0.0448	0.0494
Maintenance cost(C4)	0.0369	0.5000	1.0000	0.0185	0.0369
CO_2(D1)	0.0857	0.0170	0.0240	0.0015	0.0021
NO_x(D2)	0.0428	0.6150	0.0000	0.0264	0.0000
SO_2(D3)	0.0428	0.9630	0.3000	0.0413	0.0129
PM(D4)	0.0216	0.2860	0.5560	0.0062	0.0120
Public quality of life(F1)	0.0129	0.7500	0.3500	0.0097	0.0045
Public health care(F2)	0.0071	0.6500	0.2500	0.0046	0.0018
Real estate appreciation(F3)	0.0039	0.5500	0.1500	0.0021	0.0006
Travel safety(G1)	0.0295	0.6300	0.5700	0.0186	0.0168
Save passenger time(G2)	0.0147	0.8500	0.6500	0.0125	0.0096
Public support(H1)	0.0019	0.6500	0.0500	0.0012	0.0001
Government image(H2)	0.0038	0.8500	0.0100	0.0032	0.0000
Urban infrastructure(I1)	0.0009	0.6500	0.2500	0.0006	0.0002
Energy conservation(I2)	0.0023	0.7500	0.3500	0.0017	0.0008
City image(I3)	0.0051	0.8500	0.1500	0.0043	0.0008
Impact on other regions(I4)	0.0004	0.5500	0.2500	0.0002	0.0001
Public consciousness(I5)	0.0006	0.4500	0.0500	0.0003	0.0000
Total score	1.0000			0.5079	0.1486

From the evalutaion, we can see that the comprehensive benefit of BYDK9 is higher than that of Yutong ZK6128HG, so that the Wuhan public transport company should launch the NEB BYDK9in 295 lines.

4 Conclusion

The existing research onNEBs related decision-making pays more attention to the economic and environmental benefits, and pays little attention to the social benefits. But for bus operators, the government, passengers, residents, public opinion's concern on NEBs operation must be considered to bear its responsibility. Therefore, busoperators should consider the economic, environmental and social benefits when making decisions to introduce NEBs.

Considering stakeholders' concern as social benefits, this paper establishes a comprehensive benefits evaluation index system ofNEBs from the perspective of stakeholders. The above index system is applied to the introduction decision of Wuhan 295 Road NEB.

Acknowledgement

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Evaluation Research on Financial Competitiveness of New Energy Listed Companies

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Abstract: With A-share listed company of new energy industry in stock markets in Shanghai and Shenzhen from 2012 to 2016 as research sample, SPSS software is applied and principal component analysis is adopted to establish and evaluate three main components of financial competitiveness of listed new energy companies and deduce component score coefficient matrix in the Paper. Based on the quantitative and qualitative dimensions, this paper conducts evaluation research on the financial competitiveness of listed companies of new energy resources. It holds that the new energy companies in China suffer many disadvantages, such as low-level development with large gap and high financial risk. On this basis, it puts forward feasible suggestions to provide reference for finding how to make these new energy companies more competitive financially.
Key words: New energy; Financial competitiveness; Principal component analysis; The listed company

1 Introduction

General Secretary Xi proposed to "accelerate energy production and consumption revolution and construct clean and low-carbon, safe and high-efficient energy system" in the report of the 19th National Congress of the Communist Party of China in 2017. The development strategy of supporting development of electric vehicles and fuel cell cars, mastering low-carbon, information and intelligent core technologies of vehicles continuously was clarified with "energy-efficient and new energy vehicles" proposed in Made in China 2025 as key development field in 2015. It was proposed in the "13th Five-Year" development plan of national strategic emerging industries in 2016 that during the period of the "12th Five-Year Plan", new energy industry developed rapidly in China, competitiveness of a batch of enterprises entered into the first matrix of international market in the field and new energy revolution was changing existing international resource energy territory. Risk Analysis Report on New Energy and Renewable Energy Industry in 2017 indicated that developing new energy industry had become an important choice for China to change production modes and adjust energy structures in 2017. However, new energy development in China is still confronted with problems of relatively high cost and weaker market competitiveness. So how to evaluate financial competitiveness of new energy enterprises scientifically and fairly has become an important subject in the field of financial research.

Pei Yu (Pei Yu, 2011)analyzed the current situation and characteristics of new energy enterprises, expounding the causes and phenomena of financial risks in such new energy enterprises, and constructing a warning index for such financial risks from the aspects of management status, financial management status, financial situation and operation condition. Xiao Yanchun (Xiao Yanchun, 2013), with the help of the theories and methods regarding the investment value of listed companies, systematically studied the investment value of listed new energy companies, and built a comprehensive evaluation model. Yang Min (Yang Min, 2016)analyzed the influence of the financing structure of listed new energy companies on the performance of such companies based on the factor analysis method, finding that the capital structure of listed companies in the new energy industry is not reasonable, which adds great burden on such companies. Zhang Tong (Zhang Tong, 2017) selected the annual financial data of new companies regarding national equities exchange and quotations to make a performance research system. Based on the comprehensive model, the business level and development potential of such enterprises were analyzed. The existing studies related can provide a reference for the listed new energy companies in Chine to understand their position in the industry and their own shortcomings in management, which promotes the development of such companies. However, in terms of the evaluation of the financial competitiveness of such new energy enterprises, it still faces inadequate combination of their own characteristics.

Three principal components influencing financial competitiveness of listed new energy companies are extracted, comprehensive score calculation equation of financial competitiveness of listed new energy companies is deduced. Based on the combination of the characteristics of new energy industry, the objective evaluation of financial competitiveness for new energy enterprises is realized in the Paper through analysis on panel data of listed new energy companies from 2012 to 2016, by applying SPSS

software and based on principal component analysis method. The research hopes to provide feasible suggestions for new energy industries to improve financial competitiveness and seek more healthy and continuous development.

2 Research Design

2.1 Sample selection

142 listed new energy companies in stock markets of Shanghai and Shenzhen are adopted as initial sample in the Paper. Samples are eliminated according to the following conditions: (1) eliminate companies listed in 2012 and beyond; (2) eliminate samples with incomplete data. According to the above standards, 123 samples are selected finally. In order to improve reliability of data, average values of data from 2012 to 2016 these five years are adopted as initial data. Related data for research in the Paper are derived from CSMAR database and the software used for empirical analysis is SPSS22.0.

2.2 Index selection

With financial competitiveness of listed new energy companies as research object ang *Detailed Rules for The Implementation of Comprehensive Performance Evaluation of Central Enterprises* formulatedby the State-owned Assets Supervision and Administration Commission of the State Council as reference basis, 9 factors are selected as initial indexes (variable involves profitability, debt-paying ability and development ability of enterprises these three aspects) for empirical analysis in the Paper. Initial indexes selection is shown in Table 1.

Table 1　Variable Set

Index types	Index name	Variable code
Profitability	Earnings per share	X1
	Return on assets	X2
	Gross operating profit	X3
	Operating profit ratio	X4
Debt-paying ability	Asset-liability ratio	X5
	Liquidity ratio	X6
	Quick ratio	X7
Development ability	Operating profit growth rate	X8
	Net profit growth rate	X9

3 Empirical Analysis

3.1 KMO and bartlett test

KMO test statistic is the index used to compare partial correlation coefficient among variables. Generally, KMO>0.6 shows that selected indexes are relatively appropriate to be provided with principal component analysis; Bartlett test of sphericity is used to verify whether all variables are independent respectively. Generally, obtained P value is required to be less than 0.05. It can be known from Table 2 that KMO value of this analysis is 0.641, which shows that correlation among variables is relatively strong; P value is much less than 0.05, which shows that correlation matrix is not unit matrix and null hypothesis is rejected. In conclusion, it can be judged that selected indexes are appropriate to be provided with principal component analysis.

Table 2　KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.641
Bartlett's Test of Sphericity	Approx. Chi-Square	658.268
	df	36
	Sig.	.000

3.2 Total explained variance

It can be seen from Table 3 that the first three indexes can be extracted as principal component following the extraction principle that characteristic value is more than 1, and accumulative variance explanation ratio of the first three indexes is 66.496%, it can be reflected from this that explanation force of selected principal components is relatively large.

Table 3   Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.790	31.004	31.004	2.790	31.004	31.004
2	2.150	23.884	54.887	2.150	23.884	54.887
3	1.045	11.608	66.496	1.045	11.608	66.496
4	.982	10.909	77.405			
5	.852	9.472	86.877			
6	.596	6.625	93.501			
7	.341	3.792	97.293			
8	.228	2.533	99.826			
9	.016	.174	100.000			
Extraction Method: Principal Component Analysis.						

3.3 Communalities

Communalities reflect explanation force of selected principal component for each variable. It is shown in Table 4 that extraction degree of most variables is above 60%, where extraction degree of liquidity ratio and quick ratio is higher than 90%, which shows that extracted principal component contains most original information and extraction effect of principal components is better.

Table 4   Communalities

	Initial	Extraction
Zscore (average net profit growth rate X9)	1.000	.639
Zscore (average operating profit growth rate X8)	1.000	.428
Zscore (average liquidity rate X6)	1.000	.939
Zscore (average quick rate X7)	1.000	.926
Zscore (average asset-ability ratio X5)	1.000	.760
Zscore (average earnings per share X1)	1.000	.321
Zscore (average return on asset X2)	1.000	.813
Zscore (average operating margin X3)	1.000	.465
Zscore (average operating profit ratio X4)	1.000	.694
Extraction Method: Principal Component Analysis.		

3.4 Scree plot

It is reflected in Fig. 1 intuitively that characteristic values of the first three principal components are more than 1 and the slope is steep, while characteristic values of several subsequent components are less than 1 and the slope tends to be flat, which verifies reasonability of extracting three principal components again.
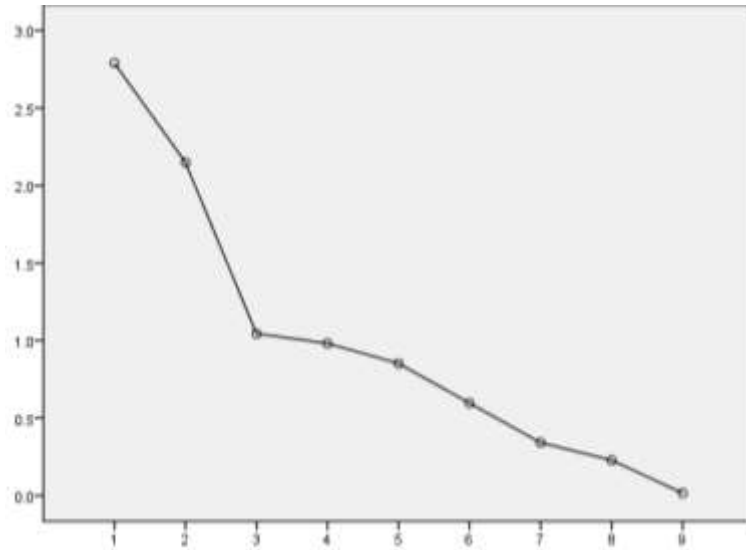
Figure 1   Scree Plot

3.5 Component plot in rotated space

Three principal components are described in Fig. 2 more intuitively. It can be known according to sample distance that extracted three principal components are: (1) net return on equity, return on invested capital and return on assets (2) gross operating profit, operating profit ratio (3) liquidity ratio, quick ratio and asset-liability ratio (4) net profit growth rate and operating profit growth rate.
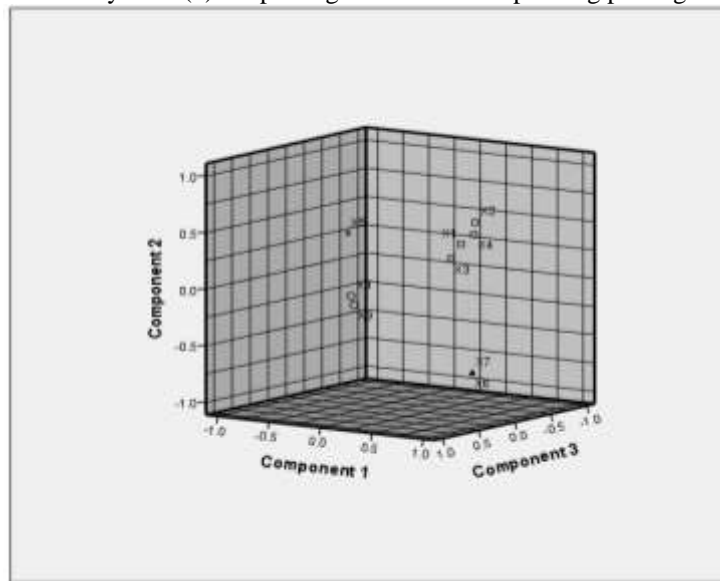
Figure 2   Component Plot

3.6 Component score coefficient matrix

Principal component scoring equation is deduced according to component score coefficient matrix in Table 5. The equation is as follows:

$F1=0.912X9+0.912X8-0.839X6+0.203X7+0.329X5+0.093X1+0.472X2+0.178X3-0.103X4$

$F2=-0.311X9-0.289X8+0.213X6+0.879X7+0.765X5+0.559X1+0.488X2+0.006X3-0.125X4$

$F3=-0.103X9-0.104X8-0.101X6+0.007X7+0.009X5-0.016X1+0.061X2+0.779X3-0.634X4$

Variance contribution ratio is taken for all principal factor weights. The equation of calculating composite score is:

$F=(0.31004\times F1+0.23884\times F2+0.11608\times F3)/0.6649$

Table 5   Component Score Coefficient Matrix

	Component		
	1	2	3
Zscore(average net profit growth rate X9)	.064	.003	.746
Zscore(average operating profit growth rate X8)	-.037	-.058	.607
Zscore(average liquidity rate X6)	.327	-.145	-.099
Zscore(average quick rate X7)	.327	-.135	-.100
Zscore(average asset-ability ratio X5)	-.301	.099	-.096
Zscore(average earnings per share X1)	.033	.260	-.015
Zscore(average return on asset X2)	.073	.409	.007
Zscore(average operating margin X3)	.169	.227	.058
Zscore(average operating profit ratio X4)	.118	.356	.009

Extraction Method: Principal Component Analysis.
Component Scores.

Based on the above analysis, selected indexes can be divided into three principal components. Liquidity ratio, quick ratio and asset-liability ratio reflect debt-paying ability of companies and have larger load on the first principal component, so the first principal component is generalized into debt-paying ability; return on assets, earnings per share, operating margin and operating profit ratio reflect corporate profitability and have larger load on the second principal component, so the second principal component is generalized into profitability; net profit growth rate and profit growth rate reflect growth ability of enterprises and have larger load on the third principal component, so the third principal component is generalized into growth ability.

3.7 Robustness test

In order to verify correctness and reliability of the above-mentioned conclusions, the following robustness test is implemented.

Insurance companies are divided into two types by cluster analysis. After the type with less number of companies is eliminated, composite score of financial competitiveness is deduced for the other type of companies according to steps same as the above research. Table 6 is obtained by verifying robustness of competitiveness evaluation results of companies by signed rank test.

Table 6   Related-Samples WIlcoxon Signed Rank Test

Null Hypothesis	Sig	Decision
The median of differences between 1 and 2 equals 0	0.156	Retain the null hypothesis

It can be obtained from results in the Table that: bilateral significance level is 0.156 and is far more than 0.05. Therefore, it can be regarded that difference between composite score of companies in test group and composite score of original companies is not significant. Both samples are from the same population and with same population distribution. It is proved that reliability of original empirical results is relatively strong and passed robustness test.

3.8 Composite score result and analysis

According to analysis results of correlation matrix, based on three above indexes and their weights, principal component score and composite score of all samples are calculated and top 10 and bottom 10 enterprises are listed, as shown in Table 7.

Table 7   Summary table of the top 10 and top 10

stock code	REGR factor score 1 for analysis 1	ranking	REGR factor score 2 for analysis 1	ranking	REGR factor score 3 for analysis 1	ranking	composite scores	ranking
300316	4.59548	1	.85628	17	-.27242	112	2.40	1
600770	.72637	22	4.54202	1	.11383	23	1.99	2
300037	2.13063	8	1.27755	6	-.03007	66	1.45	3
300234	2.04081	9	.94015	13	-.02474	65	1.28	4
300335	2.16391	7	.44367	36	-.08703	84	1.15	5

Continual Table 7

stock code	REGR factor score 1 for analysis 1	ranking	REGR factor score 2 for analysis 1	ranking	REGR factor score 3 for analysis 1	ranking	composite scores	ranking
002168	2.34781	3	.10626	54	-.01022	60	1.13	6
601311	1.48274	11	1.11017	10	-.04914	73	1.08	7
002487	2.77539	2	-.54085	95	-.28436	113	1.05	8
002389	2.30529	4	-.17109	76	-.02369	64	1.01	9
002518	1.13887	14	.89357	15	.04808	41	.86	10
600550	-.95981	110	-.71065	105	-.10758	92	-.72	114
002384	-.72731	92	-.88238	111	-.42886	117	-.73	115
600744	-1.32839	121	-.21449	80	-.31730	115	-.75	116
600642	-.09917	56	-2.04738	122	.09452	28	-.77	117
600795	-1.37085	123	-.35289	88	-.14225	99	-.79	118
000875	-1.21220	118	-.68805	101	-.11532	94	-.83	119
000862	-.75717	97	-.63108	99	-2.14001	121	-.95	120
600608	-1.25196	119	-.92312	114	-.35378	116	-.98	121
300029	-.04851	55	-6.67516	123	.41909	8	-2.35	122
600416	-1.35442	122	-1.22143	119	-7.54231	123	-2.39	123

3.8.1 General analysis

In general, overall debt-paying ability of listed new energy enterprises in China is weaker and financial risk is relatively high. Debt-paying ability is the first principal component, which shows that debt-paying ability has the most obvious influence on financial competitiveness of listed new energy companies. However, there are only 52 companies with debt-paying ability score being positive among listed new energy companies in China. The proportion is about 41% and is less than a half; where there are only 17 companies with debt-paying ability score more than 1 and the proportion is only 13%.

Overall profitability development is imbalanced with a great difference and still has great space for improvement. There are 62 companies with profitability score being positive among listed new energy companies and the proportion is more than 50%; where there are 54 companies with score more than 1 and the proportion reaches 43%; the highest score is 4.54202 and the lowest score is -6.67516. It can be reflected from this that profitability of about a half of companies is good among listed new energy companies in China, but there are still about a half of enterprises with negative profitability. The difference between enterprises with profitability ranking top and rank bottom is obvious.

Overall growth ability is weaker, difference of companies is great and the conditions is relative severe. Growth ability is of great importance for continuous healthy development of new energy industry, but there are only 56 companies with growth ability score being positive among listed new energy companies in China and the proportion is 45%; where there are 26 companies with score more than 1 and the proportion is 26%; the highest score is 4.89081 and the lowest score is -7.54231, so it is reflected that new energy companies in China have poor growth at present, the score difference of companies ranking top and bottom is about 13 scores with great difference.

Based on the above analysis, comprehensive development conditions of new energy companies in China is not optimistic with low level, great difference and many problems. Necessary measures are waiting to be adopted to improve development level further.

3.8.2 Individual enterprise analysis

Jingsheng Mechanical & Electrical Co., Ltd. (300316) ranks first comprehensively. Through analysis for related data, it is found that the debt-paying ability is in the first place with score of 4.59548, which reflects that debt-paying, risk response and continuous operation ability of the Company are relatively strong; but the growth ability score is -2.7242 and ranks the 117th place, which shows growth of the Company is poor and development speed is slow. It is suggested for the enterprise to adopt necessary measures to obtain capital, expand operation and improve market share.

Xiangtan Electric Manufacturing Co., Ltd. (600416) ranks bottom comprehensively. Ability scores of three aspects are negative, where growth ability score is -7.54231 and ranks the last, which shows that the company has relatively serious problem in the aspect of paying debts, obtaining profits and continuous operation and so on, and development speed is slow; it warns decision-makers and

management personnel of the company to pay attention to financial status of enterprises more and adopt necessary response measures.

Zongyi Group ranks the second comprehensively. Through analysis, the profitability is in the top place with score of 4.54202, which shows that the company has relatively strong profitability and market competitiveness and greater development potential; the debt-paying ability score is 0.72637, which shows that the enterprise has certain ability of paying debts and undertaking risks, but there is a difference between debt-paying ability score and the maximum score of 5 points approximately and is less than 1, which shows that debt-paying ability of the enterprise is waiting to be improved further; the growth ability score is 0.11383, which shows that the enterprise has growth but the growth is weak, and decision-makers of the enterprise need to expand operation and improve market share.

Guodian Nanjing Automation Co., Ltd. ranks the 55th place. Growth ability of the company is in the top place with score of 4.89081, which shows that the enterprise has relatively large business scale and market share, relatively fast development speed and greater development prospect. Profitability score is -.76818 and is in the 108th place, which shows that profitability of the enterprise is insufficient.

By comparing with companies with different financial competitiveness levels, it can be found that electronic and electrical industry development momentum is strong in new energy industry. Jingsheng Mechanical & Electrical Co., Ltd., Capchem, Camel Group, Kstar and Shenzhen Huicheng belong to electronic and electrical industry in companies with comprehensive competitiveness ranking top ten, accounting for 50% of top ten.

4 Conclusion

This article makes use of the "principal component analysis method" to analyze the index system of financial competitiveness of new energy listed companies. Panel data studies for 2012-2017 show that solvency, profitability, and development capability are important indicators for evaluating new energy listed companies. In particular, debt repayment ability has a high correlation with the financial competitiveness of new energy companies. Moreover, through further research and analysis, it has also been found that, at current stage, the electronic and electric industries have the most comprehensive competitiveness in the new energy industry.

The enlightenment of this study to China's new energy industry is that it is necessary to comprehensively consider three aspects of capabilities in the development of new energy companies, including solvency, profitability, and development capability. Through the improvement of solvency, it's hoped to lay a solid foundation for R&D and innovation of technology. Moreover, we will conduct further investigation and research on the reasons that have affected the comprehensive competitiveness of the electronics and electrical industries.

In terms of sample selection, this article is just limited to new energy listed companies, but the actual application scope of the system has not yet been extended to those companies that have not been listed. On the selection of indicators, non-financial indicators have not been included in the study, which can't be further reflected the impact of non - financial indicators on the comprehensive financial competence of new energy listed companies.These limitations will be further improved in subsequent studies.

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Research on the Energy Saving Control and Networking of the Energy Management and Control System in Manufacturing Enterprises

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Abstract: Energy management and control system (EMCS) realizes the networking of the enterprises'energy management and control. Combined with the energy situationand the energy consumption of manufacturing enterprises, in China,this paper proposes a method of energy-saving Control and Intelligent control system in Manufacturing Enterprises which based on the complete decomposition Model and laspeyres Index method,also makes the network extension of manufacturing enterprises' energy consumption and energy saving data. Through the interconnection of energy consumption and energy saving resources by government or third party like the energy consumption processing center, to analysis on the networking and intellectualization of the energy consumption and energy saving , energy consumption prediction and the extention of the experience and methods of high quality energy saving ,for the purpose to build a large-scale interconnected energy transmission system in orde to improve the energy consumption prediction, control and energy saving among manufacturing enterprises , regions and governments, and realize the collaborative development of the three that it is beneficial for the manufacturing enterprises to change their energy consumption into clean and low carbonization.

Key words: Energy consumption; Enterprise energy saving; Energy management and control; Intelligence; Eetworking

1 Introduction

As the global economy recovers, energy consumption recovers, energy consumption structures accelerated change further into cleanliness, low carbonization , the proportion of coal consumption drops slightly, the proportion of natural gas and non-water renewable energy consumption increases slightly.The Korean government formulate ten areas of technology such as energy, resources, machinery, manufacturing and intensified energy storage technology and continue to expand investment in machinery manufacturing enterprises intelligentialize and service-oriented; U.S.A has proposed a "Priority Energy Plan for the United States", proposing to embrace the revolution of shale oil and gas, develop the technology of clean coal and revitalize American coal industry; The European Commission has released an upgraded version of the SET-Plan. European Union will focus on four core priority areas in renewable energy, intelligent energy systems, energy efficiency and the sustainable transportation , as well as the specific areas of carbon capture and sequestration and nuclear energy,and take a range of actions to research and preferential innovation.

China is the second largest energy consumer in the world, and the name card "made in China" has been famous for a long time, accompanied by a largely increase in energy consumption.To improve the energy consumption, energy conservation analysis and experience of manufacturing enterprises in data network, and meet the "global energy Internet" proposed by general secretary xi. Manufacturing enterprise energy consumption and energy saving data interconnection to form a large interconnected energy transmission system, It is one of the research directions of China's current energy control system. according to the energy situation of China and the energy consumption of manufacturing enterprises,this paper analyzed the energy saving in the Manufacturing Enterprise, trying to solve three questions like the energy efficiency and the trend of energy saving , also the research on the development of energy Intelligent control system and network of control system in manufacturing enterprises.

2 The Analysis of Energy Status and Energy Consumption of Manuf-acturing Enterprises in China.

As shown in Figure 1, in the rapid development process of economic in China, due to the various conditions,the proportion of coal is high and it is difficult to change the energy pattern that the coal as the main source of energy. At present, the coal unilization ratio in China is high and the natural gas usage rate is low, the high quality energy is relatively insufficient, the energy resources are unevenly

distributed, the energy structure is unreasonable, which restricts the scientific development of china's energy resources. If this situation continues, it will bring more pressure to the ecological environment. Only by increasing the energy efficiency, eliminating the enterprises with hight energy-consuming improving the energy market system, and standardizing the energy regulatory system, To intelligentialize and Internetlize the control of energy resources iisthe trend of energy resources use, energy consumption control and energy consumption guidance.

From the Figure 2 and Figure 3, we can see that in the process of rapid economic development, the total output value of manufacturing industry has increased year by year, and the increasing speed has slowed down, while the rate of growth of manufacturing industry has changed a lot, and has been greatly affected by international and policy factors, the energy consumption has remained high,the energy density has dropped dramatically, gradually changing into a clean, low-carbon, safe and efficient energy system. In order to achieve a breakthrough in the new energy reforming,China must take actions to use energy and control the energy consumption in the manufacturing industry ,in the direction of intelligentialization and Internetlization.

Figure1-3 data sources: China Statistical Yearbook, China Industrial Economic Statistics Yearbook, China Energy Statistics Yearbook.
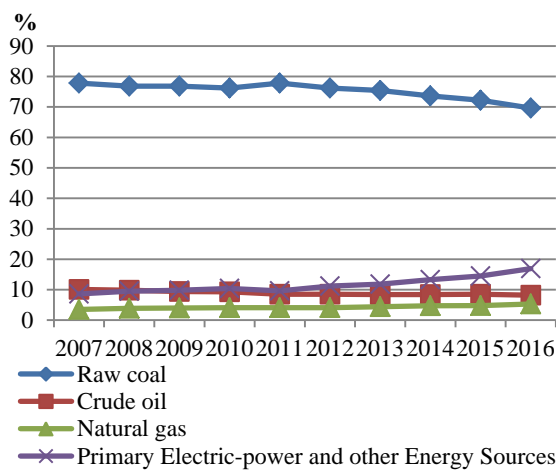
Figure 1   Analysis of china's energyresources consumption from 2007 to 2016
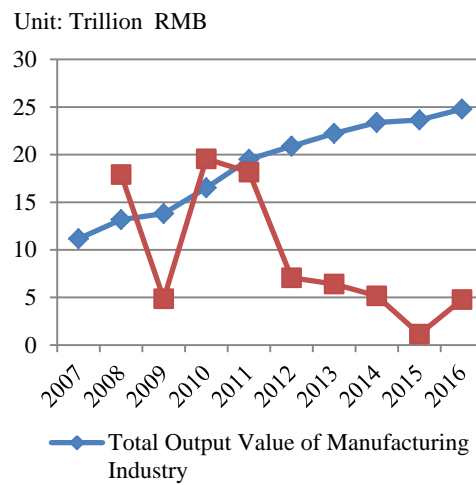
Figure 2   China's Total Output Value and the Growth Rate of manufacturing industry from 2007 to 2016
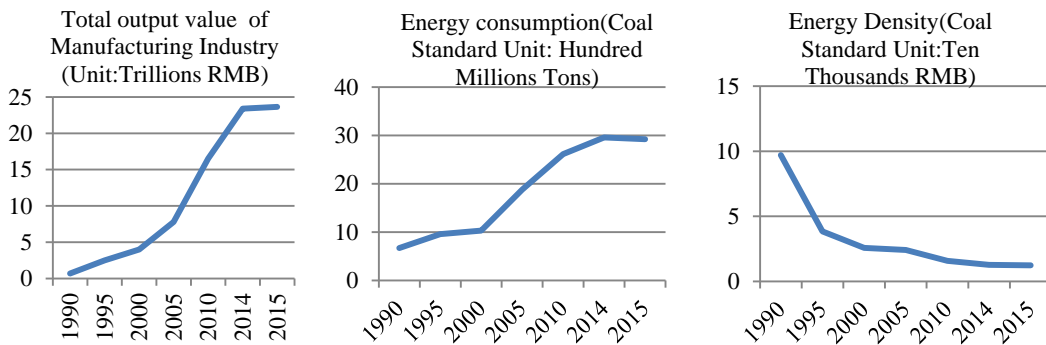
Figure 3   China's Total Output Value of Manufacturing Industry, Energy Resources Consumption and Energy Density from 1990 to 2015

The technology innovation of energy consumption control of "Made in China in 2025",not only refers to the subversive technology in the traditional sense, but also includes the organic integration of energy consumption control technology and enterprise industry chain and value chain. Manufacturing enterprises should stand at the height of energy reform and social progress, actively seek change, take the "global energy Internet" as an opportunity to continuously integrate, and make use of the innovation ability and integration of the Internet,to form a set of the systemic solutions in energy consumption and control

among the enterprises, regions, industries ,to realize the data intelligence, regionalization, interconnection and other different levels of energy consumption control, energy distribution, energy conservation promotion ,also to take effective measures to break the links among the energy use, energy consumption control and energy-saving to achieve intelligent energy control and networking that is the right direction of the manufacturing companies, government and third-party agencies need to work together.Total Output Value of　Manufacturing Industry,Energy Resources Consumption and　Energy Density.

3　The Implementation Approach of Energy Control System on Energy Conservation,Intelligent Control in the Manufacturing Enterprises

To realize the intelligent control,the manufacturing enterprises 'energy control system firstly collects the energy itemized metering information,water, gas (hydrogen, oxygen, nitrogen and inert gas), fuel gas (gas and natural gas, etc),electricity, steam, coal, oil, etc. Secondly ,controls and coordinates the energies.The energy control mainly reports the energy data periodically , which includes the statistics and forecasts, and compares the actual energy consumption with the expected energy consumption calculated on the basis of actual production parameters. In order to improve the reliability of energy data measurement and calculation and realize the energy intelligent control system for planning, observation and control, for making a plan of the implementation of energy-saving technology projects . Energy coordination is a comprehensive dynamic balance between all energy sources. According to the production plan and the energy prediction, the energy supply and control can be coordinated intelligently, which can not only meet the energy demand of production process, but also avoid load peak reasonably. Through the above two steps to achieve the dynamic control of energy quality and energy indicators.The dynamic control of energy quality is through certain means of detection, such as the quality analysis, quality tracking, trend assessment, warning of crossing line , dynamic quality monitoring, intelligent analysis and control of the output provided by the energy center ,balances the contradiction between the production power and the cost of the enterprise, the dynamic monitoring and control of the energy index is based on the statistical energy metering data, the production data, the energy consumption data of each energy consumption equipment , and the control index is put forward, and the energy performance evaluation and management are carried out for each user. The data of energy consumption are obtained through the above methods, and the network intelligent analysis, processing and energy cost accounting, and energy prediction and energy equipment management are carried out.

Energy cost accounting is based on energy measurement data, according to energy input, output value, cost accounting analysis;Energy forecasting is the energy center to account the energy units according to real-time energy database and historical energy database, also using data mining model or multivariate statistical method to caculate the intelligent prediction and analysis according to different production and operation states, to propose the trend of energy consumption;the management of energy consumption equipment is to maintaint the basic data information and give the intelligent analysis,prediction and early warning of the running state and service life of the equipment according to the operation parameters and state curves of the equipment ,which under the accumulation of a large amount of historical data, only in that way it provides the basis for the planned maintenance of the equipment, also it carries on the intelligent control via the utilization ratio, the operating rate,the operation record and the fault record and so on.

4 The Energy Saving Analysis of Energy Management and Control Intelligent Control system in Manufacturing Enterprises

The study of energy efficiency in foreign countries started early and accumulated abundant literature, which generally uses energy density to measure energy efficiency. For example, Mukherjee defined the energy density as the amount of energy consumed per unit of output or activity,M. G Pattersonian 1996) defined energy efficiency as producing a limited number of services or useful production with less energy. Wei Chu China(Wei Chu China, 2007)pointed out that the energy efficiency defined by the DEA method was a measure of the current energy investment and the optimal achievable energy investment under the framework of total factor production, and the influence of other factors on the output is considered synthetically. It is a better indicator of technological efficiency change. In this paper discusses the energy saving problem in the process of intelligent energy management and control system of manufacturing enterprises in China by useing the method of J.W.Sun et al. (J.W.Sun et al., 1999) ,which based on the Laspeyres exponent complete decomposition model.

Firstly,let's set the the energy saving analysis model and method of energy management and control

intelligent control system in a manufacturing enterprise,and assumW_t as the energy consumption of the manufacturing enterprise in period t ;and Q_t as the GEP (gross domestic product of the manufacturing enterprise)in the period -t ; $I_t = \frac{W_t}{Q_t}$ represents the energy intensity of the manufacturing enterprise at time -t;$S_t = \frac{Q_t}{GEP_t}$, represents the proportion of GEP in period -t in this manufacturing enterprise,that is the output structure. so the total energy consumption in production of manufacturing enterprises:

$$W_t = \sum_1^n \frac{W_t}{Q_t} \times \frac{Q_t}{GEP_t} \times GEP_t = \sum_1^n I_t \times S_t \times GEP_t \tag{1}$$

According to the complete decomposition model(J, W, Sun, etc., 1999), the variation of energy consumption can be reduced to three aspects,the increasing effect of production output value of manufacturing enterprises (energy consumption change caused by the increase of total production volume), energy intensity effect (energy efficiency improvement caused by the progress of production technology), structure change effect (the effect of the change of production capacity proportion on energy consumption).

The energy intensity effect can be expressed as:

$$W_I = \sum_1^n (I_{t+1} - I_t) \times S_t \times GEP_t + \frac{1}{2}\sum_1^n (I_{t+1} - I_t) \times [(S_{t+1} - S_t) \times GEP_t + S_t \times (GEP_{t+1} - GEP_t)]$$
$$+ \frac{1}{3}\sum_1^n (I_{t+1} - I_t) \times (S_{t+1} - S_t) \times (GEP_{t+1} - GEP_t)$$
$$= \sum_1^n \Delta I \times S_t \times GEP_t + \frac{1}{2}\sum_1^n \Delta I \times (\Delta S \times GEP_t + S_t \times \Delta GEP) + \frac{1}{3}\sum_1^n \Delta I \times \Delta S \times \Delta GEP \tag{2}$$

The structural effects can be expressed as:

$$W_S = \sum_1^n \Delta S \times I_t \times GEP_t + \frac{1}{2}\sum_1^n \Delta S \times (\Delta I \times GEP_t + I_t \times \Delta GEP) + \frac{1}{3}\sum_1^n \Delta I \times \Delta S \times \Delta GEP \tag{3}$$

The growth effect of output value can be expressed as:

$$W_G = \sum_1^n \Delta GEP \times I_t \times S_t + \frac{1}{2}\sum_1^n \Delta GEP \times (\Delta I \times S_t + I_t \times \Delta S) + \frac{1}{3}\sum_1^n \Delta I \times \Delta S \times \Delta GEP \tag{4}$$

According to the above mode , the energy saving prediction formula of the manufacturing enterprise is as follows :

$$ES = -(W_I + W_s) = -\Big[GEP_{t-1} \times \sum S_{t-1} \times \Delta I + \frac{1}{2}\sum \Delta I \times (S_{t-1} \times \Delta GEP + GEP_{t-1} \times \Delta S) +$$
$$\frac{1}{3}\Delta GEP \times \sum \Delta I \times \Delta S + GEP_{t-1} \times \sum I_{t-1} \times \Delta S + \frac{1}{2}\sum_i \Delta S \times (I_{t-1} \times \Delta GEP + GEP_{t-1} \times \Delta I) + \frac{1}{3}\Delta GEP \times$$
$$\sum \Delta I \times \Delta S \Big] \tag{5}$$

Compared with the general energy saving prediction formula:$Es = -(I_t \times GEP_t - I_0 \times GEP_t) = -GEP \times \Delta I$,Because it takes the changes in dynamic process of energy intensity and the effect of economic structure in manufacturing enterprises into account, it can reflect the actual situation well and the efficiency of energy saving in period T is:

$$ES_{R,\ t} = \frac{ES_t}{W_{t-1} + W_{G,\ t}} \times 100\% \tag{6}$$

Take W_t、Q_t、I_t into the formulae①~⑥which are the energy saving analysis model of intelligent management and control system ,we can get the energy saving estimate ES ,also analysis the energy saving efficiency $ES_{R,\ t}$in period t .As shown in Figure 4, it is the energy saving and energy saving rate of a manufacturing enterprise in 2017.
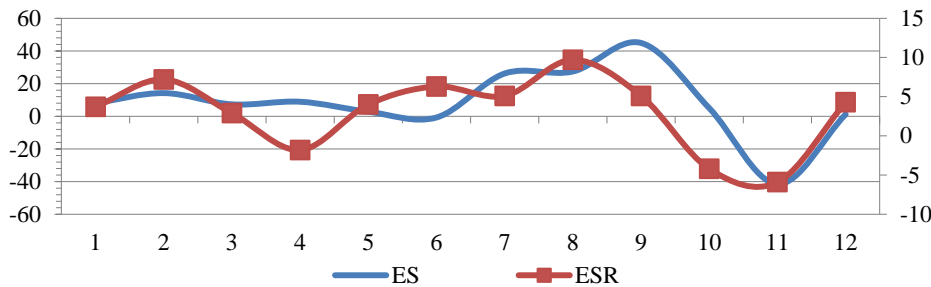
Figure 4　Energy Saving (100 tons of standard coal) and Energy Saving Rate of a Manufacturing Enterprise in 2017

5 The Networking of Intelligent Control System in Manufacturing Enterprises' Energy Management and Control

The EMCS is a management and control interconnection systemwhich combines computer technology, network communication, automation instrument and data intelligent analysis technology .It can monitor the energy management and control of enterprises and provide the basis for energy dispatch. Achieve the purpose of energy saving via systematic intelligent control, and analysis the energy and data resources for the regional interconnection and sharing, providing practical experience and basis for energy saving, which is good for the government or region to analyse data as a whole. Through that way,it is good to distribute the regional Energy and promot the effective Energy Saving methods,so it is an inevitable trend for enterprises, regions and governments to popularize regional energy distribution and effective energy saving methods and it is convenient to promote the efficiency of energy management in enterprises, regions and governments, and it is also the necessary for the development of enterprises.

As the Figure 5 shows that manufacturing enterprises collect the data of the energy consumption equipment, energy consumption control equipment and energy saving equipment via different terminal equipment, then transmit the data to the server of energy management center where the multi-port data intelligent analysis and processing center (based on the complete decomposition model of Laspeyres exponent method for energy saving and energy saving rate analysis) is used to analyze and process the energy consumption data in cloud computing, so as to facilitate the energy consumption monitoring of manufacturing enterprises. The intelligent energy saving control is realized by analyzing and preprocessing and manually confirming the disposal after intelligent analysis and early warning. After authorizing the third party or government energy consumption processing center, the energy consumption and energy saving data of manufacturing enterprises are interlinked with energy consumption and energy saving resources through external or extension network, so as to realize data analysised, managed, shared together. At the same time, the manufacturing enterprise can also receive the data by the third party or the government energy saving data receiving server, so that the enterprise can intelligently analyze and select the energy saving experience and method which can help its own enterprise, and realize a more efficient energy saving way to maximize its economic benefits.
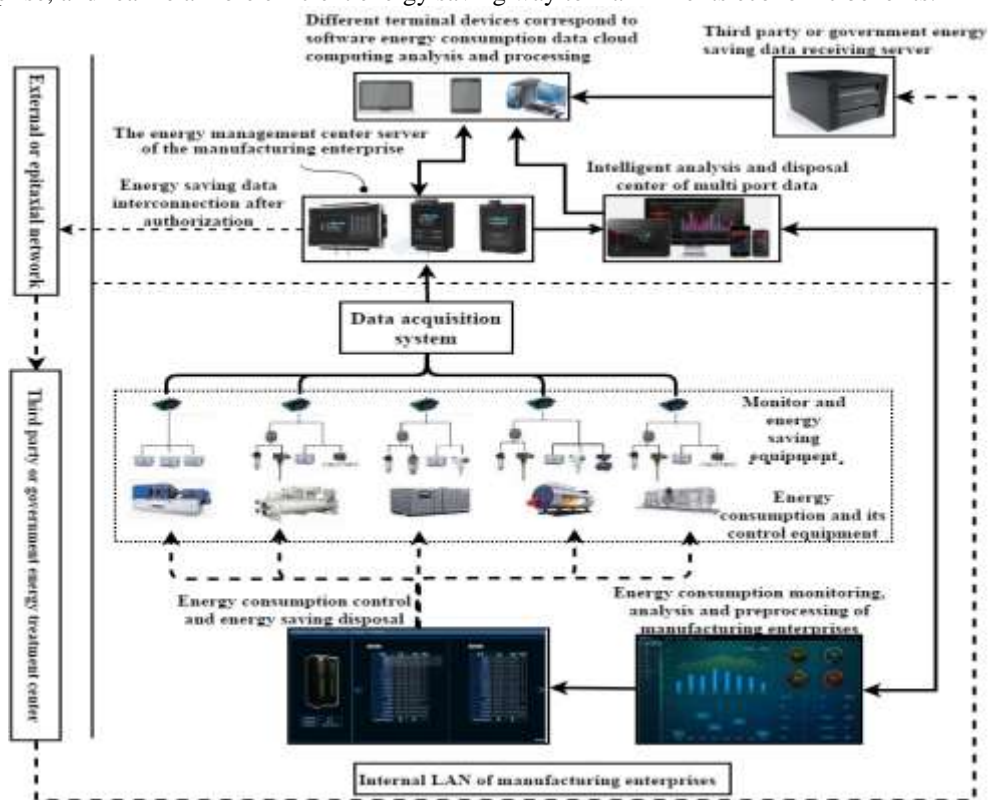
Figure 5   The Networking of Intelligent Control System in the Manufacturing Enterprises'energy Management and Control

6 Conclusion

This paper focuses on the energy management and control system's intelligent, networking and data interconnection in the manufacturing enterprises ,and to realize the intelligent analyzing of energy consumption and energy saving model which is based on completlydecomposit the Laspeyres index method which combining the process of energy consumption and energy-saving intelligent analysis and manual early warning treatment disposal at the same time ,also combining intelligence and networking.With using the technology of networking,automatization, software and data Information Server in the process of network platform design,for the purpose to improve the reliability and practicability of the system. Based on analyzing, sharing,managing the the data of disadvantages in the process of energy using by the third party or the Government's energy consumption and energy-saving data analysis and disposal Center .It plays an important role in optimizing energy-saving measures ,enhancing the energy efficiency of enterprises.It also provide the emergency early warning in the process of energy consumption and the reasonable pre-disposal in time ,to reasonably adjust and balance the energy consumption.

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Rhetoric Moves and Linguistic Realizations in Research Article Abstracts

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Abstract: Theabstract tends to be the vehicle used to decide if the article is of sufficient interest to be read in its entirety and, to some extent, it 'sells' the article. Therefore, it is prudent for novice writers to take the time to acquire the skills of writing an abstract to enter the discourse community of their discipline. Based on200 abstracts from four journals, the present study aims at exploring the rhetorical moves and the linguistic realizations of abstracts in the fields of scientific and technological disciplines. The result indicates that three moves---the research background, the methodology, and the result moves, are obligatory in the generic structure of abstracts. The findings of the study have some pedagogical implications for academic writing courses for graduate students, especially students from non-English backgrounds.

Key words: Abstract; Rhetorical moves; Linguistic realization

1 Introduction

Research paper abstracts are an important site for the visibility of scientific endeavour. An abstract is a concise summary of a research project that concisely describes the content and scope of the project and identifies the project's objective, its methodology and its findings, conclusions, or intended results. In articles, the abstract serves as an accurately condensed version of the article helping the potential readers to decide whether to read the whole article or not. Hyland, for example, maintains that an abstract may "provide a decision making point for readers to judge whether the entire article merits further attention or not"(Hyland, 2009). Mart ń-Martín notes that "abstracts constitute, after the paper's title, the reader's first encounter with the text". Therefore, he pointed out that "there are few scholarly journals that do not require an abstract to be sent together with the original paper"(Mart ń , 2003).

In the academic publication, most scholarly Journals require that a homotopic abstract accompany each original article, eventhe articles written in languages other than English. Thus, acquiring the skills of writing an abstract is critical for novice writers to enter the discourse community of their discipline. As a result of the great importance, the studies of abstracts have witnessed a far leaping interest from scientific researchers and linguists since the 1980s.

Abstracts from a great variety of disciplines have been analysed in order to feature the linguistic characteristics that published scientific research papers are written since Swales developed his ground-breaking genre theory for organizing abstracts—— the "IMRD" model (Swales, 1990). By skimming from the works of Swales (Swales，1990), Bhatia (Bhatia, 1993), Hyland (Hyland, 2008) and Dudley-Evans (Dudley-Evans, 1986), the comprehensive generic texts of abstract will be obtained. One of the important windows to explore the abstract is the "move". The concept of move in abstract is defined by Swales based on the genre theory, as "discoursal or rhetorical unit that performs a coherent communicative function in a written or spoken discourse"(Swales, 2004), referring to a linguistic segment embodying specific communicative function and purpose inside the structure of the abstract text.While Santos, when explaining the choice of move as a unit of analysis of abstracts, states that "a move is to be considered as a genre stage which has a particular, minor communicative purpose to fulfill, which in turn serves the major communicative purpose of the genre"(Dos Santos, 1996). Therefore, an abstract could be the mechanical combination of moves in text.

Generally speaking, previous studies on the RA abstracts mainly concentrated on the schematic models of the abstracts(Hyland & Tse, 2004, Santos, 1996). A few researchers attempted to describe the linguistic features of abstracts and its realizations through different moves in the abstracts. For example, Hyland compared the move structures of abstracts across eight disciplines, but his purpose was to test the practicability of his abstract model from the linguistic perspective. Santos also studied the linguistic features, such as tense, voice and perfective in abstracts. However, most of the studies employed the materials mainly in the discipline of applied linguistics or social science. The linguistic studies of abstracts in the scientific and technological articles are in crying need.

As an inevitable part-genre within RAs, the abstract has become the most read type of research literature with the exponentially increasing research output. The present study thus attempts to not only explore the rhetorical moves of abstracts in the fields of science and technology, but also reveal the linguistic realization of moves in the RA abstracts.

However, the literature of academic English writing reveals that novice writers still have difficulty constructing well-structured abstracts that are appropriate to the norms set by their scientific community. Therefore, the plausibly approach to teaching novice writers and graduate students how to write the well-organized abstracts will be of great value. In response to this need, this paper will examine the features that constitute the abstracts of research articles at the macro-level of textual organization and content as well as at the micro-level of textual analysis. To these ends, 100 abstracts in three leading Journals (Nature, Science, and Cell) from the field of material science, chemistry and biology are considered.

2 Methodology

2.1 RA abstracts corpus construction

The research aims to take the quantitative approach to explore the linguistic characteristics of RA abstracts. Therefore, the corpus-driving method has been employed in the exploration that a total of 200 RA article abstracts were selected form four scientific research journals in the disciplines of material science, chemistry, biology and physics: 50 from Nature, 50 form Science, 50 from Biomaterial Science (BS) and 50 form Physical Review Journals (PRJ). The high impact factors are the main reason that those four journals were chosen to be sample extracted. On the other hand, those articles are closed related to the majority research fields of modern science and technology. For the manual text analysis, only abstracts in those articles were extracted intentionally.

Considering the rhetorical structure and linguistic features of RA can be marginally different from those of empirical research articles, only the informative RA abstracts with brief purpose statement of IMRD or IPMRD were input into the corpus. Another criterion cast upon the time validity, namely, all the articles include in the corpus were published between 2010and 2017, accessible online and download properly. Moreover, the total number of sentences in the corpus and the number of words within different abstracts were counted manually.

2.2 Approach to rhetoric analyses on moves

The research thought of this article is to study the linguistic realization of moves in RA abstracts. Therefore, the first step in the analysis is to identify the moves in the abstracts collected in the corpus. After then, the typical linguistic features of each move would be investigated. However, identifying the moves as subjectivity suffered the insufficient linguistic clues to mark the boundaries within the moves in the same abstract. Connectives, phrases and certain clauses, such as "the article discusses, this paper is concerned with, the result shows …" would be helpful identify the boundaries between moves. As an initial assumption, each move in the abstract would contain one sentence, but some moves might be signalled by single words or clauses, they (the same sentence) would be both regarded as Move 1 and Move 2 etc. Therefore, they were marked as two different moves. Those phenomena often occur in the Move 2 and 3 as illustrated in such that "In order to bridge the gap, the present paper offers a different analysis of…This research is designed to determine".

The theoretical framework for the rhetoric analysis on moves in this article resorts to Swales' genre theory, Santos's model (Santos, 1996) and Pho's research article abstract model. Swales, as elaborated in the literature review, is the great contributor for the genre theory in which he proposed IMRD for abstract writing and CARS for the introduction organization in RA articles. But Santos absorbed Swales' CARS thought and divided the Move1 and Move2 into sub-moves, thus forming five Moves in his model. Pho made slight changes in one of the moves based on Santos's model, introducing a set of questions and functions for more practical dealing of moves in abstracts, as shown in Table 1(Pho, 2008).

Table 1 Framework for Move Construction, Adapted from Pho.

Abstract Moves	Function/Description	Question Asked	Move Labels along with Abbreviations in the Present Study
Situating the research (STR)	setting the scene for the current research	What is known in the field?	introduction (I)
Presenting the research (PTR)	stating the purpose of the study, research questions and hypotheses	What is the study about?	purpose (P)

Continual Table 1

Abstract Moves	Function/Description	Question Asked	Move Labels along with Abbreviations in the Present Study
Describing the methodology (DTM)	describing the materials, subjects, variables, procedures, etc.	How was the research done?	methods (M)
Summarizing the findings (STF)	reporting the main findings of the study	What did the researcher find?	results (R)
Discussing the research (DTR)			
(a)	interpreting the results/findings and/or giving recommendations	What do the results mean?	discussion (D-a)
(b)	no discussions or recommendations		pseudo-discussion (D-b)

3 Results and Discussion

The sequence of moves in the abstracts from the corpus were clearly presented in the data. Generally, they were arranged in the order of STR (move 1), PTR (move2), DTM (move3), STF (move 4) and DTR (move5). This order was mostly in line with Santos's model with a few exceptions of the samples from BS and PRJ.

Data analyses show that most of the selected abstracts in the corpus are signalled by four to five moves, whereas a few abstracts from Physical Review Journals just include three moves. For all the four journals, a further look at the structures of all abstracts in the corpus reveals that three basic moves are inevitably higher frequency, namely, the Background move, to "present the research", with 98%, the method move, to "describe the methodology" with 98% and the Result move, to "summarize the findings", with 93%. Those data firmly indicate that Move 2, 3 and 4 are inseparable for the RA abstracts. They are undertaking the main information for readers. The move 1, "situating the research" with 44% frequency occurs comparatively less than the others in abstracts, which is a little beyond of the supposed idea. The figures are closely in consistent with Santos's original findings in his abstract move model.

However, the comparatively lower frequency of move 1 (44 %) and move 5 (57%) does not support the opinion proposed by Hyland that there is an increasing trend of the appearance of STR (situating the research) and DTR (discussing the research) moves in abstracts. The underlying reason for this distance may be due to the different samples that Hyland's declaration is mostly concluded from the social science while the samples in this article are selected among the scientific journals. On the other hand, the 57% frequency of move 5 also indicates that a vague strategy has been employed by the academic writer to blur the discussion of result rather than explicitly argue for the importance of their own research. This strategy is called by Hyland as hedging approach.

Table 2   Occurrence of Moves in the Abstracts Within Corpus

Moves	Number of Nature abstracts containing move(N=50)	Number of Science abstracts containing move (N=50)	Number of BS abstracts containing move (N=50)	Number of PRJ abstracts containing move (N=50)
Situating the research (Move 1)	21	25	30	12
Presenting the research (Move 2)	50	47	49	50
Describing the methodology (Move 3)	50	50	50	46
Summarizing the findings (Move 4)	27	34	28	25
Discussing the research (Move 5)	36	35	42	24

Data also show that abstracts in the empirical investigation articles mark their boundaries more clearly and efficiently with the use of verbs, such as argue, examine and claim. In the transition of each move, the markers are more tentative. In move 1, the writers often take two different stances: one for the third address , such as "The article advocates/ analyses/ shows/ considers/ explains/ describes/

establishes…", and the other the paper's stance, such as " The article advocates/ analyses/ shows/ considers/ explains/ describes/ establishes/ introduces/ proposes/ discusses/ develops/ presents/ provides/ studies/ represents/ features/contains/concentrates on/ demonstrates the feasibility of /focuses on/ deals with/gives detailed explanation for/investigates into/ holds that/aims to give a comprehensive account of/ offers a solution to / serves as an introduction to …".

Although the style of an abstract may differ from discipline to discipline, the structure and information provided is quite formulaic. The present tense is most frequently used in abstracts to state facts, describe methods, make comparisons, and give results. The past tense is preferred when reference is made to the author's own experiments, calculations, observations, etc. The journal abstract contains certain textual and linguistic characteristics.

4 Conclusion

This study constructed a little-scale abstract corpus with 200 RA abstracts published recently in four scientific academic journals. Then, the total number of the sentences and the moves were identified manually. The rhetoric structures of the abstracts were considered. The quantitative and qualitative methods are both employed to analyse the realization of rhetoric and moves in abstracts writing. The statistical data were used to make the comparisons with Santos's model and Pho's abstract models. The analysis indicates that not all the scientific RA contain the full five moves in their abstracts, but three moves are inevitable for the abstract structure. Although the concrete arrangement of the moves would be in variable in abstract organizations, the higher frequently occurring moves are move 2 (PTR), move 3 (DTM) and move 4 (STF). However, the frequencies of move 1 and move 5 demonstrate to be the non-obligatory moves in abstracts, which does not support Hyland's idea of the increasing tendency of the two moves in RA abstract. With regard to the differences between the five-move abstracts and the three-move abstracts, the analysis show that although the three moves can work out a general guideline in terms of what the paper has been designed to do, the lack of another two moves would leave readers in puzzling with insufficient information.

The results also suggest that a combination of certain linguistic features such as thematic progression patterns, grammatical subjects, verb tense and voice can help distinguish moves in the abstract. The findings of the study have some pedagogical implications for academic writing courses for graduate students, especially students from non-English backgrounds. The three models of abstract writing proposed respective by Swales, Santos and Pho in this article would be of great value for the inexperienced writers to mock and for the teachers to stipulate their teaching approaches to RA abstract writing.

Acknowledgement

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A Review on Research of Healthy Cities Using Spatial Analysis Approach

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Abstract: Objective: This report surveys and evaluates the scientific research on the application of several spatial statistical analysis methods, and GIS or other software in the research of healthy city planning. Methods: Research teams conducted a new and more ex-haustive search for rigorous empirical studies that link the research of healthy cities by spatial analysis such us GIS, GWR(Geographically weighted regression). Results: This review found a growing body of the application of spatial analysis approaches to assessment of healthy cities planning in order to improve the prevention and control of spatial related diseases.
Key words: Healthy cities; Spatial related disease; Spatial statistical analysis; GIS software

1 Introduction

Only recently city become a densely populated and highly structured settlement. A safer and healthier environment for people is the core of urban planning. The origin of urban planning is closely related to public health. (Corburn, 2009)However, with the rapid development of medical technology, public health gradually fade away from the scope of urban planning. Nowadays, with the change of travel style, sedentary and less activity make chronic diseases(cardiovascular disease, diabetes …) is becoming a main threat of human health(FrankAndresenet al., 2004). A large number of studies have shown that chronic diseases are not only affected by biological factors, lifestyle, but also directly related to the built environmental factors such as land use, density, traffic and urban space(FengGlasset al., 2010).

Although the link between the built environment and the risk of chronic diseases has long been known, so far we still lack deep and relatively correct cognition of how the built environment affects health. ((Garfinkel-CastroKimet al., 2015). In the past decade, GPS,RS(remote sensing),GIS space research technology has been applied in the fields of healthy city research. Healthy city research has achieved a lot of fruitful results (LaiMak, 2007).

2 Methods

The application of planning space technology in public health at the beginning of the century. Using academic search engine PubMed, Google scholar, Web of Science, an database that covers the most recent years of literature (2001-2018) was analyzed. Keywords in headings and abstracts include public health, urban Planning, geographic information systems, or global positioning systems, remote sensing, image processing. The literature selection elements include: (1) It should include public health and environmental impact factors, such as foodcape, built environment, or related to chronic diseases, such as dietary behavior, physical activity, etc. (2) It should contain one or more space technologies, such as spatial data or methods. The review's aim is to understand the present situation of past relate studies, identify the major problems that need further study, and understand the methods used in similar studies.

3 The Use of Spatial Analysis Approach in Healthy Cities Research

3.1 The focus of research on healthy city in the past decades

Research on the health effects of built environment in the past decade is mainly exists in the two carriers. The one is physical activity, and the other is Foodcape.

(1) Healthy impact of physical activity

Physical activity's extension is larger than physical exercise. It includes not only physical exercise nor physical work, but also slow physical activity such as walking and cycling. Sedentary, lack of physical activity, and lifestyles depending on motor travel are one of the major causes of the rapid growth of chronic diseases ((SaelensSalliset al., 2003).

The objective assessment of built environment has always been the focus of scholars. The most

representative theory is famous 3D Model which was proposed by Cervero first in 1997.The 3D model was consist of Density, Diversity and Design. Subsequently it was extended to 5D model with added factors : Destination Accessibility and Distance to Bus stop(EwingHandyet al., 2006). It has been widely used in the world. The other widely used theory framework include 5 elements (HandyClifton, 2007), 3 factors framework (FrankAndresenet al., 2004), and 4 elements framework (EwingHandyet al., 2006)

Diversity: Ewing And Other people's research found that physical activity and land mix Utilization degree (Land use Mixture , LUM) has a strong correlation between(FrankSalliset al., 2006) . Land use can increase the accessibility of the destination and increase the likelihood of using a physical mode of transportation, thereby reducing the risk of chronic diseases (PapasAlberget al., 2007).

Density: density can be measured by population, building density (volume rate), employment, etc. High density often means that land use is more compact, which helps to reduce the mobility of motor vehicles, but too much density can also lead to residential repression. Dunphy and Other people's studies show that when the population of each square mile exceeds 7500 , walking and cycling activities can increase significantly (Dunphy & Fisher, 1996). A large number of scholar studies have confirmed this judgment (SturmDatar, 2005) (RundleRouxet al., 2007).

Design: pedestrians and cyclists have a high demand for sidewalks, public transport sites, visual richness and aesthetics, and many of the design factors for the built environment are the best-of- pace index (Walk Index , WI), rich design content makes people feel more safe, self-confidence and comfort make people more inclined to choose walking and cycling. (Saelens & Sallis et al., 2003). There are 2 Different research directions, one of which is the attractiveness of the street from a user's point of view (attractiveness), and the other is the connectivity of the street from the road function (Connectivity) .the higher the accessibility of public service facilities, the better the system, the better the quality, and the higher the road connectivity, the greater the probability of physical traffic travel (Frank & Andresen et al., 2004) , thus reducing the risk of chronic diseases (Oluyomi, 2011; Ball & Lamb et al,).

Public transport density: is another important variable that causes chronic ann drew ·Rundle (Andrew Rundle A study of the relationship between public transportation system and the prevalence of chronic illnesses in New York City shows that the density of bus stations and the density of rail transit sites affect the community residents ' BMI important factors for values (Rundle & Roux et al.,) . The research shows that when the bus station is located in the area with high accessibility of the road network, the utilization rate of the public transport station will be greatly improved (Lund & Willson et al., 2006).

Green vegetation: Some studies have found a link between green vegetation and walking tendencies. If people have a green environment (including agricultural and natural green spaces) within the 1~3km range, they have higher self-perceived health (Maas & Verheij et al., 2006) . Tirt and others used objective measurements and self-assessment methods to study the impact of destination accessibility and normalized vegetation index (NDVI) on walking and Body mass index (BMI). The landscape green area in the 1km range of the respondents ' residence was calculated by satellite images. Data show that respondents who live in areas with high accessibility and high NDVI values have a Lower BMI (Tilt & Unfried et al.).

Bird points out that there is no linear mechanism of influence between the built environment factors, physical activity and health outcomes, and this mechanism will vary greatly depending on the subject, the purpose of the action and the location characteristics. (Bird & Grant) .

In summary, the environmental factors such as density, land use, index, public transport density, green vegetation, urban space design can significantly change the travel behavior and physical activity, so it is becoming a cross-field research hotspot in urban and rural planning, public health and urban transportation. However, the conclusion of the study on the factors related to the obesity of built environment is not identical.

(2)City fastfood map (foodscape)

Generally speaking, chronic diseases such as cardiovascular disease and overweight in relation to the intake of high-energy foods, City View Map (Foodscape refers to the distribution of fast food restaurants (which provide high-calorie, high-fat food) and supermarkets (providing healthy food) in the city, Land use and spatial planning determine the accessibility of supermarkets and fast food restaurants, thus affecting the public's choice of healthy food and ultimately the impact on individual health. The application of GIS and the drawing of "healthy food scene map" has become a new research direction in recent years. American scholar Andrew ·Rundle and other health food outlets, which are not prone to chronic diseases, are distributed throughout the city, discovering their density and BMI Value

Negative Correlation (Rundle & Neckerman et al.) .

(3) Chinese research in this fields

Chinese research is relatively fragmented, and is still in the introduction and introduction of foreign theoretical stage, Most studies tend to stay in the qualitative and descriptive, rare empirical and quantitative studies. after entering The century, the research of the environmental health impact mechanism of the built environment starts from introduction and introduction of Western theories (Kobe Lee , 2003; Xu from Bao, Trebizond, etc. , 2005) , 2006Binyi Liu introduced the American "Design for Positive living" campaign (Binyi Liu, Guo Yan , 2006) , Tan Shaohua put forward the viewpoint of active intervention health from the environment of human settlements (Tan Shaohua, Guo Jianfeng, etc.) . In the past ten years, scholars have made some preliminary achievements in the study of the built environmental health factors of physical activity as carrier (li Zhiming, Zhang Yi), Mainly related to the framework of healthy urban planning (Tianli, Jinwei, etc.), the path and elements of Healthy city planning (Wang Lan, Liu Shuwen, etc.), Health impact assessment HIA (Li Yu, Wang Yueyi , Zhang Yalan, Cai Chunting, etc.). By using the data of "Chinese Family Tracking survey CFPS", the research on the environmental factors, personal travel characteristics and socioeconomic characteristics of the residents' chronic diseases in the community Built Environment (Bindong, Shanhong, etc.), Wang Lan and other factors affecting the distribution of particles in the urban space cause respiratory diseases (Wang Lan, Chaoxiao, etc.), Su Chang, etc. using the "China residents ' health and nutrition Survey" to investigate BMI Changes and the relationship between BMI and dietary and environmental factors (Su Chang, Zhang Bing, etc.) . Yangdong and so on the use of comparative case analysis of the 4 communities in Dalian, the preliminary identification of the supermarket distribution of the elderly physical activity has a significant role in promoting or restricting the establishment of environmental factors(Yangdong, Liu Zhengying ,) .

3.2 The application of spatial analysis approaches in healthy cities

The spatial analysis method is seldom used before the study of the factors affecting the establishment of chronic diseases. According to the China Center for Disease Control and Prevention, "China's chronic disease and its risk Factors monitoring report ", obesity and other chronic diseases in the space there is a certain aggregation, China's obesity population distribution, from north to south gradually tightening trend, the northern fat is too much, Southern Fat Less, the Northeast is the fat "hardest hit"(China Center for Disease Prevention and Control). In Jiangsu Province, a similar phenomenon of spatial aggregation of people with chronic diseases (Leeson, Huang Hui, etc.)was found in the surveillance of national physique.

Figure 1   Chinese Obesity Index Map

The occurrence of chronic diseases is related to heredity, bad living habits, etc. , also related to geographical environment, built environment, living habits, climate and pollution. The reason that overweight rate in north is higher than that in South is related to the regional climate, eating habits and other objective factors. The low rate of obesity in Southerners includes many factors, the key reason being that heat causes the local people to metabolize quickly. In addition to the weather, obesity may also be linked to the local diet structure (Beijing Evening News).

Spatial Analysis (Exploratory Spatial Data analysis) is a set of spatial data analysis methods and techniques, taking the spatial correlation measure as the core, through describing and visualizing the spatial distribution pattern of things or phenomena, discovering spatial agglomeration and spatial anomaly, revealing the spatial interaction mechanism between the research objects. (chenfang lv, Shange, etc.) .

In the early 1980 years, GIS it was applied to the Canadian forest management system for the first time. Geographic Information systems (GIS), Global Positioning systems (GPS) and Remote sensing (RS) represent the development of spatial analysis techniques and statistical methods, as well as public, governmental and media concerns about environmental and health issues in recent years, Greatly promoted the development and application of spatial epidemiology (Alick Zhou, Yang Guoying, etc.), e.g. using GIS Technology has made great progress in the field of public health in the research on infectious diseases such as schistosomiasis, tuberculosis, hepatitis and AIDS. International Conference onGIS and Health in Hong Kong (Lai, Poh C & Mak, Ann S H ; national experts discussed the application and practice of GIS technology in health and environment research.

Although chronic illnesses are a cause and mechanism of relatively complex chronic noncommunicable diseases, their epidemiological characteristics have a common denominator with infectious diseases -- The distribution of the population has obvious spatial and geographical characteristics, so it can also be used GIS derived spatial analysis technology to describe the prevalence of chronic diseases, geographical characteristics, distribution patterns, spatial aggregation and chronic diseases and density, land use, and other factors of the establishment of the environment, to reveal the prevalence of chronic disease and spatial distribution characteristics, provide reference for intervention and prevention from planning and urban design point of view (Tan & Shah et al., 2013; Wang & Wen et al.).

3.3 Summary

To sum up, the existing research has the following three aspects worth attracting attention:

First , the current research on environmental health effects is concentrated in the west, especially in North America, Europe and Australia . (li Zhiming, Zhang Yi) , domestic research has just started. As we all know, the urban environment in North America and Australia is very different from the domestic urban environment, the United States and Australian cities are mostly sparsely populated, the living density is low, the urban sprawl (Citycrawl) degree is serious, the European city scale is small, the road is narrow, China's urban population, large living density, wide road, dense traffic, building volume ratio (density) is also large, so some of the conclusions from western cities are still applicable to the completely different Chinese urban environment, is still unknown.

The second, from the existing Western related research, there are also shortcomings: first, the precise quantification method and means of the built environment is scarce before, its scientificity and validity are difficult to be verified; The study shows that the socioeconomic status (Social economic status, SES) can also affect physical activity. How to eliminate the self-selection deviation of the spatial distribution of chronic disease population (selection bias) is another important problem to be solved in this study. The spatial aggregation of chronically ill people often ignores the effects from neighboring regions, but the population of chronic diseases is spatial aggregation (China Centers for Disease Control and Prevention), That is, "spatial autocorrelation", which has a certain effect on the authenticity of the results autocorrelation.

The third, although there is already a large number of studies on a certain type of disease or a single built environmental factors, but these studies are still more scattered and fragmented, and did not form a systematic theoretical framework (Chen Haiying, in a van ,) due to the lack of core theory guidance, the conclusions of the study are not identical or even contradictory. (Bindong Building, Shanhong, etc.) . From the present research situation of our country, the research on the introduction and introduction of Western theory and the fat effect of built environment has not been extensively entered into the mainstream theory of urban planning.

4 Conclusion

The above is a summary of the research progress of the physical activity and the food scene map of the Healthy building environment research from two perspectives, in fact, with the attention of the Government, society and the public to health issues, relevant interdisciplinary studies including public health, urban planning, epidemiology, spatial statistics and other developments in recent decades, But there are still many challenges to face:

4.1 The theoretical research needs to be deepened

In 2013, Harris studied 2764 network analysis of the related literature of the built environment and physical activity shows the evolution of the research in this field, indicating that in the past - years of researchin this field are still in the exploratory stageto Sallis, Ewing, Brownson , Frank , Giles-corti and other representative scholars have made important contributions to the development of this field. (Harris & Lecy et al.), but the core theory has not been established, the relevant research is often only a single factor or local factor of the built environment, the research scale and standard vary greatly, and the tendency of fragmentation and localization is presented. (Chen Haiying, in a van, Li Mengfei) . In addition, due to the differences in the built environment between China and foreign countries, there are conflicting and even contradictory research conclusions, such as the study on density and accessibility, the conclusions are contradictory and conflict (bindong , Shanhong) .

4.2 Research tools need to be innovative

Previous studies have proved to varying degrees that there is a correlation between built environment and health, but often due to lack of deep longitudinal study, the establishment of causal relationship between specific factors and health effects appears to be quite difficult. The Spatial analysis method of the fat effect needs a large amount of accurate data support,before the popularization ofGIS , because it is unable to directly objectively measure the impact of environment on health, the relevant research mainly adopts the way of interview and questionnaire survey. because of the Self-Reporting Act (self-report and lateral research methods, often because of the difficulty in controlling self-selection deviations (Self selection bias) and Error (Handy & Cao et al., 2006; Cao & Mokhtarian et al., 2008; James & Hart et al.), It is impossible to draw sufficient conclusions and establish precise correlations, and Many of the findings are questioned as pseudo-correlations, This has also become a major weakness in similar research (Ewing & Cervero).

4.3 Research and application prospects

The American Urban Land Research Institute (Urban land Institute) guidelines for the design of health sites have been promulgated (Building Healthy Places Toolkit), including the total of urban function mix, street density, building density, slow line system, environmental lighting, accessibility of natural environment, etc. -project planning and design tools (Institute, U l, 2015) , it has a great impact on urban planning in North America. As the research enters the stage of implementation evaluation, the impact mechanism of community built environmental factors on health is expected to be further revealed.

From the above research progress can be found that the current domestic and foreign academic The research on the relationship between built environment and population health is mainly found in the developed countries and regions such as North America, Europe and Australia, the related research in our country has less accumulation, and the empirical research combined with our country's national conditions is very scarce, especially the lack of longitudinal in-depth study on some kinds of space-related diseases. This project uses the method of big data statistics and spatial measurement analysis to study the risk factors and influence mechanism of the built environment, and explores the strategies of active intervention from the perspective of planning and design.

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Research on the Crisis Conversion Countermeasures of Garbage Incineration "Nimby" Event Based on Text Segmentation and Structural Similarity Calculation

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Abstract: Based on the theoretical basis of text segmentation, case structure similarity calculation and Bayesian evolution, combined with text mining method, this paper proposes a set of crisis transformation management innovation methods of waste incineration "nimby (not in my back yard)" event. Compared with traditional qualitative research methods, this method can more effectively learn from previous successful experiences through quantitative analysis and data support. With the accumulation of case training sets, the accuracy of decision-making suggestions will gradually increase. In this paper, the quantitative analysis and research on the "nimby" incident of waste incineration are carried out by this method, and the keyword list of "nimby" of waste incineration is constructed. Bayesian evolution of different angles is carried out for different types of waste incineration "nimby" cases. The solution to the "nimby" problem is summarized, we should propose accurate and effective countermeasures mainly from the aspects of information communication and diversified governance system, funding source reporting, scientific distribution mechanism and compensation mode.
Key words: Text segmentation; Similarity calculation; Nimby; Crisis transformation

1 Introduction

With the increasing level of urbanization, land resources are becoming increasingly tense, and as residents' living standards improve, the residents' awareness of environmental protection becomes stronger and stronger. Waste-to-energy technologies such as waste incineration and power generation are used to implement waste disposal methods that are harmless, resource-reduced, and reduced. But it is particularly difficult to get up (Fang Chengxian, 2009). According to statistics, about 32% of the mass incidents in China with a scale of more than 100 people in recent years are closely related to "nimby" projects such as garbage incineration. Therefore, how to learn from past successful experiences and minimize the losses and social impacts caused by the incident are of vital importance to building an ecological civilization and building a harmonious society.

In recent years, Chinese scholars have discussed the "nimby" problem mainly by analyzing and comparing real cases. Using the perspectives and research methods of economics, political science, and sociology, they have come up with many suggestions that have guiding significance for reality. In general, in the current domestic literature on "nimby" issues, the research methods are still dominated by qualitative methods, while the literature using quantitative analysis is still relatively small. This is in contrast to a large amount of quantitative analysis and data-based support in Western academic circles. And there is a big gap. With respect to the study of semantic similarity analysis, Chen YJ. proposed a semantic-based case knowledge representation model, which decomposes the case knowledge into four semantic levels, aiming to acquire new knowledge through knowledge inference rules between the same level and between different levels (Chen Y J,2010); Sebastian CB uses semantic technology to model the design process, product knowledge, documentation, and decision process in the case, and takes flexible ontology rules as the core to provide a case knowledge management and integration platform for engineering design (Sebastian C B,2008); The semantic knowledge-based case knowledge and model proposed by Lily S is composed of requirement ontology, case knowledge ontology and domain ontology. By capturing the needs of the designers, inference algorithms are used to obtain knowledge from the case knowledge base to realize the analysis and processing of personalized information (Lily S,2010).The above studies added semantic information for case knowledge from different perspectives but did not really apply semantic similarity to emergency case analysis.

This paper proposes a crisis transformation method based on the theoretical basis of text segmentation, case structure similarity calculation and so on. Taking the garbage incineration "nimby" event as an example, the implementation process of Bayesian transformation effective path is explored from special perspectives, and a precise and effective countermeasure and suggest is proposed for the new case.

2 Theoretical Basis

2.1 Text segmentation based on "jieba" word segmentation of Python

The "jieba" word segmentation supports the three segmentation modes of the precise mode, the full mode, and the search engine mode (Hu Fagang,2015). The precise mode refers to the most accurate separation of sentences and applies to text analysis. The full mode refers to the scanning of all the possible words in a sentence. Its advantage is very fast, but can not solve the ambiguity, search engine model refers to the accurate model based on the long-segmented again, improve the recall rate, suitable for search engine segmentation.

The "jieba" word segmentation comes with a text dictionary named "dict.txt" which contains more than 20,000 words and contains the number of occurrences of each term as well as part of speech (the number of entries is based on the training of people and other word resources and other resource creators). The "jieba" word segmentation is a word segmentation of a conceptual language model. The so-called word segmentation of a conceptual language model refers to finding a segmentation scheme S in all the results obtained by the full segmentation so that P(S) is the largest.

2.2 Bayesian network model tree structure

Bayesian Networks (BN), also known as reliability network or causal network, is a graphical model for solving the joint probability calculation problem in probability theory (Gao Xiaoguang, 2016), and is a graphical model for describing the dependencies between data variables. It is also a model used for reasoning (Xiao Zhongming, 2017), and a set of directed acyclic graphs and model parameters (Yan Chunling, 2018). In the Bayesian network, the two variables X and Y are directly connected, which means they have a direct dependency relationship. Understanding of X will affect the reliability of Y, and vice versa. In this sense, we say that information can be passed between two directly connected nodes.

On the other hand, if the two variables X and Y are not directly connected, then the information needs to be passed between the other variables. If all information channels between X and Y are blocked, then information cannot be passed between them. At this time, understanding one of the variables does not affect the reliability of the other and thus is independent of the mutual conditions.

If we consider the basic case in which the two variables X and Y are indirectly connected through the third variable Z, the Bayesian network can be decomposed into three basic structures (Zhang Ru, 2014).

2.3 Similarity calculation of Chinese cases based on ontology

Ontology-based Chinese case representation is divided into two modules:

a). Extraction of concept collections. Firstly, keyword matching technology is used to express the explicit knowledge in the case using concepts and relationships in the domain ontology. Then, with the help of the extracted relationships and related rules, the inference mechanism of the ontology is used to represent the tacit knowledge in the case, thus extracting the conceptual collection of case representation ontology (Zhang Wei, 2014).

b). Extraction of concept relationships. Other elements of the ontology other than the concept, such as instances, attributes, etc., are linked by the four basic relationships between concepts. Therefore, based on the concept set formed, referring to the four basic relationships of the constructed domain ontology, it is possible to extend and select concepts, attributes, etc. of the concept, and reconstruct the hierarchical structure between the concepts, and achieve the use of the ontology to indicate the purpose of the case eventually.

The similarity "Sim (p_i, p_j)" between p_i and p_j is calculated as follows:

$$Sim(p_i, p_j) = \frac{\alpha}{dis(p_i, p_j) + \alpha}$$

Among them: The dis (p_i, p_j) express the shortest distance of the proto-top p_i, p_j. In this paper, we use the node weight calculation. The parameter α is an adjustment parameter, which can be adjusted according to the depth of each tree structure hierarchy of the original meaning.

From the analysis of the tree hierarchy of   Yoshihara, the semantics of a concept that is closer to the root is more abstract and wider in scope. The lower the concept is, the finer the classification is. And the more specific the semantics of the concept, the narrower the scope of use is. Thus, according to the depth of the concept, the semantic distance is improved, that is, the similarity of the concept increases with the sum of the levels in which they are located, and decreases with the increase in the difference of the levels at which they are located, forming a new similarity calculation method, the formula is as follows:

$$Sim(p_i, p_j) = \frac{\alpha}{dis(p_i, p_j) + \alpha} \times \frac{depth(p_i) + depth(p_j)}{\max\left(\left|depth(p_i) - depth(p_j)\right|, 1\right)}$$

Among them: depth(p_i) represents the depth of the Yoshihara node p_i.

Calculate the similarity of the composite concept using the arithmetic average method (where $SimPair_i$ represents the semantic similarity of the same node in the two tree structures):

$$Sim(S1，S2) = \frac{1}{k} \sum_{1 \le i \le k} SimPair_i$$

3 Case Application - Waste Incineration Incident

This paper takes the waste incineration "nimby" event as an example to study the countermeasures through the above text segmentation, Bayesian evolution and similarity calculation methods. First of all, we crawled a large number of cases related to waste incineration through online crawling, and conducted two screenings on the crawler's direction and content. The first is title segmentation matching based on keyword table and stop word list. The second is to screen through the HTML structure filtering algorithm designed for the chapter structure, and finally, obtain the webpage file of the key page with high relevance to the research. Then we use Python "jieba" word segmentation for text segmentation. Since many synonym words appear (the original word frequency table is shown in Table 1), we use Baidu's NLP (Natural Language Processing) interface for word similarity substitution (the word meaning similarity substitution table as Table 2). Finally, the frequency and weight calculation of each word are carried out, through the manual screening of field experts, the ten keywords most relevant to the garbage incineration avoidance event are sorted out (Table 3). Then we divide the garbage incineration cases that the network crawls into two categories: one that is successfully completed (Class A), and the other that is subject to "nimby" conflicts (Class B). We use Bayesian construction (Figure 1). The ten keywords in the keyword table are Bayesian nodes. And the classified cases are used as various training sets. Using the Matlab tool, the effective transformation of the "Class B to Class A" path is discussed from a special perspective. At the same time, it is worth pointing out that, with the increase and decrease of cases and the improvement of methods, the crisis transformation path will undergo dynamic changes, and it will not be the same level.

Table 1　Original Word Frequency Table (Excerpt)

Word	Frequency	Word	Frequency	Word	Frequency
Waste incineration	159	Project	144	Rubbish	143
Life	124	Construction	121	Power plant	94
Power generation	89	Incineration	89	Environmental protection	85
Resident	82	Surroundings	80	City	73
Site selection	71	Garbage disposal	70	Jobs	70
Government	69	Emission	67	Standard	65
technology	61	Landfill	61	Happening	59
Environmental impact	57	Resource	56	Pollution	56
Environmental assessment	56	Opinion	39	Participate	38
Management	36	Information disclosure	31	Dioxin	23

Table 2　Word Meaning Similarity Replacement Table (Excerpt)—Based on Baidu NLP Open Interface

Word 1	Word 2	Similarity
Local government	Government	0.84623
Citizen	Resident	0.844015
Rubbish	Domestic garbage	0.836175
environmental impact	Environmental assessment	0.834894
Landfill	Landfill	0.826828
Secondary pollution	Pollution	0.825864
Standard	Emission Standards	0.817001
Municipal party committee	Government	0.816235
Supervision	Supervision	0.824241
Emissions	Emission Standards	0.812505
Contradiction	Conflict	0.80778

Table 3   Key Word List of Garbage Incineration "Nimby" Events

Residents	Site selection	Pollution	Environmental Impact Assessment	Conflict
RE	SS	PO	EA	CO
Participate	Information disclosure	Dioxins	Compensate	Government
PA	ID	DI	BC	GO
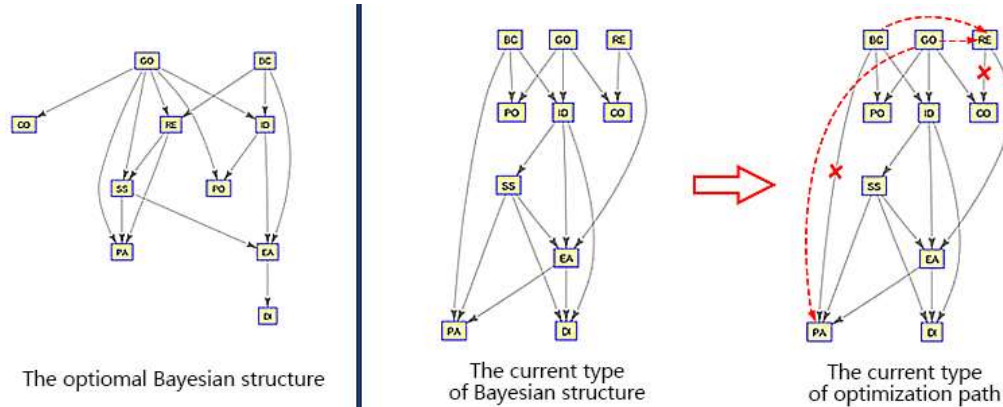
Figure 1   The Conversion of Class B to Class A

The optimized plan: Increase the association between GO and RE, highlight the communication between the government and the people, and improve the communication mechanism. Strengthen the relationship between GO and PA, promote public participation, and actively guide the public. Raising the correlation between BC and RE is based on local conditions and provides people with effective compensation in economic, psychological, and ecological aspects.

The weakening of the relationship between BC and PA is intended to compensate for the formulation of the plan. It should not indulge people's unreasonable demands, but should satisfy residents' reasonable needs and moderate participation.   Reducing the correlation between RE and CO shows that the government must fully understand public opinion and meet the public's voice.

The similarity between the current type of Bayesian tree and the optimal Bayesian tree is calculated using the formula of   Yoshihara similarity:

$$\text{Sim}(S1, S2) = \frac{1}{k}\sum_{1 \le i \le k} SimPair_i = 0.65$$

The similarity between the Bayesian tree and the optimal Bayesian tree after the current type of optimization is:

$$\text{Sim}(S1, S2) = \frac{1}{k}\sum_{1 \le i \le k} SimPair_i = 0.78$$

The main strategy of this program is: The policymakers should increase communication with the public, understand public opinion in depth, promote the active participation of the people, establish and improve the communication mechanism with the people. And in the process of formulating a compensation plan, policymakers must ensure that the resident's requirements but do not condone the residents' excessive demands. This scheme increases the similarity between Class B and Class A structure from 0.65 to 0.78.

4 Conclusion

This paper breaks the limitations of the traditional qualitative research methods and incorporates quantitative research and data analysis into the crisis study of waste incineration "nimby" events, which can more effectively learn from past successful experiences and provide the scientific basis for decision-makers to make more accurate and effective decisions. It is concluded that for different cases of "nimby" of waste incineration, countermeasures should be proposed mainly from the aspects of information communication and diversified governance system, funding source reporting and scientific distribution mechanism, and compensation mode, so as to solve waste incineration "nimby" problem fundamentally. This paper designs a set of research methods for crisis transformation of garbage incineration "nimby" events based on theories such as text segmentation, case structure similarity calculation, Bayesian evolution, etc. which provides a new solution to the transformation of sudden incident crisis similar to the waste incineration "nimby" event.

Acknowledgement

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Study on Time Emergence of Dominant Design of Inkjet Printer and NC Machine by Using F-term in Japanese Patent

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Abstract: This research is aimed at identifying the trend of technology and time emergence of the dominant design of inkjet printer and NC machine by using F-term in Japanese Patent. F-term was employed instead of International Patent Classification (IPC) because of the multi view point of the theme and it provides the certain technical area. The firm's product entering time to the market was evaluated to the S curve of the product lifecycle and technology life cycle was also investigated.
Key words: Dominant design; Product life cycle; Japanese patent; F-term

1 Introduction

In global competitiveness, it is important to make a long-term strategic decision in research and technology development. The potential direction of technology development and innovation can be determined by forecasting the trend of technology (A. K. Firat, et.al., 2008) (S. Jun, 2011) (D. Kang, et.al., 2013). However, forecasting technology is difficult because most of the forecasting method was using the expert subjective experience (S. Jun and S. Joo Lee, 2012). In addition, most of the previous study was only depicted the simply current condition, not describing the future trend of technology (J. Kim, et.al., 2012). Some related studies of technology trend analysis and forecasting application to predict the future technology development were conducted.

The comparative study between decision tree and statistical feature analysis and Gartner's forecasting model was done for technology trend analysis and forecasting application (J. Kim, et.al., 2012). The analysis on this study was using three sub models namely Technology Life Cycle Discovery (TLCD model, Technology Maturity Forecasting (TMF) model, and Emerging Technology Discovery (ETD) model. TLCD model was made by the analysis of papers and patents.

The identification of future trends was done by a mixed methodology using journal content analysis, focus group and trend reports on the academic libraries. The most popular topic was concluded with the highest number of downloaded article (R. Gwyer, 2015). There is no previous study stated the correlation between the number of downloads article and the popular topics that would indicate the trend.

The trend of innovation of Small Medium Enterprise's companies was conducted by using American standard industry classification (SIC) data (Z. J. Acs and D. B. Audretsch, 1988). Although the evaluation method of this research is an effective means for evaluating the trend of the American manufacturing industry, it may not viable to be applied to the evaluation of the Japanese manufacturing industry.

Previous studies have employed the patent document to predict the future state of technology (S. Jun and S. Joo Lee, 2012)(Jun, S. et. al., 2012) (Shrivastava, S., et. al., 2015) (Jun, S. and Park, S.S., 2013) (Kim, G. and Bae. J, 2017) (P. L Chan, et.al., 2010). The study of technology forecasting employed the International Patent Classification Code. The IPC code was used in Path analysis. The patent documents that concerning nanotechnology as the target technology was analyzed for verifying the analysis result (S. Jun and S. Joo Lee, 2012). The other study was also employed IPC code to search the direction and trend of technology over patent period (Shrivastava, S., et. al., 2015) (Jun, S. and Park, S.S., 2013). In International Patent Classification, there is the limitation of subdivision of IPC (FI) and inadequate segmentation. There are too many documents that are included in one symbol. This is also a single view point that from IPC only. The F-term indexing system is based on multiple viewpoints differing from those in IPC.

In this study, we propose the patent information analysis method using the F-term as Japanese patent classification code. The patent information analysis was used to predict the technology trend particularly on inkjet printing technology (IJ) and microfabrication equipment (MC) as the target technology in the case study company. The F-term is the more detailed information related to the patent

information that derived from the IPC. This is a unique and more specific classification. By using the F-term in Japanese patent, we able to find the more specific technology that related to the target technology in this study. By understanding the trend of technology, the product innovation process will be on the right path. It is important to integrate the product innovation process to the product life cycle management (A. Staisch et.al, 2012).

It is important to discern technology trends and the timing of the new technology for emerging the product to the market. In response to the issue of how to view the market and technology trends, we used the concept of technology and market change that was shown in "Dominant Design Theory" of James M. Utterback (Utterback) (J. Utterback, 1998) (J. Utterback,et.al., 2006). Utterback´s model for innovation defined three phases of innovation in the marketplace for product namely the Fluid, Transitional and Specific phases. Some studies work on recognizing the dominant design (Bakker, S. et.al., 2010) (P. Anderson and M. L. Tushman, 1990) (R. Roy, 2016) (M. Hekkert and R. van den Hoed, 2004) (H. Sievers, 2015) (F. Suarez, 2015) (S. Wilson, 2007) (A. Brem et.al., 2016).

Nobeoka (Nobeoka Kentaro, 2006) states that the problem of Japan's manufacturing is the manufactures in Japan only suffers in "making things" as well, but it is not linking to the customer's satisfaction or profits. It makes creating the "value creation" is not possible. For linking to the "value creation", there are two important points, namely the technology uniqueness / differentiation and a high customer value.

Therefore, we must recognize the dominant design of our product in a pre-market phase of development. To be dominant in the market share, we must understand our dominant design. When a dominant design is defined, we are mostly out of the product innovation phase. The phase take place when all players start to optimize their processes, improving the quality and reducing the cost of their products. Therefore, in this research, we devised a method to evaluate the change of product and process innovation by patent analysis and investigate the dominant design of target technology.

2 Research Methodology

As a case study research, we conducted the study in a manufacturing company in Japan. As a target technology of company, we selected two products namely small NC microfabrication equipment (MC) and inkjet printer device (IJ). The research methodology is shown in Figure 1. Related to the company's target technology, the previous studies, and Japanese patents documents were reviewed. The trend of technology was obtained from the F-term as a specific term in Japanese patent. the S-shaped curve of technology is evaluated by diminishing down FI (File Index) to the Japanese patent application and obtaining the number of technology applications. The Japanese patent was reviewed over period 1998 – 2016. The overview of F-terms in the Japanese patent classification and its correlation to the International Patent Classification (IPC) is shown in Figure 2. In the F-term indexing system of Japan patent classification, the entire technical area is divided into small areas called "theme" and patent documents are analyzed in each "theme". Each "theme" has "F-terms", which are search keys. After obtaining the theme from the F-term of.

In this research, "technology trend" refers to the next market and technology evaluation factor.

1."S curve of technology" representing market growth and product life cycle

2."Product innovation" and "process innovation" representing the status of innovation

3."Dominant design" (period of emergence, technical elements) representing the transition period of "process innovation" from "product innovation"

Figure 1   Research Methodology

70,000 entries 190,000 entries   380,000 entries
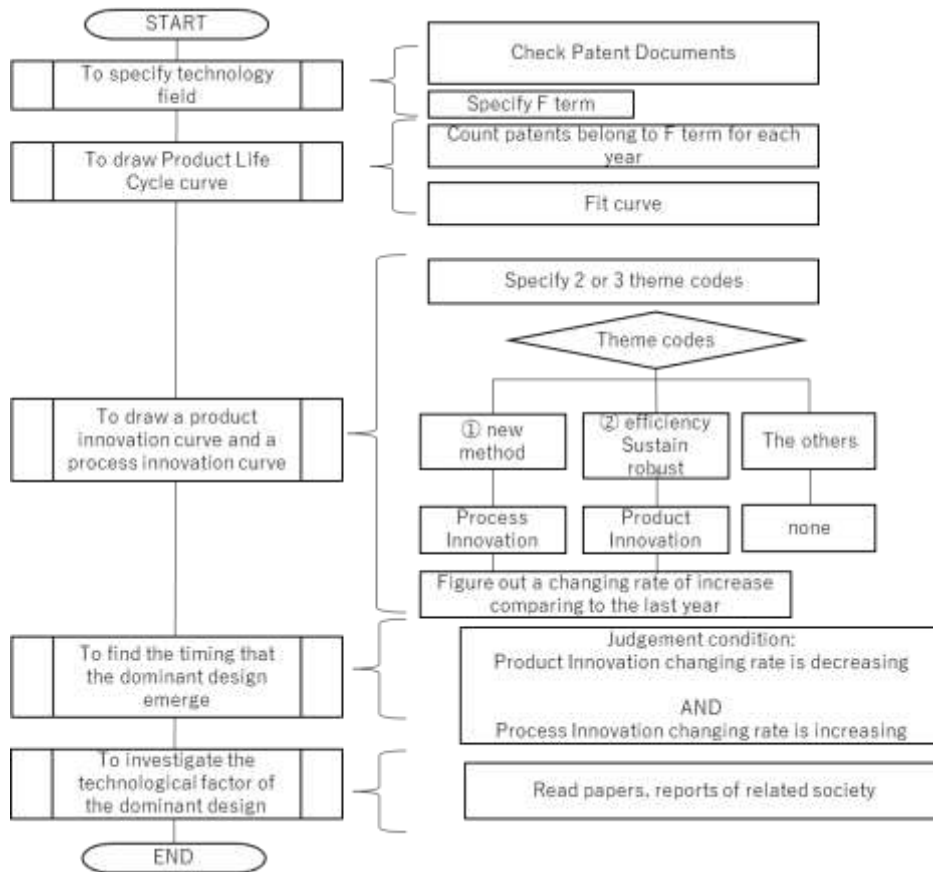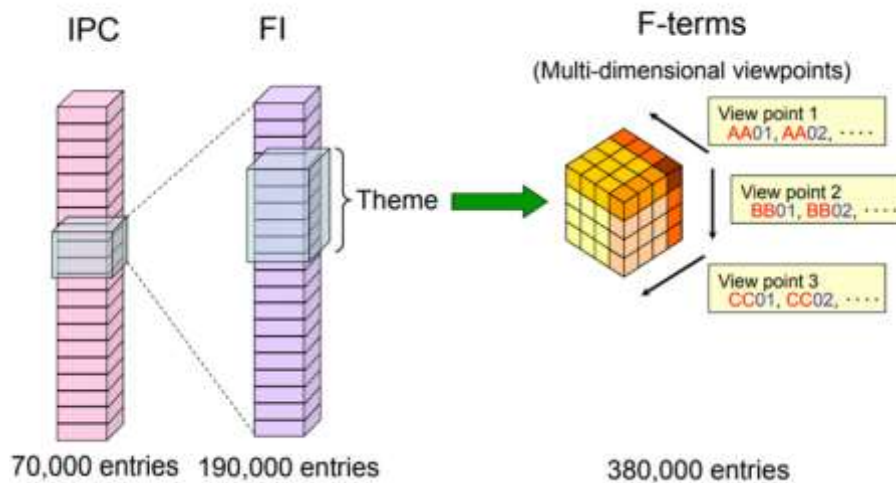
Figure 2   Overview of IPC, FI and F term

3 The Emergence Time of Dominant Design of IJ and NC Machine Technology

As described in Figure 2(Japan Patent Office, 2013), the theme code was obtained from the F-term in the Japanese patent classification. This code is the unique and specific code according to the specific field in Japan's technology. The theme codes that employed in determining the dominant design of IJ technology from the Japanese patent application were 2C 056, 2 C 057. Subsequently, the S-curve of technology was obtained and shown in Figure 3. The figure shows that the S-shaped curve of technology has reached the peak phase around 2006, and after 2017 it is at the "declining period". The innovation of

product and process were investigated by using the number of cases from F-term in Japanese Patents. Both product and process innovation are fluctuating and recognized as the dominant design at around 1990 until 2003. The dominant design of IJ then obtained from academic journals over period 1990 – 2003, namely "on-demand printer" and "line printer".
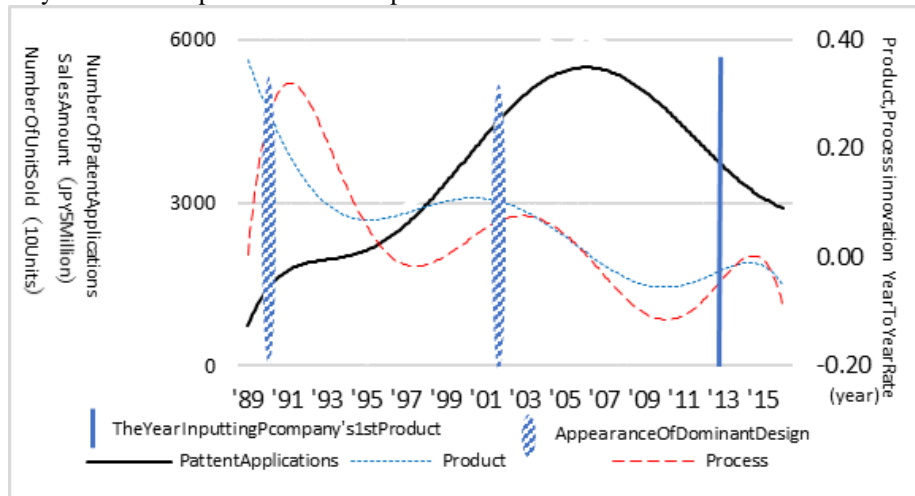
Figure 3   S-curve and Innovation of IJ Technology

It depicted in Figure 3 that the company as the object of this research entered to introduce its product to the market in around 2013. The period of entering the market indicated in the specific phase as in Utterback Innovation model. Therefore, the company must make a new breakthrough in innovation and using it to move from the end of the innovation cycle to the beginning of a new one with the next innovation of product. The company must create a wave of radical innovation to sweeps across existing technologies and make it become obsolete. As the current result, this company's IJ business has not reached to making big benefit for 6 years.

The "S-curve of technology" and the innovation of the NC machine technology is shown in Figure 4. The theme code used is 3C001 (machine tool). As shown in Fig. 4, the S curve of technology reached its peak around 1994 and declining in 2017. It is judged as 'declining period'. The innovation of product and process increased until 2009 and currently declining. From the viewpoint of technology development, the NC machine field is not as active as the IJ device. The dominant design emerged around 1993 - 2004. The company entered the market before the period of dominant design ended. After the dominant design period, the innovation of process increasing significantly. The company entered the market prior to the rapid increase in technology development pursuing Quality, Cost, and Delivery (QCD), in a situation where various technical elements are easily accessible to small and medium-sized enterprises.
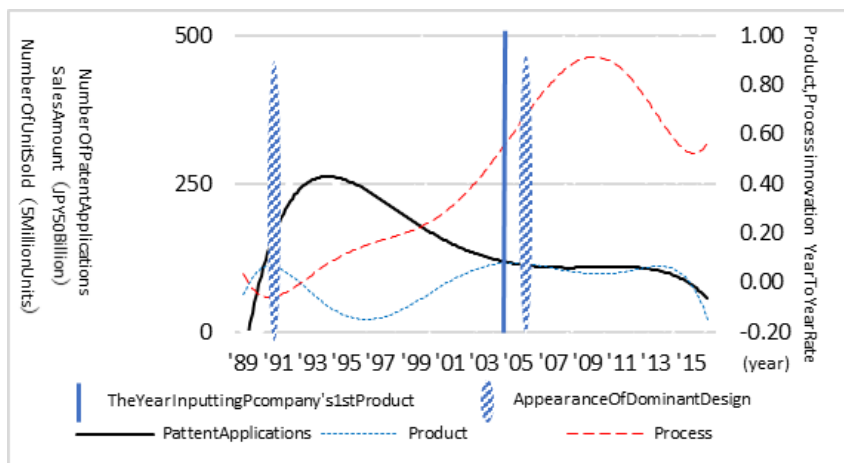
Figure 4   S-curve and Innovation of NC Machine Technology

The market segments are clear and therefore the company able to concentrate on serving specific

customers. It can be stated that they introduced their product at the correct time and can be successfully grasped the customers who need special orders. As the result, the company has obtained the niche market concerning R&D laboratory of the enterprises and universities with steady benefit for 16 years. Furthermore, product innovation is in the specific phase, waiting for the new radical development on the product for jumping to the new cycle of innovation.

4 Conclusion

The objective of this research is to identify trends of technology and examine the product's introduction time to the market.   The trend of technology was evaluated by using the theme code of F-term in Japanese Patent Classification. The emergence time of dominant design of Inkjet printer (IJ) and NC machine was investigated.   From the S curve and innovation lifecycle, it was determined the period of emergence time of dominant design for inkjet printer technology over period 1990 until 2003. The introduction time of inkjet printer to the market was behind the dominant design period. The introduction time of NC machine to the market was in the vicinity period of dominant design around 1993 until 2004. The company entered the NC machine's market prior to the rapid increase in technology development pursuing Quality, Cost, and Delivery (QCD). It becomes viable for the firm to successfully grasp and concentrate on the customers who need special orders.

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Co-design of Service Innovation Through Problem Based Learning in Higher Education Incorporating Living Labs

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Abstract: The aim of this research is to propose a model of problem based learning to develop service innovators. This model futures empirical finding for problem solving by implementing with enterprises and higher education institutions. This study focuses on craftsmanship in the manufacturing small enterprises in Japan. It is because the management of a small enterprise is tight and it is difficult to demonstrate the value of excellent craftsmanship. This study shows a model of co-design of service innovation and the execution process of the model by enterprises and higher education institutions incorporating living labs which is one methodology to practice open innovation.

Key words: Human resource development; Living labs; Manufacturing; Production service; Service innovation; SME

1 Introduction

There are lots of small and medium enterprises (SMEs) in Japan. Despite its small scale, SMEs are supporting the Japanese economy. As shown in figure 1, in Japan, 99.7% of the enterprises are SMEs (Ministry of Economy, Trade and Industry in Japan, Small and medium enterprise agency, 2014). In terms of the number of enterprises, SMEs are overwhelmingly larger than large enterprises. In terms of the number of employees, SMEs are also lager.

SMEs are largely involved in subcontracted manufacturing which is the backbone of a number of principal industries of Japan, such as the automobile industry. Therefore, SMEs accumulate potential technologies and skills in order to meet the strict demands of large enterprises (Ministry of economy, Trade and industry, Labor and welfare editing in Japan, 2016).

However, the management of SMEs are tight and SMEs are lack the core personnel to lead research and development in addition to manufacturing. It is difficult for SMEs alone to demonstrate its value. Therefore, discovering superior craftsmanship and translating it into earning power is a problem that requires urgent attention (Small and medium enterprise agency in Japan, 2015).

2 Aim and Method of This Study

The aim of this research is to propose a model of problem based learning to develop service innovators. Both of enterprises and higher education institution future empirical finding for problem solving by implementing this model.

Figure 1　Ratio of Manufacturing Enterprises in Japan

In this research, participation observation (J. Blomberg, M. Burrell, and G. Guest, 2002) and interview were used for data collection. In addition, co-design (J. Blomberg, M. Burrell, and G. Guest, 2002) and living labs (European Network of Living Labs, 2018, F. Akasaka, A. Kimura, 2017) were used for analysis and problem solving. Co-design is is one methodology for value creation and an approach to involve various stakeholders and work together to solve problems. Living lab is one

methodology of open innovation and an approach to understand and solve problems at workplace and society's site.

This study shows a model of co-design of service innovation and the execution process of the model by enterprises and higher education institutions incorporating living labs which is one methodology to practice open innovation. This model futures empirical finding for problem solving by implementing with enterprises and higher education institutions.

3 Issues to be Solved
3.1 Lack of human resources capable of management leading to service innovation
Japanese government advocate strengthening of power to make profits by not only reforming by traditional cost reduction and time reduction, but also by improving productivity and value creation, in order to realize differentiation by high quality and high added value (Baines T.S., et al., 2009).

Meanwhile, manufacturing companies in Japan have accumulated techniques and experiences of manufacturing, but it can not be said that they are fully working on intangible value creation and grasping customer satisfaction. That is Japanese manufacturing companies are not good at service innovation yet.

Consequently, management reforms that cause service innovations are necessary for manufacturing industry. Due to the spread of design thinking, the idea creation method which is possible to be applied to manufacturing has become known (). However, many enterprises haven't learned such service innovation that had not mentioned in the past education of engineers. In Japan, the definition of service is not clearly recognized yet (T. Arai, Y. Shimomura, T. Hara, 2007). Even the academic conference in Japan only presented reference standards for servisology. Therefore, the manufacturing enterprises need to learn about value creation again (R. F. Lusch, S. L. Vargo, 2014).

3.2 Lack of educational opportunities in SMEs
99% of all Japanese companies are SMEs. Many of which are engaged in contract manufacturing from large companies. As in Europe and the United States, small and medium enterprises need to complement innovation knowledge to enhance their profitability centered on their own specialty, in order to independently trade with overseas markets as well as large enterprises.

Large enterprises can learn through OJT (On the Job Training) in departments such as in-house education, study abroad, research and development, marketing, etc. On the other hand, small enterprises with limited management resources do not have much opportunity to learn again like large enterprises do. However, because it is small and medium scale, there is a possibility that the educational effect will be penetrated and practiced quickly.

3.3 Lack of higher education to help to solve problems of enterprises in the traditional curriculum
Traditionally, universities have built a curriculum centered on subjects in accordance with educational policy. Meanwhile, the environment surrounding enterprises and companies is rapidly changing. As mentioned in 2.1 and 2.2, in recent years, there has been a strong demand for value creation by service innovation to make the manufacturing industry survive.

However, higher education to solve new problems in the industry was not found in the traditional curriculum that teaching industrial technology. There is concern about the gap between the traditional curriculum and higher education necessary for enterprises. The higher education is required to design provide new problem-solving education. Therefore, the universities need to understand concretely what kinds of problems the enterprises suffer from before the preparation of the new problem-solving education.

4 Survey of Problems of Manufacturing SMEs
4.1 Overview of the survey
As shown in Table 1, this survey was conducted between 2015 and 2017 to understand the problems that manufacturing SMEs have.

The subjects to be investigated were four manufacturing SMEs ranging in size from tens to 100 employees. This survey was conducted by the enterprises, six students and one faculty member in cooperation. The participated observation and interview were used for the survey methods.

The participated observation was focused on the servitization.of manufacturing industry. It is the servitization.that how far each enterprise's service innovation was progressing.

We focused on management problems and ingenuity to solve problems by management and employees through living labs.

Table 1 Overview of Survey

Enterprise	Production type	Investigation (hour)		
		Observation	Interview	Total
A	Metal processing	3.5	2.5	6
B	Metal processing	3	3	6
C	Electronic parts	4	3	7
D	Motor	5	1.5	6.5

4.2 The results of the survey

4.2.1 Progress of servitization

As a result of the survey shown in 3.1, the following information was revealed.

In participated observation, we understood the difference of servitization among the enterprises. The progress of manufacturing servitization of each enterprise was classified based on the four steps of the industrial revolution, "Mechanization, water power, steam power," "Assembly line, electricity," "Computer and automation," and "Cyber-physical systems". A summary of the results about servitization of each enterprise is shown in Table 2.

Table 2 A Summary of the Results about Servitization

Enterprise	Production Type	Delayed← Mechanization, water power, steam power	Servitization Assembly line, electricity	Computer and automation	→Leading Cyber-physical systems
A	Metal processing		→		
B	Metal processing		→		
C	Electronic parts			→	
D	Motor				→

In the interview, several common terms and differences were extracted about management problems about management problems and ingenuity to solve problems. A summary of the survey results is shown in Table 3.

4.2.2 Comparison of management problems and ingenuity to solve problems

All of the four enterprises were in common in that they were also engaged in multi-product small-volume production that was difficult to set up a production line, but also challenge the prototyping of new products and new services using the excellent technology.

In particular, several characteristics were clarified in the homepage and leaflet brochure. All of the enterprises listed their core technologies. Furthermore, enterprise C and D were appealing the value of their technologies to customers for the usage by customers.

Table 3 A Summary of the Results about Management Problems and Ingenuity to Solve Problems

No.	Management Problems and Ingenuity to Solve Problems	Servitization Delayed		Leading	
		A	B	C	D
1	Multi-product Small-volume Production which is difficult to set up production line	Y	Y	Y	Y
2	Utilize production management tool	Y	Y	Y	Y
3	Creation of the prototype of new product / service with good skill	Y	Y	Y	Y
4	Presentation of their superior technology through the website etc.	Y	Y	Y	Y
5	Accountability of value of superior technology giving to customers through the website etc.	Not yet	Not yet	Y	Y
6	Adjustment to increase orders to take use of their excellent technology	Not yet	Not yet	Y	Y
7	Pricing including the value of their excellent technology for customers	Not yet	Not yet	Y	Y
8	Pioneering new customers at overseas exhibitions	Not yet	Not yet	Y	Y

According to participated observation and interview, enterprise C and D calculated prices from added value and negotiated with customers rather than accumulating costs. Enterprise C and D were implementing selection of orders to take advantage of core technologies. Although competition in the market was severe, enterprise C and D seemed to have accumulated experience of explanation their excellent technologies to customers.

On the other hand, enterprise A and B had habitually accepted prices proposed by large companies. Enterprise A and B were always waiting for any order by large companies and had never refused any order. Although enterprise A and B were able to maintain relations with certain large companies, they received few orders using their excellent technologies.

4.2.3 Higher education required by enterprises

These survey results were shared with four companies and discussed. As a result, the following view was obtained.

‐ Even without the assemble line for mass production which the large companies in the manufacturing industry are all working on, service development can be promoted while using strengths.

‐ It is difficult to create value simply by having excellent technologies .

‐ Explanation of value for customers is necessary for both price negotiation and market competition.

‐ Compared with mass production, multi-product small-volume production can provide various values, but the explanation of the value is diverse and difficult.

‐ Regarding improvement of technology, the method of training in-house training is mature, but training in-house for improvement of the explanation of value is not easy.

Ultimately, we conclude that improving the capability of the explanation about the value that the excellence of technologies brings to customers is the top priority.

Therefore, enterprise A, students and the faculty member cooperated and tried to visualize core technology of enterprise A based on living labs methodology at their workplace in enterprise A (S. Hirata, 2016).

5 A Case of Problem Based Learning in SMEs through Industry-Academia Collaboration

5.1 The extraction of visualization of core technology through participant observation of enterprise

An excerpt from the visualization of the core technology through living labs methodology at the workplace of enterprise A is shown below.

Time was spent with the craftsmen at their factory and office in order to gain a practical understanding of the efforts required and ingenious devices implemented in the individual processes of metal casting through participant observation (Y. Yamaguchi, S. Odajima, S. Hirata, 2016). We carefully observed the work of the craftsmen's usual work and recorded what we understood. For instance, the extent of contraction, expansion, and bending differs depending on the thickness and shape of the metal to be poured later. Therefore, the dimensions of a wood model to make the mold must be determined in advance in order to control for such a complicated variable. The design of a part to be larger or smaller depends on tacit knowledge gained from the experience of each craftsman.

A variety of polishing tools with varying widths have been fabricated by individuals at their own personal expense in order to create complex surfaces. Standardizing or formulating manuals for such gut feelings and experience is difficult, and these skills must be acquired through on-the-job training by repeatedly forging alongside an expert. Since there is a limit to how much the gut feelings and experience of an expert can convey, creating memos for items of consideration and operations and making them available for search by ICT is believed to be effective.

5.2 Solutions for problem solving by so-design

The result of the participant observations in 4.1 were recorded in notes, pictures and videos as Table 4. Based on these data, we conducted co-design to develop a system that explains the superior technology among enterprise A, students and the faculty member.

As a result of the co-design, by registering the above data in the database and reading the ID of each work tool with a sensor, the explanation of the technology related to each tool could be displayed from the personal computers by text, photo and video. Proposal was made to use this system for training human resources and negotiating with customers in order to account the excellent technologies.

Table 4   Extraction of Superior Technology and Classification of its Accounting Method

Superior Technology	Classification of its Accounting Method				
	Possibility of Application of Automation to Replace Humans with Machines	Documents	Photo	Video	OJT
(1) Capable of determining the dimensions of patterns and anticipating shrinkage allowance and warpage of finished model.	-Computer-aided design(CAD)/ Computer-aided manufacturing(CAM) -Three-dimensional (3D) data - Sensor -Vibration controller] -Power assist - Traceability through business model management	NG	NG	NG	Best
(2) Capable of increasing the purity of metal to be casted by adding a groove and inflection to the mold for precipitation and flotation of impurities.		Best	Good	NG	Good
(3) Capable of adding a projection that enables product to be taken out without breaking the mold upon dismantling.		Good	Best	NG	Good
:		:	:	:	:
(13) Capable of controlling quality standards for each client.		Best	NG	NG	Good

Legends for judgment standard: Best: optimal as an option, Good: can be an option, NG: inappropriate for an option

6 Conclusion

Based on this empirical study, a model of problem based learning for higher education through industry-academia collaboration was indicated as shown in figure 2. In addition, the process of practicing this model through living labs, in cooperation with enterprises and higher education institutions was shown.

Application of this model to higher education institutions and enterprises would support sustainable development of human resources who lead service innovation. This model can be applied not only to SMEs but also to large companies.
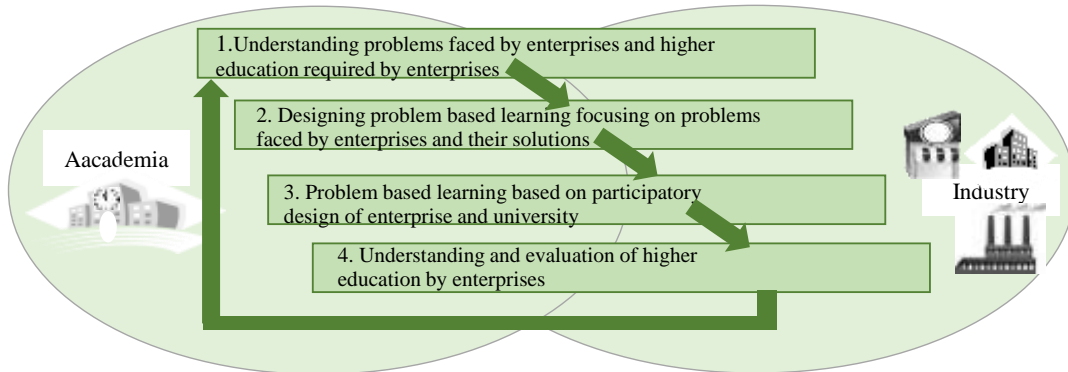
Figure 2   A Model of Problem Based Learning of Higher Education through Academia-Industry Collaboration

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Stakeholders' Trust towards the Role of Auditors: A Synopsis of Audit Expectation Gap

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Abstract: The role of external auditor has always been a dubious issue since the emergence of the profession whereas public expectation is beyond imagination regarding the role of auditors. With the inevitable facts that the business entity assumption separates the business and owners; agency conflict exists between the parties and the role of external auditors rises as a means of monitoring the task of management on behalf of owners. As auditing, is a powerful tool to retain stakeholders' confidence on the result of business operations, numerous expectations ambiances the role, played by the external auditors. This paper is an attempt towards empathizing the Audit Expectation Gap (AEG) and offers a rational to look upon the issue, based on the extensive literature review .Further, the study portrays the necessity of involving stakeholder's expectation towards the auditing profession by developing a conceptual model of AEG and the variables affecting the AEG. Auditors should not skip the issue merely enunciating that it is a self-regulatory profession; otherwise, stakeholders will lose faith on auditors, and its consequence is far reaching.
Key words: External auditors; Stakeholders trust; Audit expectation gap (AEG); Conceptual model of AEG

1 Introduction

Massive Global corporate scandals, financial crisis and collapses of large entities such as Barings, HIH, Parmalat, Enron and Lehman Brothers have diluted the stakeholders confidence in the worlds capital market .The auditing profession has also come under the spotlight, following   the melodramatic flop of eminent companies without any prior warning signals in audit reports and highlighted the miracle phenomena, the audit expectation gap (AEG).The collapse of the big companies have always been costly to the auditing profession in many ways, such as compromising the professional reputation, incurring high cost of litigation in order to settle down these cases in courts, and the possibility of taking increased responsibilities and the most importantly loosing stakeholders faith (Wolf, Tackett, & Claypool, 1999).

In the eve of 2018, the collapse of Carillion Construction Company in UK has made the situation worse and the Audit Expectation Gap has been noticed from a newfangled perspective and this downfall indicates, it is stint to reassess the role of auditors. Carillion is the latest in a string of cases where auditors have conveyed a clean message about the health of companies soon afore austere financial snags arose that in many cases evidenced ruinous. Most users of accounts undoubtedly surmise that if an auditor signs off a company's accounts without qualification there should exist next to zero risk of being bankrupt within a year where as Carillion collapsed just after ten months of its being audited .If through the legislation, it can be decided, what users want from the audit process, only then the profession will know where it stands, as a consequence an acceptable outcomes-based   auditing model can be achieved (Kingsley Stephen, 2018).Either auditors need to start excavating extensive into latent glitches or people should start expecting less of them or customers of audited accounts must be articulated the fact that they are just expecting too much (Wighton David, 2018).

The Big Four firm's failure to hook a years-long fraud containing made-up mortgages at Colonial Bank happened due to professional negligence; a recent verdict referred on the case of Colonial bank collapsed in USA.The testimonial was found that, the auditor of the aforesaid bank did not design the audit procedures to detect fraud and very junior level employee, as like as college-aged intern were assigned and sent to evaluate such a big issues and the consequence was catastrophic(Masters Brooke, 2018).As investors believe on the financial figures produced by the company's executives and they can demand higher standards regarding auditors' independence and judgment and it   is high time to lessen the dependency of auditors on the lucrative non audit work, therefore urge for the breakup of big four firm into consultancy and audit only services (Ford Jonathan, 2018).

This paper articulates an overview of the audit expectation gap (AEG), the contributing factors

behind the AEG, the consequences of not handling the AEG properly and also infer some ways of mitigating AEG and the pluses of doing so. Moreover, the study proposes a conceptual model relating the causes, consequences, and the ways of mitigating AEG; whereas the ultimate upshot is enhancing stakeholder's confidence on the auditors.

2 An Overview of the Audit Expectation Gap

Liggio (Liggio, 1974) demarcated, Audit Expectation Gap (AEG) as the difference between the levels of expected performance as anticipated by both the user of a financial statement and the independent accountant. The Cohen commissions (1978) defined Audit Expectation Gap as the gap what the public expects or desires and what auditors can and should reasonably expect to accomplish. According to the American Institution of Certified Public Accountants (AICPA, 1992), AEG is the gap concerning what the public and financial statement consumers believe auditors are responsible for and what auditors themselves believe their responsibilities are. Moreover, Porter (Porter, 1991) came with a comprehensive definition of AEG and introduced the term reasonableness gap and performance gap.

a. Reasonableness gap: The difference between what the public believes auditors to achieve and what they can practically be likely to achieve.

b. The deficient standards gap: The difference between what can sensibly be expected from auditors and auditors' existing duties as defined by the law and professional standards.

c. The deficient performance gap: The gap between the expected standard of performance of auditors' existing duties and auditors' perceived performance, as perceived by the public.

AEG is the deviation of notion between auditors and the public about the duties and responsibilities assumed by auditors and the messages conveyed by audit reports (Monroe & Woodliff, 1994) as well as the AEG subsists when auditors and the public embrace dissimilar beliefs regarding the auditor's obligations and responsibilities and the messages channeled by audit report (Chye Koh & Woo, 1998; Frank, Jordan Lowe, & Smith, 2001; Wolf et al., 1999)

Accounting and auditing literature and the institutional setup seems to assent the presence of AEG and has entitled to litigate in order to moderate the gap or to edge its influence on auditors (Cohen1987, Porter 199, AICPA1978, Mock et al., 2012, Gold, Gronewold, & Pott, 2012). Liggio (1974),noted a wide expectations gap between what users of company accounts consider auditors' job is and what the auditors and their regulators think. The significant causes of AEG is the self-regulatory framework of the profession that enable the profession to set audit objective though it may give less importance to public expectation. The need for government interference and renovating the legal proclamation regarding auditor's responsibilities, selection and compensation of auditors may bridge the gap (Onulaka & Samy, 2017).The audit expectation gap curtails from the permutation of the insufficient auditors performance, divergence in the audit standards and regulations, irrational expectations and misconceptions of audit functions. Considering numerous corporate scandals the role of external auditors come into question and users are more concerned regarding the auditors independence and objectivity towards the entity subject to auditing, auditor's responsibility to evaluate the entity's viability; and the influence of auditing fees and remuneration on audit quality (Mansur & Tangl, 2018).

Replicating the study ofSchelluch (Schelluch, 1996), significant reasonableness gap was discovered in Lebanon (Munir Sidani, 2007) as well as AEG was identified in the expanseauditor errands for fraud prevention, conservation of accounting records, and auditor decision in the assortment of audit techniques and also the dependability of audit and audited financial statements, and the expediency of audit in Egypt (Dixon, Woodhead, & Sohliman, 2006); in Malaysia (Nazri Fadzly & Ahmad, 2004); in Singapore (Best, Buckby, & Tan, 2001) identified AEG mostly in the area of auditors responsibility and trustworthiness of the audited financial statements.Meanwhile, Chowdhury, Innes, & Kouhy (Chowdhury, Innes, & Kouhy, 2005) ascertained AEG mostly in the area of accountability and audit independence in the Public sector auditors of Bangladesh as well Siddiqui, Nasreen, & Choudhury-Lema (Bangladesh Siddiqui, Nasreen, Choudhury-Lema, 2009) portrayed that there is significant audit expectation gap in Bangladesh in the area of auditors responsibility and somewhere auditors responsibility in fraud detection while education plays an important role in reducing AEG in an emergence economy setup like Bangladesh.

An audit report on the general purpose financial statements articulates a positive and unbiased opinion providing a high but not absolute level of assurance whereas the report on review engagement provides a moderate level of assurance, which is a lower level of assurance (Gay, Schelluch, & Baines, 1998). Moreover significant AEG was found in respect of Auditors independence and in respect of the

short form of audit report (P Schelluch, 1996). Lin & Chen (2004) revealed AEG in the areas of role of auditors, objectives of audit, and auditors' role regarding the discovery of fraud in China.

　　The artifact of an audit is amplified trustworthiness committed to the audited financial statements whereas biasness, conflict of interest and lack of perceived independence make the audit report nothing just a company commercial, whereas huge monetary and reputation losses, misplacing credibility to the profession, augmented legal fees, exorbitant out-of-court settlements,　elevating　insurance premiums, and susceptible guideline are some of the costs associated with not responding to the AEG properly(Wolf et al.,1999)

　　The auditing professions anxiety about the appearance of expectation gap is justified; however, steps should be taken to lessen the gap. More literate, conversant and educated users stretch less burden to auditors, conversely professional bodies should take active steps regarding educating users about the duties and responsibilities of the auditors and the meaning of auditors report. Moreover, the wording of the audit report have significant effect on the gap as different audit report will bear different wording and the responsibilities of the auditors to be specified clearly (Monroe & Woodliff, 1993, 1994). Ameliorating auditors professional training, ensuring quality control and enhancement of audit methods were suggested to bridge the auditors performance gap, Expansion of auditors independence and responsibility were put to bridge the standard gap and finally educating people and society about the role of auditors and introducing the extended (long form) audit reports to bridge the reasonableness gap in Hungary (Füredi-Fülöp, 2015).

　　Public has extravagant expectations of auditors' responsibilities beneath the present professional standards as they face difficulty in evaluating the auditor's performance and auditors are not effusively alert of their responsibilities. Limited information content of the audit opinion is one of the major causes of AEG. Changes in the content of the audit report is probable to narrow the gap,　however, compulsory auditors rotation and a prohibition on providing non-audit services, may lessen the gap only to a smaller extent (Ruhnke & Schmidt, 2014). Pourheydari & Abousaiedi (Pourheydari & Abousaiedi, 2011), found Audit expectation gap in the areas of auditor responsibility for fraud detection, internal control soundness, and the preparation of financial statements. Furthermore, they ground peanut upshot whether audit purpose could be accredited to the culture of reliance amid auditors and stakeholders in Iran. Progresses in auditor-user communication, audit reports, auditing framework, and auditor integrity could be the probable propositions in narrowing AEG in the existing state of affairs.

　　The standard audit report　provides users a ominously upper degree　of assurance in the company's management, investment soundness, and achievement of strategic objectives although there is differences in the perception among the auditors and different level of users in understanding of the massage carried out　by the SAR and inferring the technical word in SAR (Asare & Wright, 2012). Sweeney (Sweeney, 1997) notified that educating the public as to what the audit function currently entails and changing the nature of the audit function to meet the public expectation. The revenues earned from consultancy outweigh the revenues earned from audit by the accounting firm where as less proficient auditors performing the riskiest audits and in the end an upturn in audit failures and external appointment of auditors, required auditor rotation and a market based instrument that would hedge against inevitable audit failure(Wolf et al., 1999).

　　Stakeholders confidence is distorted regarding the financial reporting drill and related audit functions in this epochs(Rezaee, 2004).The auditing profession has undergone with　the hasty erosion of stakeholders' buoyancy for several eons particularly later the demise of numerous valuable　companies though the exterior auditors delivered fresh report about the strength of the companies just afore their downfall (Onulaka & Samy, 2017).Auditor should alter the approach from self- vindication, self-protection to meet the stakeholder's expectation. Considering the significant causes of AEG, consequences of AEG, ways to reduce the AEG and the impacts of reduced AEG has been portrayed as the basic theme of this paper.

3 Conceptual AEG Model

　　A theoretical model (Figure 1) has been developed that reflect the relationship among the audit expectation gap and the variables affects such gap. Lack of perceived independence is the prime causes of AEG, biasness and lack of objectivity make the audit report nothing just a company advertisement (Wolf et al.,1999).Other causes of AEG are self-regulatory framework of the profession (Onulaka & Samy, 2017), responsibility for fraud detection,viability of the audited financial statements (Ruhnke & Schmidt,2014; Pourheydari & Abousaiedi, 2011), reliability of the audited financial statements (Dixon, Woodhead, & Sohliman, 2006; Nazri Fadzly & Ahmad, 2004; Best, Buckby, & Tan, 2001), difficulties in understanding the meaning of audit report (Asare & Wright, 2012). The consequences of AEG is also

fatal such as huge financial and status losses, dropping integrity to the profession, amplified legal fees, overpriced out-of-court settlements, elevating insurance premiums, and inclined guideline and finally losing the stakeholders' faith on auditors, are some of the costs associated   with not responding to the AEG properly (Wolf et al.,1999). However, it is possible to keep the AEG in a control mode and earning stakeholders' confidence, and it is vital because if stakeholders loose trust on auditors, the necessity of the existence of auditors is questionable. Educating the society regarding the role and responsibility of the auditors beneath the particular standard set up is the most effective way of diminishing AEG (Monroe & Woodliff, 1993, 1994; Sweeney 1997; Füredi-Fülöp, 2015) and the consequence of diminished AEG is the enhanced stakeholder's confidence in the auditing process.
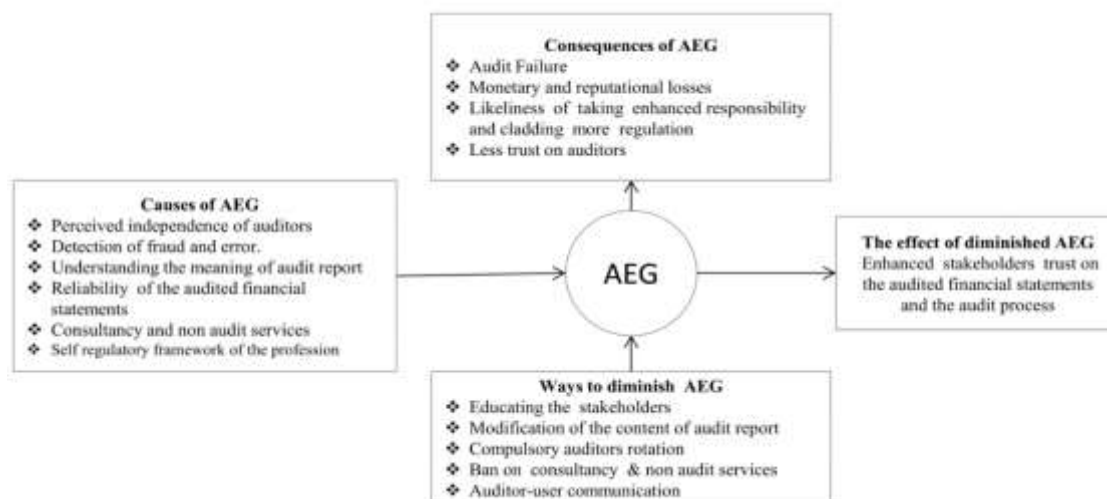
Figure 1   Conceptual AEG model

4 Conclusion

Notwithstanding the self regulatory eminence of the profession,contradictory institutional structure,inequality in the circulation of wealth,influence,politics and power, as well as   in a fluctuating social context , AEG is an incessant phenomena.However , to retain stakeholders   trust and confidence in the profession and placing rationalities to the birth of auditors,the auditors should be responsive towards AEG.The number of proposed mechanism such as, educating the public towards the role and reponsibilities of auditors,ensuring perceived independence,demand for the inhanced regulation such as modification for the content of auditotors report, limiting the mix of service provided by auditors,mandatory auditors rotation, regulating the appointement of auditors and so on may act as arbitrator to lessen the GAP; where cost of audit may increase considerably, neverthless may and will not exceed the cost procured to the profession through the AEG. The study concludes that   instead of fetching huge professional   disgrace and fronting lawsuit, it is punter to uphold perceived independence, ensure the reliability and the usefulness of the audited finacial statemnets in order to lesen the AEG, hence retaining stakeholders trust and confidence towards the auditing profession. Moreover this study contributes in the AEG literature by unfolding AEG in a more vibrant ways, and provides a future route for research involving the stakeholders confidence in the auditing process.

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Study on the Evaluation of the Transfer of Management Rights of East Lake Greenway Station

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Abstract: The transfer of management rights in tourist attractions is one of the most important ways of the development of tourist attractions in China in recent years. It is also an important driving force to promote the market management of tourist attractions. In view of the transfer projects of Wuhan East Lake greenway station, this paper discusses the feasible methods of evaluating the value of the management rights of the post station, calculates the post station income with the grey forecast model, and forecasts the excess income based on income method of the asset evaluation. It is believed that the value of the management rights transfer obtained by this method is more suitable to the market value. Instead of the overall value of scenic resources that have been studied by previous scholars, the value is more easily accepted by the assignee to achieve the goal of win-win cooperation, thus ensuring the healthy and sustainable development of the East Lake scenic area.
Key words: East Lake greenway; Transfer of management rights; Value assessment; Tourist attraction

1 Introduction

The value of the management rights of the tourist attractions depends on the economic value of the scenic spots, and the economic value of the tourist attractions has become the key element of the value evaluation of the transfer of management rights. Foreign scholars began to study the value theory of resource assets in 1960s (Krutilla, 1967; Pearce D W, 1994).Chinese scholar, Lu Dinghuan (1985), started to study the economic value of forest park and he believed it was mainly reflected as recreation value. From then on, Chinese scholars have made a comprehensive analysis of the economic value of tourist attractions. They think the economic value of tourism scenic spot includes entertainment value, cultural research value, biological service value, existence value, option value and heritage value. All of these values can be divided into two categories: use value and non-use value. Thus, the economic value classification system of tourism scenic spot (Li Xiumei, 2011) has been established as the following figure.
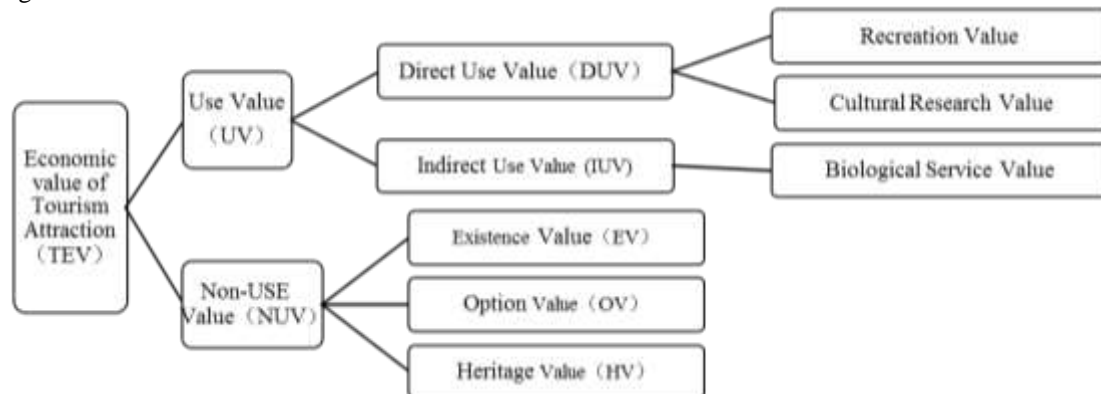
Figure 1   Economic Value Classification System of Tourism Scenic Spot

East Lake greenway connects East Lake's major scenic spots. Most of these scenic spots are open to the public without charging fee. As a world-class greenway, it is not only the first choice for marathon riding, but also a leisure place for the citizens to adjust the rhythm of life. As a tourism attraction, its value includes the use value of economic function and the non-use value of social function. Cheng Shaowen and Xu Qiaoli set up an evaluation index system (2004) for the lake tourist destination, and applied it to Wuhan East Lake scenic spot to evaluate its transfer value. But nowadays the management mode of lake tourism spot has changed, for example, in East Lake scenic spot ticket proceeds are no longer the main source of income. The common calculation methods used in the past are

needed to analyze its applicability, so the value of the management rights transfer of East Lake greenway station has the significance of research.

2 An Overview of the Management Right Transfer of East Lake Greenway Station

2.1 The meaning of the management right transfer of east lake greenway station

The management right transfer of East Lake greenway station is that the station owner transfers the management right of station to quality enterprises by leasing, contracting and buying, allowing the enterprises to manage the station and carry out market operations under the premise of reasonable protection of the resources of East Lake scenic spot.

2.2 The Forms of the management right transfer of east lake greenway station

At present, the main forms of the transfer of the management rights of tourist attractions in China are three types: share cooperation, holistic lease and franchise. Wuhan East Lake scenic spot is a national scenic spot, after more than 50 years of development, its ability of tourist reception and service facilities have taken shape. Although East Lake greenway was officially opened at the end of 2016, it connects all parts of the scenic area organically and turns East Lake scenic area into an inseparable whole. The greenway stations have been completed by the East Lake Green Road Management Co., Ltd. of Wuhan, it is suitable for the use of the overall lease for the East Lake greenway stations.

On August 2, 2016, Wuhan East Lake Green Road Management Co., Ltd. made a bid for the overall management rights of East Lake greenway station ($4100m^2$) and achieved success on August 8, 2016. The relevant contents are shown in Table 1.

Table 1　Projects of Management Right Transfer

Project Name	The Management Rights of Wuhan East Lake Greenway Station ($4100m^2$)
Service Items	Bicycle rent, Sightseeing battery car, Cruise ship, Shop, Public toilet, Direct drinking water
Date of Transaction	2016,8,8
Validity	6 years
Volume of Transaction	1582,0000 Yuan

3 Methods of Evaluating the Management Rights of East Lake Greenway Station

There are five principal methods to assess the value of tourism attractions. They are TCM (travel cost method), CVM (contingent valuation method), ICM (income capitalization method), EM (entertainment method), and HPM (hedonic price method). The most commonly used methods are travel cost method (TCM) (Zha Aipin, 2015) and contingent valuation method (CVM) (You Weibin, 2014).

3.1 Travel cost method

TCM is a mature method for evaluating the value of non-market goods, which is mainly applicable to leisure and recreation, nature reserves, national parks and other tourist destinations, such as reservoirs, dams and wetlands. Although these natural scenic spots may not require tourists to pay fees, tourists need to pay for the traffic. This cost of the tourists can be regarded as the actual payment for these recreational or natural scenic spots.

3.2 Contingent valuation method

CVM is mainly used for the evaluation of the non-use value of East Lake greenway. CVM, based on the utility maximization theory, inquires each tourist's willingness to pay for the East Lake greenway, then counts all these samples, finally adopts the median value as the willingness to pay for the scenic spot. Therefore, the non-use value of the scenic spot can be obtained according to annual tourist number.

3.3 Income capitalization method

There are 24 stations in East Lake greenway. They provide not only profit services of various entertainments but also non-profit services such as toilet and drinking water for tourists. So the transfer of management right of East Lake greenway stations should pay more attention to the recreation value of tourism resources, which can combine both "profit" and "non-profit" characters of East Lake greenway stations, thus calculating the excess earnings reasonably. Both travel cost method and contingent valuation method can not accurately explain the contribution of each tourist resource in scenic spots to the whole recreation value of scenic spots (RT Carson, 1996), so this paper also evaluates the value of management rights by using the income capitalization method. ICM, once a common method of evaluating estate market value, has been applied to value appraisal system of

tourism resources. Furthermore, along with the appearance of management right transfer of scenic spot in recent years, it becomes an important means to evaluate the economic value of scenic spots.

As the relevant information of the project is not open to public, it is impossible to know whether the assessment of the project has been performed by a professional agency, and how the income of 1582, 0000 Yuan has been calculated. If the income capitalization method is used to assess the profitability of the operational assets of tourist attractions, the profitability should be determined through market supply and demand. But the operation time of greenway station is short and the data collected are limited, so the prediction hides great uncertainty. Therefore, this paper tries to use GM (1, 1) model (Liang Yuhong, 2012) in grey system theory to predict future income.

4 Basic Ideas of Income Capitalization Method to Assess the Value of Management Rights of Greenway Station

The theoretical basis of income capitalization method is utility theory of value, which determines the value of assets through the future income. The basic ideas of evaluating the management right value of greenway station by means of ICM are as follows. Firstly, determine the discount rate; secondly, determine the term of income; thirdly, determine the amount of income; fourthly, calculate the assessed value of management rights of greenway station within the income term.

The discount rate is determined by the commonly used capital asset pricing model. The term of income is determined by the transfer period of the project, that is, 5 years. The amount of income is expressed by the annual after-tax net profits of greenway station. The annual cash inflow minus the operating cost last year is the net cash flow of greenway station management rights. This paper tries to use the GM (1, 1) model of grey system theory to model, so as to predict the future revenue of greenway station.

4.1 The determination of income amount

The original data of East Lake greenway station revenue are taken as data, and the corresponding 1 cumulative sequence is

$$\left\{ x^{(0)}(i) \mid i = 1, 2, 3, 4, 5 \right\} \tag{1}$$

$$\left\{ x^{(1)}(i) \mid i = 1, 2, 3, 4, 5 \right\} \tag{2}$$

$$x^{(1)}(i) = \sum_{j=1}^{i} x^{(0)}(j)$$

The GM (1, 1) model is used to predict the income, and the GM (1, 1) model is

$$\frac{dx^{(1)}}{dt} + ax^{(1)} = u \tag{3}$$

In the formula, a and u are grey parameters of the grey equation. The identification formula of the parameter list is

$$\overline{a} = [B^T B]^{-1} B^T y \tag{4}$$

$$B = \begin{bmatrix} -\frac{1}{2} x^{(1)}(2) + x^{(1)}(1) & 1 \\ -\frac{1}{2} x^{(1)}(3) + x^{(1)}(2) & 1 \\ \dots & \dots \\ -\frac{1}{2} x^{(1)}(N) + x^{(1)}(N-1) & 1 \end{bmatrix} \tag{5}$$

$$y = \left[x^{(0)}(1), x^{(0)}(2), x^{(0)}(3), x^{(0)}(4), x^{(0)}(5), \right]^T \tag{6}$$

Then the GM (1, 1) model in the form of discrete solution is obtained

$$\overline{x}(k) = (x^{(1)}(0) - \frac{u}{a})e^{-a(k-1)} + \frac{u}{a} \tag{7}$$

The cumulative fitting values of income sequence can be reduced to original prediction values through the formula (8).

$$\overline{x}^{(0)}(k) = \overline{x}^{(1)}(k) - \overline{x}^{(1)}(k-1) \tag{8}$$

With the increase of K value by 1, the forecast value of East Lake greenway station revenue can be obtained. After deducting the relevant cost and the average profit of the industry, we get the excess return from the project.

4.2 Assessed value of the management rights of East Lake greenway station

Based on the above analysis of the relevant parameters of the value of management rights of greenway station by using the income method, the corresponding calculation model is obtained. It can be expressed as:

$$P = \sum_{t=o}^{T} \frac{R_t}{(1+r)^t} \tag{9}$$

Among them, P is the assessed value of management rights, R is the discount rate, T is the project operation period, and R_t is the excess return of T years.

5 Findings and Suggestions

Through the above methods, it can be found that some factors have influenced the value of management right transfer. Pricing and competitors are the most important factors among them.

Firstly, let's discuss product pricing in scenic spots. Most shops of station are national chains, so the prices of products are fair and reasonable. However, there are problems in the fare of sightseeing cars and cruise ships. The prices of 40 Yuan for sightseeing cars and 80 Yuan per hour for cruise ships are expensive for most tourists. This is also the reason for the suspension of cruise ships. So at the beginning of pricing, we need to take into account consumers' feelings, measure their purchasing power and willingness, and adopt some adjustments of products' prices.

Secondly, competitor is also an important factor. When evaluating the value of the management rights of East Lake greenway station, it is necessary for us to consider whether there are competitors or not in the scenic area. In theory, there should be no competitors in scenic area, but in fact competitors do exist in these areas, such as roadside vendors and shared bicycles. The guarantee deposit of renting a car at the post station is 800 Yuan and the rental fee per hour is about 10-20 Yuan; however, the rents for all kinds of shared bicycles are only 1 Yuan per hour. So few tourists want to rent station bicycles and the business keeps going on by painstaking effort. So, administrators of East Lake greenway should ensure that competitors such as these are forbidden to enter into scenic spot.

6 Conclusion

The transfer of management rights of tourist attractions is the road of tourism development with Chinese characteristics. It is a unique topic of tourism research in China, and has both theoretical value and practical significance. Its success has a significant impact on the development of tourist attractions and tourism industry in China. The research on this topic should not only have international vision, grasp the general characteristics and trends of international tourism development, but also take root in the China's present situations of economy, society and tourism development, so as to not only reach international standards but also reflect the characteristics of China's tourism. To evaluate the value of the transfer of management rights of East Lake greenway station, this article analyses the above bidding projects, and hopes to arouse more scholars' attention to this respect. Hence, they will provide theoretical guidance for the practices of the transfer of management rights of tourist attractions in future and realize the sustainable, healthy, orderly and harmonious development of tourism industry in China.

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Research on the Performance Evaluation of the Students from Economically Disadvantaged Families in Colleges and Universities

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Abstract: In recent years, a series of funding policies for students from poor families are issued to ensure that they have the equitable access to receive higher education opportunities. In this paper, the fuzzy comprehensive evaluation method is selected to evaluate the performance of the funding work and the analytic hierarchy process is used to determine the weights of the performance evaluation indexes. A college of science and engineering of a university in Wuhan is taken as an example to make an empirical analysis. Combined with the evaluation, the precision identification mechanism of poor students should be optimized and the multi-dimensional model of the funding should be perfected. The qualitative and quantitative methods can provide the scientific basis for the further financing work for poor students in colleges. And then, the precise funding and the educational function can be achieved.
These methods can be used to achieve the precision funding and educational function.
Key words: Performance evaluation; Poor students; Suggestion; Mode; the evaluation index system

1 Introduction

In recent years, the scale of college students' funding has been expanded, and the amount of funding is also increased. In 2017, a variety of policies and measures established by governments, universities and public have contributed to 42.76 million students in national institutions of higher learning, and the subsidy amounted to 105.07 billion, increased by 9.93 percent on the previous year (Ministry of Education, 2018). The funding work in the universities has been greatly improved with the development of economic society. However, the effectiveness of some colleges' funding work has been a decline in a certain extent with the rapid growth of funding scale and amount. The main reason led to this situation is that funding work can't meet accurately the need of students with financial difficulties. So it makes higher demands for the colleges' accurate funding.

Research on the performance evaluation of college student financial aid in foreign countries is mainly discussed from the perspective of higher education funding efficiency. Ronald. Feeso has systematically studied issues such as student financial assistance in the quality of student financial assistance programs, in which the effectiveness of the student financial assistance from the perspective of efficiency is mainly discussed. Robert b. Axchibald discussed the current development status and existing problems of the current financial aid system from the perspective of efficiency in the article of "reestablishing the financial aid system", and tried to explore the establishment of financial aid programs that are better suited to the real development of the education. The domestic research mainly focuses on the connotation and characteristics of performance evaluation of poor students' financial aid. In recent years, more and more attention has been paid to the research on the construction of the evaluation index system of college poverty students' financial aid with the gradual improvement of the idea of the targeted poverty alleviation. At present, we have established the student funding policy system covering from preschool education to postgraduate education. College students can apply for 12 kinds of funding policies like state grants, state educational loans, college bursaries and grants, work-study, allowance of special difficulty and tuition waiver, etc. (Ministry of Education, 2018). In the implementation of the funding policy, colleges basically follow the principle of dynamic management and universal coverage to carry out the financial assistance management for the poor students. However, the development of the funding work for poor students in colleges is uneven and the best result of the funding performance to poor students in colleges has been not achieved. It mainly focuses on the following aspects (Bai Hua, 2013):

(1) The economic aid is paid too much attention and the spiritual incentive is neglected in the funding for poor students.

(2) The funding allocation is unreasonable.

(3) The financing channel is single.

(4) The funding policy implementation is inadequate.

So how to evaluate the financial performance and the implementation effectiveness to find the

weakness of the financing work has become a subject to be solved urgently. In view of the importance and complexity of performance evaluation research for poor college students, this paper will use qualitative and quantitative methods, which can provide the scientific basis for the further financing work for poor students in colleges.

2 Theoretical Perspectives and Conceptual Framework

The performance evaluation of poor students in colleges referring to the index system of the performance evaluation of poor students is constructed by the use of scientific evaluation method and mathematical statistics analysis method and the effect is evaluated by integrating quantitative and qualitative analyses (Zhong Yibiao, 2010). It is aimed at assessing and evaluating the effectiveness and the benefit of the funding work, finding out the problems in the process of the funding, and putting forward the methods and paths to further improve the performance.

In this paper, the fuzzy comprehensive evaluation method is selected to evaluate the performance of the funding work for poor students in colleges, so as to solve the fuzziness, complexity and uncertainty of the performance evaluation. This method is to quantify the factors which are not easy to be quantified on the basic principle of fuzzy mathematics, and the membership of the object evaluated is evaluated comprehensively from the multi-level assessment indicator system (Minola Tommaso and Giorgino Marco, 2008). The construction of fuzzy comprehensive evaluation model mainly includes the following steps which are in Figure 1.
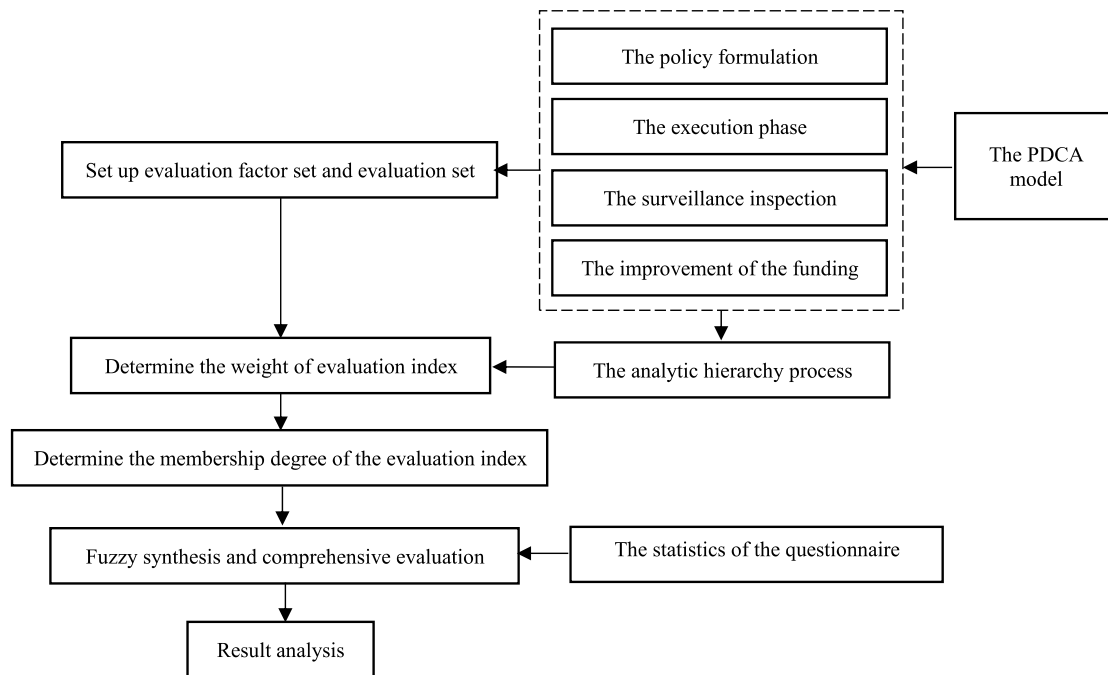
Figure 1   The Construction Steps of Fuzzy Comprehensive Evaluation Model

3 The Construction of the Model
3.1 The design of the evaluation index system
3.1.1 The design of the indexes based on the process management theory

The funding for the poor students is a systematic job. In this paper, the process management theory is used for the scientific management of the funding work, and the benefit of the funding is maximized (Bai Hua and Xu Ying, 2014). The whole process of the funding is designed and controlled according to the PDCA model, divided into four sub processes: the policy formulation, the execution phase, the surveillance inspection and the improvement of the funding (Liang Jun, He Liping, and Chen Yu, 2010). On the basis of the existing research results, the framework of the evaluation index system for the funding is determined, which is made of the identification, fund raising, funding resource disposition, funding surveillance and tracking, social effect of funding and funding policy (Xu Ying, 2016).
3.1.2 The determination of the performance evaluation indexes' weight

In this paper, the analytic hierarchy process (AHP) is used to determine the weight of the performance evaluation indexes. The qualitative analysis and the quantitative analysis are combined in this method, and the weight calculation is more scientific and objective compared with other qualitative methods such as Delphi method. It is divided into three steps: (1) Determine the relative evaluation criteria for indexes to construe the judgment matrix. (2) Calculate the maximum characteristic root and corresponding eigenvector, and complete the consistency check. (3) Calculate the absolute weight of the indexes (Zhao Jie, 2005).

Based on the results of the literature research and the 1-9 scale method, the evaluation indexes are intercompared and determined quantitatively in Table 1. The judgment matrix is construed to calculate the relative importance of each evaluation index.

Table 1   The Scale of The Judgment Matrix

item	a_1	a_2	a_3	a_4	a_5	a_6
the identification	1	3	5	7	3	1
the fund raising	1/3	1	3	5	1	1/3
the funding resource disposition	1/5	1/3	1	3	1/3	1/5
the funding surveillance and tracking	1/7	1/5	1/5	1	1/5	1/7
the social effect of funding	1/3	1	1/3	5	1	1/3
the funding policy	1	3	3	7	3	1

So the judgment matrix of the evaluation index can be obtained as follows:

$$\mathbf{A} = \begin{bmatrix} 1 & 3 & 5 & 7 & 3 & 1 \\ 1/3 & 1 & 3 & 5 & 1 & 1/3 \\ 1/5 & 1/3 & 1 & 3 & 1/3 & 1/5 \\ 1/7 & 1/5 & 1/5 & 1 & 1/5 & 1/7 \\ 1/3 & 1 & 1/3 & 5 & 1 & 1/3 \\ 1 & 3 & 5 & 7 & 3 & 1 \end{bmatrix} \tag{1}$$

The product of each row is:

$$M_i = \prod_{j=1}^{n} A_{ij} \tag{2}$$

and the n-root of M_i is:

$$\overline{W_i} = \sqrt[n]{M_i} \tag{3}$$

The normalization process of the vectors $(\overline{W_i})$ is carried out, and the eigenvectors are obtained:

$$W_i = \frac{\overline{W_i}}{\sum_{j=1}^{n} W_j} \tag{4}$$

The result calculated through the formula is W= (0.3270, 0.1401, 0.0645, 0.0318, 0.1096, 0.3270). So the weights of six indexes are following: the identification is 0.3270, the fund raising is 0.1401, the funding resource disposition is 0.0645, the funding surveillance and tracking is 0.0318, the social effect of funding is 0.1096 and the funding policy is 0.3270.

Finally the consistency check of the matrix is evaluated, in which the largest eigenvalue is calculated through the following formula (5):

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

The result is λ_{max} =6.2792.

Then the coincidence indicator (C.I) of the matrix is calculated through the formula (6):

$$C.I = \frac{\lambda_{max} - n}{n - 1} \tag{6}$$

The final obtained is C.I=0.0558.

In the situation of n=6, the average random coincidence indicator (RI) is 1.24 in the standard value check list. So the consistency ratio (CR) can be obtained by the formula (7):

$$CR = CI/RI \tag{7}$$

The result (CR) is 0.045 which is less than 0.1. So the result has passed the consistency test, which indicates that the judgment matrix of the evaluation indexes for the funding is consistent and reliable. W= [W_1, W_2, W_3, W_4, W_5, W_5] = [0.3270, 0.1401, 0.0645, 0.0318, 0.1096, 0.3270].

4 The Case Analysis

4.1 The statistic of the questionnaire

This survey is mainly based on teachers and poor students at a college of science and engineering of a university in Wuhan. The data is collected and sorted out by the network questionnaire, which mainly involves the teachers' and students' overall evaluation of funding based on the above 6 evaluation indexes. The results of the questionnaire are coded uniformly, and the data is counted and analyzed by SPSS. A total of 400 questionnaires were sent out and 377 were recovered, and the percent recovery is 94.25%. The basic situation of the survey samples is as follows in Figure 2.
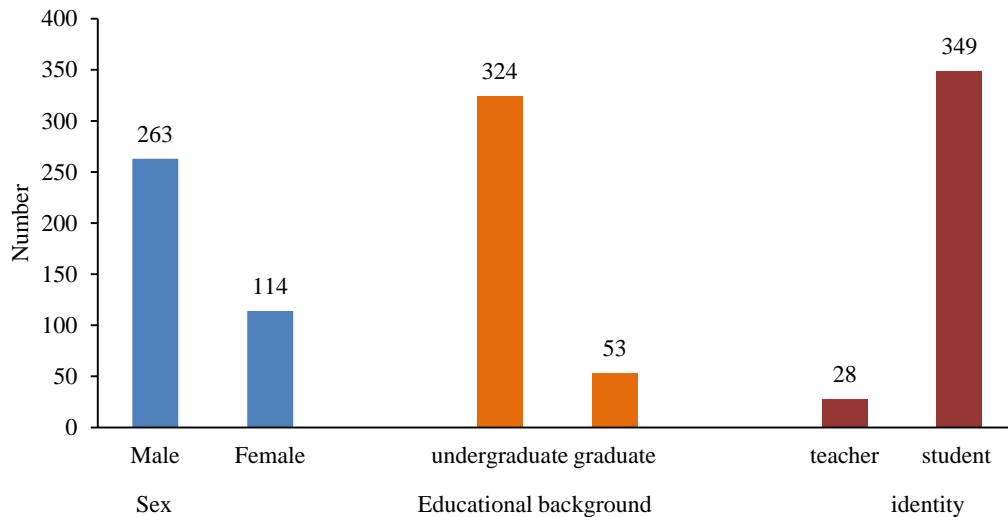
Figure 2   The Basic Situation of The Survey Samples

The performance of the funding for poor students in the university is evaluated and the results are shown in the Table 2.

Table 2   The Statistical Results of The Questionnaire

opinion target	statistical results			
	excellent	good	Common	substandard
the identification	261	84	29	3
the fund raising	205	118	46	8
the funding resource disposition	218	112	37	10
the funding surveillance and tracking	212	135	26	4
the social effect of funding	189	137	44	7
the funding policy	193	126	57	1

The evaluation results are converted into the specific numerical valves as follows:

$X_1 = B \cdot V^T = (261/377, 84/377, 29/377, 3/377) \cdot (90, 75, 60, 45)^T = 83.99$

$X_2 = B \cdot V^T = (205/377, 118/377, 46/377, 8/377) \cdot (90, 75, 60, 45)^T = 80.69$

$X_3 = B \cdot V^T = (218/377, 112/377, 37/377, 10/377) \cdot (90, 75, 60, 45)^T = 81.41$

$X_4 = B \cdot V^T = (212/377, 135/377, 26/377, 4/377) \cdot (90, 75, 60, 45)^T = 82.08$

$X_5 = B \cdot V^T = (189/377, 137/377, 44/377, 7/377) \cdot (90, 75, 60, 45)^T = 80.21$

$X_6 = B \cdot V^T = (193/377, 126/377, 57/377, 1/377) \cdot (90, 75, 60, 45)^T = 80.33$

The whole evaluation index $X = X_i \ W^T = (83.99, 80.69, 81.41, 82.08, 80.21, 80.33) \cdot (0.3270, 0.1401, 0.0645, 0.0318, 0.1096, 0.3270)^T = 81.69$

4.2 The result analysis

The evaluation results are divided into four grades, which are excellent, good, common and poor. Their score intervals are respectively [90, 100], [75, 90], [60, 75] and [45, 60]. Through the analysis of the scores and the weights of the indexes, the evaluation result of the funding for poor students in the college of science and engineering is at a good level and the scores are all more than 80. Among these,

the score of the social effect is the lowest. The reason may be due to our excessive attention to funding itself (Yang Hongbo, 2014). The satisfaction of the identification is highest, which can be seen that the formulation and the publicity of the funding policy have been universally recognized. The results of the all indexes have not reached the excellent standard. And about 30-60 investigators in the process of the evaluation consider that the indexes are in a common or poor level. It is undoubtedly a higher requirement for our funding work. Besides, all the evaluation results of the funding raising, the social effect of fund, and the funding policy are slightly above the good level. So it is necessary to broaden the financing channels further for funding, to pay attention further to the social effect of funding, and to improve further the funding policy. It is clear that the establishing of the complete set of performance evaluation index system for funding is conducive to evaluate scientifically the effectiveness of the funding for poor students in colleges and universities, and to find the problems and the loopholes in the funding process. Furthermore, the effective measures should be taken to solve the identified problems and the function of the funding and education is better performed.

5 Suggestions

5.1 The precision identification mechanism of poor students should be optimized

The identification of poor students is the basic work of the funding and the prerequisite for ensuring the smooth development of the funding, which is to achieve the precise identification. Therefore, we should optimize further the identification mechanism of the funding for poor students and construct the precise identification mechanism. Firstly, it is an important link of the funding to structure the information network of students from economically disadvantaged families (Chen Faxiang, 2013). The civil administration department and the statistical department of the local government should make a detail statistic about the household incomes per capita, the consumption and the sudden consumption induced by the irresistible factors, and the students' family economic information database system in which the connection of primary school, secondary school and university is established. The students from economically disadvantaged families are scientifically identified by combining the local economic development and the poverty line division. It is not simply to list the economic situation of the students and other relevant information. The poverty degree of poor students is established and the standard for the identification of poor students is unified through the analysis of these basic information, and these provide an operable database information system for the identification work. Besides, we should keep the dynamic of the data, and the data of the family economic situation is updated at any time. The relevant stakeholders in the local government departments and universities should ensure the accuracy of the information, and prevent the occurrence of the falsification of the family economic situation, and the relevant persons who provide false data will be severely punished.

5.2 The multi-dimensional model of the funding is perfected

The effectiveness of the funding for poor students in colleges and universities depends on the allocation of the funding resources. In order to maximize the financial aid output, the most appropriate funding projects should be given to students according to the different types of difficulties and the degree of difficulty. The allocation concept of the funding resources should be optimized. The proportion of the free funding should be reduced and more compensation funding is provided to poor students. Through this way, not only the economic difficulties of poor students can be solved, but also the comprehensive quality of them is exercised. On the basis of the identification, the funding resources are overall planned to realize the optimal allocation among different majors and different difficulty groups. The differential funding is achieved to realize the pertinence by the use of big data (Zhu Ping, 2017). The material need and the spiritual need of the subsidized object are meted, in which the studies are smoothly finished and the students are encouraged to become self-confidence and self-reliance. All these ensure the benign operation of the funding system and the efficiency of education (Zhang Yuanhang, 2016).

6 Conclusion

It is an important measure to realize the fairness of education and resolve the social contradictions. The performance evaluation is helpful to improve the efficiency and the overall development level of the funding. Through the continuous promotion of the funding system and the improvement of the funding level, the funding for poor students in colleges and universities plays a more important role in the process of undergraduates' comprehensive healthy growth, and the precise funding and the educational function can be finally achieved.

Acknowledgement

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Solving Electricity Deficit in Kinshasa with Solar Kits

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Abstract: This paper highlights the importance of adopting use of solar kits to overcome the shortage of electricity supply in the city of Kinshasa instead of polluting generators. Given a need for electricity delivery estimated at 5 kwh for a poor household of three occupants, a 1KWsolar inverter coupled with 1000W solar modules and appropriate accessories sold for US$ 990 would perfectly replace SNEL network, the unique electric utility company that uses rolling blackout to handle its low power supply capability within the town, with all the environmental benefits in lieu of a 4 kw power generator sold at US$ 900 with all   consequences related to the use of fossil fuels in terms of CO_2 emissions harmful to health and the environment. Similarly for a middle class household of 5 occupants, a solar kit of 3 kW to 2700 dollars or 5 kW to 4600 dollars, is far preferable to an8kw generator ofUS$ 4155which pollutes and entails expenses related to the fuel consumption.
Key words: Power generator; Load Sshedding; Rolling blackout; Solar kit

1 Introduction

A nation's energy resources contribute fully to its economic growth through the achievements they make possible. Energy is important for all sectors of the economy; the mastery of energy is the motor of human activity. Of all forms of energy, electricity remains a vital resource for economic and human development (Pierre Jacquet et Al, 2010). Thus developed nations had long understood the vital importance of energy in the development model. (Séraphin M. Kasemuan, 2006). All forms of energy can be transformed into electrical energy for the development of industrial, commercial and agricultural activities as well as essential social services such as education and health However,despite its energy potential (Uranium, Coal, Oil, Congo River, etc.), the DRCongo has a huge energy deficit. Thoughts substantial hydroelectric resources estimated at around 100,000 MW, the country has not be able to take full profit of this potential to provide most of the energy needed to operate businesses, supply transportation, and provide comfortable living ... Its energy deficit is reflected today in a low rate of service in electricity estimated at only 9% for a population of nearly 80 million inhabitants. Many households in rural areas are still dependent on solid fuels for cooking, heating and have no access to electricity. And even those who have access to electricity, they constantly face the problem ofrotational load shedding, which means a partial distribution in electricity. Households are often deprived temporarily of power for 24, 48 or 72 hours. Due to this situation, Congolese invent new forms of social organization through acquisition of generators to, at least, iron, watch TV in the evening and especially turn on lights when it is dark. Cooking is provided by a charcoal industry commonly called "makala" preferred over oil and gas for its relatively low cost. The poorest people who cannot afford charcoal, are content with less common sources of energy such as sawdust. This survival behavior, a portrait of widespread poverty, is far from relieving the population because it has very negative environmental consequences. Thus, through this paper, we analyze the possibility of initiating other energy alternatives for this country and especially for the capital city of Kinshasa, such as solar energy with all its advantages in terms of cost, installation and protection of the environment.

2 Issue of Electricity in Africa

Compared to other regions of the world, Africa is lagging behind in terms of electricity generation capacity, per capita electricity consumption and household access to electricity, according to the World Bank's Africa Renewable Energy and Accees Program. (AFREA). Fifteen of the top last 20 countries in the world for electricity consumption are in Africa (IEA, World Bank 2016). For those countries that seem to be connected whatsoever, disparity between urban and rural areas is striking. South Asia, the second largest region in the world with the lowest rates of access to electricity, however, has more than double the number of inhabitants with access to electricity compared to Africa (79%) and five times more among rural residents (70%). (Masami Kojima and Chris Trimble, 2016).

Several authors, agencies and international institutions have sought to address this issue of access to electricity in Africa due to its impact on economic development: lighting, powering engines, powering computers and generating heat, enabling the supply of services such as communications,

health care and education as well as many amenities available in modern economies. (James Morrissey, Oxfam 2017). It should be remembered that electricity consumption is considered even as a key factor in the human development index, indicating better than GDP, the quality of development of a country. (Paul Mathis, 2014).

It is also interesting to note that for many authors, the question is not addressed in the general sense of energy but rather in the exploitation of electricity as the main application with more advantages than others. (Switzerland Energy, 2014).

This raises the problem of lack of access to electricity as a hindrance to Africa's development. IndeedAgbeti Komi notes the low rate of 23% access to electricity in Togo as an obstacle to development. (INSEED TOGO). GIZ, a service provider in the field of international cooperation for sustainable development and international education work through the project on promotion of electrification for renewable energies reveals that only 15% of Malagasy have access to electricity. Recent reports by the international energy agency estimate access to electricity at 7% for Liberia, 14% for the Central African Republic, 25% for Rwanda, 9% for the Democratic Republic of Congo and so on…bringing together a figure of 1.6 billion people still living without access to any electric source of what to compromise the industrialization. (AQCIE, 2013).

This unfortunate finding has led the international community to recognize access to electricity as essential to achieving the Millennium Development Goals. (OECD, 2006). Many studies have been undertaken in order to make a diagnosis and propose remedies. This has led to a number of causes ranging from the exorbitant cost of investments to mowed governments (Masani Kojima and Chris Trimble 2016); the problem of profitability of investments faced with the multiple connection to a meter of low-income households. (Christine HEURAUX, Alain GUINEBAULT, Benjamin AUGÉ, Lassane OUEDRAOGO, Seydou KEITA, Fran çois GEMENNE, 2011).

Various solutions have been proposed, such as off-grid electrification, which is less costly than connecting the grid with micro power plants; exploiting new technologies with hybrid solar-generator systems, (ARE, Sd, Bhattacharyya, 2015). Pierre Radanne, a specialist in energy issues, highlights the use of renewable energies (ADEME, 2002). Looking at the solar potential in Africa, in the light of technological advances in photovoltaic energy also motivate solutions to private initiatives (UNDP 2013). This is the trend that our research is looking at because expanding people's access to an unreliable network without addressing the capacity issue would likely increase the pressure on the system and make the network less reliable for those who are already connected. (Bhattacharyya 2012, Murphy 2014).

3 Data and Methodology

This study is based primarily on the analysis of existing documents and previous studies. We capitalized existing data and information from specialized agencies, periodicals, newspapers and specialized books on energy Secondly, efforts were made to assess households' electricity needs based on household electrical and electronic assets as well as the illuminated surface. Thus, methodological approaches led to the finding of indicators approaching the estimated values of the national report on "Sustainable energy for all by 2030" initiated by UNDP. Finally, when the data proved to be unreliable or non-existent, internet was of great benefit to us. An analytical and comparative method is then used to evaluate electricity supply and demand in the city of Kinshasa and thus propose more practical solutions in terms of solar energy.

4 Estimation of Households' Electricity Demand in the City of Kinshasa
4.1 Demographic evolution of the city

The city of Kinshasa shows a strong demographic evolution accentuated by an influx of war refugees and an ever increasing urbanization. The demand for electricity would have quadrupled in ten years following this booming population shown in the graph below.
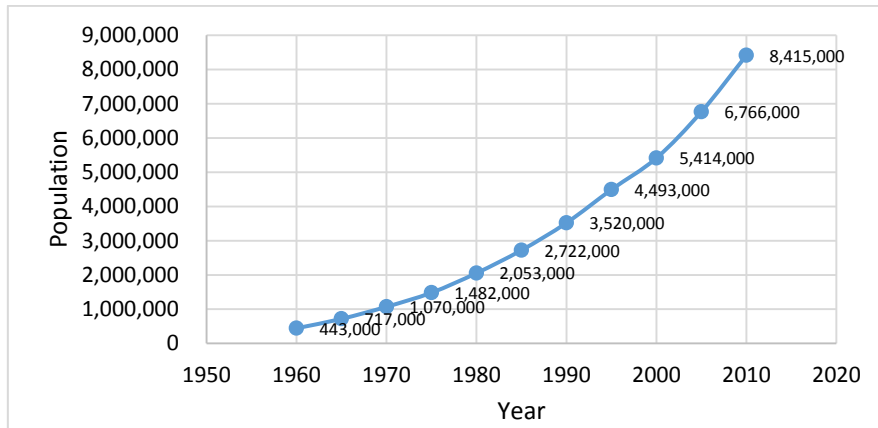
Figure 1   Demographic Evolution of Kinshasa Population
Source: Data from World Development indicators 2017

This population growth reflects ever-increasing energy needs. The chart starting from 1960, the year of independence, reveals the challenges facing the country in terms of energy needs to cover.

4.2 Household demand for electricity

To understand the household need for electricity, a practical method much more realistic prevailed over the ones used in many literatures that only take statistics on the electricity production divided by the population.Our main goal being to estimate the real need in terms of electrical consumption that is a function of the occupied surface, the number of rooms to be lit, appliances available, living habits of the occupants, we have targeted three types of households for the city of Kinshasa: poor households, middle class households and rich households. In this paper, the estimate is made only for poor and middle class household

(1) Assumptions

The identification of the type of household is based on the wealth in possession at home, the area occupied by inhabitants as well as the number of adult occupants. Rather than referring to income, which is a non-existent variable in the Congo, material possession seemed more convenient to determine the electricity needs of a household, which, moreover, depends on the size of the house, the number of occupants, the number of rooms to be enlighten, the cooking system (charcoal or electric), the domestic hot water production system (electric stove, electric water heater, or gas stove ...) and finally the number of appliances and their energy label. It is also necessary to add the lifestyle of the occupants of the dwelling and their consumption habits. Indeed, a person staying at home most of the time will consume more energy than a person who is regularly absent.

(2) Poor household

We consider as a poor household, a family of three adults occupying a three-room residence with a TV set, an iron, a fan, a radio, and three phones. From these assets, below an estimate of the electricity consumption.

Table 1   Estimate on Poor Household Energy Consumption Need

Electrical Appliance	Power	Operating hours per day	Energy consumption/day
1CRT TV	120 w	15 h	1800 w
1 Iron	750 w	1h	750 w
1 fan	45 w	6h	270 w
1 radio	6 w	18h	108 w
2 bulbs	75 w	8h	1200 w
1 bulb	100 w	12h	1200 w
Total			**5328 w**

Source: Survey from the field.

(3) Middle class household

A middle class household for our paper is a five adult's family occupying a residence of more or less six rooms and having two televisions, an iron, a refrigerator, a radio, an air conditioner, a fan, a

laptop and ten cellphones.

Table 2   Estimate on Middle Class Household Energy Consumption Need

Electrical Appliance	Power	Operating hours per day	Energy consumption/day
2 LCD TV	100 w	14h	2800 w
1CRT TV	120 w	3h	360 w
1 refrigerator	500 w	24h	12000w
10 cellphones	5w	2h	100w
1 iron	750w	1h	750w
1laptop	8w	2h	160w
1radio	6w	6h	36w
1cooker	1800w	3h	5400w
1 air conditioner	3500w	4h	14000w
1 fan	45w	4h	180w
1 chandelier	360w	4h	1440w
Interior light	360w	6h	2160 w
Exterior light	400w	12h	4800w
Total			**44186 w**

Source: Survey from the field.

From these assumptions, an estimate of about 2kwh for a poor household and 44kwh for a middle class household is evaluated in terms of electricity consumption. An alternative approach of electricity demand per capita according to each social rank, will end up with 1.776 kWh / inhabitant for a poor household and 8.8372kwh / inhabitant for a middle-class household. For lighting only our two households need 2.4 kWh and 8.40 kWh respectively. The basic need for lighting, fan leads the choicefor generators as alternatives to electricity.

4.3 Household electricity supply

The electricity supply in Kinshasa is a task devoted to SNEL, a public national company. Due to poor management, this company fail in production and delivery of electricity. This company currently operates only 480 megawatts to meet the need of this city of 8 to 10 million inhabitants. A simple computing applying electrical distribution rules, taking into account the efficiency of 0.8, the available megawatt electric (MWe) capacity would be of 384 as explained in the table below.

Table 3   Kinshasa Power Supply

		Power
Power, MW		480,00
efficiency	0,80	
Power MWe		384
Hours par an	8 760	
Energy, E = MWh		3 363 840,00
1 MWh = y KWh	1 000	
E, KWeh		3 363 840 000,00

Source: Made from SNEL General Manager statement

From 384 MWe, the real efficiency obtained, taking into account losses due to transport and distribution, an estimate of the real offer is of 3,363,840,000.00. This capacity represents an average per capita electricity consumption of 336.384 kWh or 420.48 kWh / inhab. depending on whether the population is estimated at 10 or 8 million. This annual electricity consumption gives us daily figures of 0.93 kWh / person / day or 1.1 kWh / person/day depending on whether we are 8 or 10 million inhabitants. An obvious deficit in the supply of electricity. This lower power supply capability is recognized by the head of SNEL and justified by a poor production, transmission and distribution infrastructure of management in electrical energy. Consequently, rolling blackout or rotational load shedding every day, is the last-resort measure used to fill the power gap in all municipalities of the capital.

To face with this situation, adaptation behaviors have been developed, ranging from the use of gas, charcoal and use of an electric generator to overcome the need for electricity without integrating the environmental aspects of these electricity sources alternatives. The next paragraph highlight some aspects related to the use of generators as energy alternatives.

4.3.1 Generators alternatives

a. Generator description

A generator is an autonomous device capable of generating electricity. Generators are used either in the areas where electricity delivery is stopped for non-overlapping periods of time over different parts of the distribution region, or to alleviate a possible power failure, or as a complement to an uninterrupted power supply consisting of a storage battery that powers a power supply.   The power of a generator is expressed in kva (kilo volt amps). They work from all fuels. The most common are gasoline, diesel, natural gas, LPG, biofuels and the most powerful heavy fuel oil. However, the models commonly used in the Congo, mostly coming from China, Dubai or Lebanon, run on gasoline and diesel.

b. Cost of generator acquisition

Table 4   Price for Generators in Kinshasa Market

Rated output/Max Output		Price
KW	KVA	($)
2,24	2,8	360
2,8	3,5	400
4	5	900
4,4	5,5 (silent)	1450
4,8	6 (silent)	1580
5,2	6,5	840
8	10	4155
8	10 (silent)	5000
12	15 (silent)	13500

Source: Source: Jehovah jireh shop, Id. Nat. 01-929-N766986W

Gasoline as well as fuel oil, main source of electricity generation in power generators is polluting. It is necessary at this time of green initiative to inspire awareness by calculating the CO_2 emissions according to the amount of fuel consumed to take into account externalities to be incorporated into the real cost of this alternative.

c. Operating cost

Diesel

1 liter of diesel weighs 835 grams. Diesel is 86.2% carbon (C), which corresponds to 720 g of C per liter of diesel. To burn this C in CO_2, 1920 g of oxygen is needed. The sum therefore gives us 720 + 1920 = 2640 g of CO2 per liter of diesel.

Table 5   Operating Costs Related to Diesel Generator

Power	Consumption	Emissions	Cost of diesel
(kwh)	(l)	(kg CO2)	($)
2.5	0.2328	0.2699	0.28
5	0.4655	1.3495	0.57
7	0.6517	1.8893	0.80
10	0.931	2.699	1.15
45	4.1895	12.14	5,16

*1l of diesel for 1970 FC = 1.23 US $ Source: Inspired from data collected from the field.

Gasoline

1 liter of gasoline weighs 750 grams. Gasoline is 87% carbon (C), which corresponds to 652 g of C per liter of gasoline. To burn this C in CO2, 1740 g of oxygen are necessary. The sum therefore gives us 652 + 1740 = 2392 g of CO2 per liter of gasoline.

Table 6   Operating Costs Related to Diesel Generator

Power	Consumption	Emissions	Cost of gasoline
(kwh)	(l)	(kg CO2)	($)
2,5	0,2595	0,66	0,32
5	0,519	1,32	0,64
7	0,7266	1,848	0,9
10	1,038	2,64	1,28
45	4,671	11,88	5,78

*1l of gasoline for 1980 FC = 1.24 US $

The use of generators as an alternative to electricity generation leads to a fuel consumption and an estimate of CO_2 emissions evaluated through the table above.

For a 5 kWh need, a poor family would pay more or less of 900 US dollars for the acquisition and a little less than a dollar for thefuel supply.

For 45 kWh need, a middle-class family would pay more than $ 4,155 for the acquisition and almostUS$ 6 for the fuel supply.

The evaluation of the costs involved should not however end at the cost of acquisition and the operating cost. It is imperative to integrate other costs.

d. Environmental cost of current energy alternatives.

Generators produce carbon dioxide, an asphyxiating gas, as well as carbon monoxide, extremely toxic and more or less undetectable. Even in good condition and placed in an airy room like a garage, but adjoining a part of occupied housing, they can be the cause of fatal intoxications. The generator user is exposed daily to intoxication by the fact that he uses public transport during the day time for his daily activity exposing himself to the CO_2 released by an obsolete transport system and on his return home, he still aspire emissions from his own generator

The coal industry is not without danger, it causes deforestation and the scarcity of wood resources. The smoke caused by wood for cooking is very polluting and causes many diseases. The fuels used for lamps at night causes a black smoke harmful to health. The use of a renewable energy source such as solar energy can help solve these problems. And in this area, the Congo has considerable assets.

4.3.2 Solar kit alternatives

4.3.2.1 Solar potential in Congo

The Democratic Republic of Congo is in a very high band of sunshine whose values are between 3,250 and 6,000 Watt peak / m ²/ J for solar energy. Kinshasa the capital also has a considerable solar potential, the average sunshine varies between 3.22 and 4.89 kWh / m2 / d, values well above the PACA acronym for the Provence-Alpes-Côte d'Azur region in France, which is considered as a region characterized by excellent sunshine with an irradiation of 3 kWh / m², the first French solar region in terms of power connected to the grid. Note that under standard solar conditions, the maximum power of a cell when the sky is clear, is 1000 W / m², at a temperature of 25 °C and a standardization of the spectrum of light AM 1.5 (atmospheric mass). With this potentiality, the country can take advantage of photovoltaic electricity applications.

4.3.2.2 Photovoltaic electricity

The sun's rays can be transformed through solar cells to produce electricity. This is what we call photovoltaic energy. A solar cell is an electronic component that, exposed to light, produces electricity. It consists of a thin silicon wafer with a thickness between 0.2 and 0.3 mm, called "wafer". The set of solar cells connected in series constitutes a module. And several modules connected in series constitute a photovoltaic installation otherwise called solar photovoltaic panel. A photovoltaic power plant is therefore the set of several photovoltaic installations. For domestic use, useful applications are lighting, cold (refrigerator, air conditioning etc.), water supply and communication (radio, TV, telephone etc.). The amount of sunshine striking the surface our planet annually provides more than 10.000 times the amount of energy that all of humanity can use in a year

4.3.2.3Solar kit

For individual photovoltaic project, two installation systems can be built. An installation connected to the network and a stand-alone installation. In the case of an installation connected to the network, sizing can be done in different ways. The three most used criteria are: electricity consumption, available space and budget.

Four elements are important to set up the solar kit.

a. Solar panels also called photovoltaic modules, which convert light into electricity.

b. Batteries: provide energy storage to run the system when there is no sun. Its other role is to power devices more powerful than the cumulative panels.

c. The regulator or solar charger: its role is to stop the charge of the battery when it is already fully charged and thus avoid overcharging.

d. The inverter: it plays the role of converter, it is a power electronics device for converting the direct current received from the panels in alternating current

Table 7   Preferential Price of Solar Kits in Kinshasa

Power(kW)	Price (US $)
1	990
3	2700
5	4600
8	7500
10	9800

Source: SOLARANDU STD LTD

Prices may vary according to several criteria for the same desired power. For our analysis, our choice is based on SOLARANDU's company offer.

A poor family or household can meet his electricity need with a1 kW solar kit for 990 dollars that can power the lighting, television and even a small refrigerator (100-120w). A middle class household would end up with a3kwsolar kit of 2700 dollars that would support the light, television, refrigerator and even a split. A capacity of 5 kW solar kit would be well within the reach of a wealthy family. The next paper will address this issue.

An annual assessment of the two alternatives as response to electricity deficit in Kinshasa reveals the supremacy of the solar kits on generators currently in vogue on the Kinshasa market. Results have estimated that a poor family would cover their electricity needs with a 5Kva generator, which translates to an acquisition cost of $ 900. The operating cost expressed through fuel consumption is $ 230 a year. The total annual cost without taking into account the cost of maintenance of the machine and the cost of externalities that could not be less because of pollution not limited to the user but has the whole neighborhood, is 1130 dollars,

On the other hand with 990 dollars disbursed for an autonomous solar system, a poor family ensures its comfort of electricity supply and cannot envisage other relative expenses only after three years for replacements in battery. An investment that is much better than a generator on a financial level

As for a modest or middle class family, if the choice is made, to ensure his electricity consumption on a10 KVA group for 4155 dollars, annual expenses without integrating the cost of externality and maintenance would amount to 6335.8 dollars, a cost significantly higher than the solar kit of 5 kw capable of providing lighting, appliances and even running a split. With the new technologies available nowadays, mentioned S. Doty and turner, the energy consumption can be reduced by 50 percent and then comply with lower power solar kit.

Moreover, the photovoltaic systems release no greenhouse gases and guarantees the permanence of the electricity even for days not very sunny. In fact, they don't need direct sunlight to produce energy; they just need daylight and this means they can operate even during cloudy and less bright days. Electricity can also be conserved through the bank of batteries. Generators are rather sources of noise and environmental pollution with CO_2 emissions whose health effects are harmful with symptoms of intoxication ranging from vertigo, headache, drowsiness, visual disturbances and a reduction of lucidity and loss of reflexes. Above all, these emissions contribute to global warming. The choice on solar system is by far the best for the amount of sunshine striking the surface our planet annually provides more than 10.000 times the amount of energy that all of humanity can use in a year.

5 Conclusion

This paper work focused on evaluating the opportunities offered by solar energy in the household electricity consumption model, revealed in many ways the need to integrate this energy source into the energy supply. The analysis helped us to circumscribe the energy deficit in the city of Kinshasa, the capital of the Democratic Republic of Congo, a city whose population growth rate and the influx rate of refugees fleeing wars continues to grow.   Data collected from several sources showed that the National Electricity Company, the only company in charge of the production and distribution of electricity, was not able to ensure a permanent supply that matched demand. From the mouths of its leaders only half of the city need estimated at 1000 MW could be covered by a current yield of 480 to 510 Mw hence management marked by rotational load shedding to cover the supply of all municipalities in the city. Faced with this situation, substitution behavior has beendeveloped through the use of power generators to make up for the energy deficit. However, these fuel-powered generators contribute to CO_2 emissions that are harmful to health and the environment. An assessment of local potential has allowed us to appreciate the solar potential of the city which would lead to a better use of solar alternatives, the country being in a very high band of sunshine whose values are between 3,250 and 6,000 Watt peak / m ²/ J for solar energy. Comparing usable solar kits for households, we conclude that solar alternatives would be far better as a solution to the generator set. Despite the relatively high acquisition cost according to the needs of households, meaning US$ 990 for one kilowatt solar kit capacity and $ 2700 for 3 kilowatt solar kit capacity againstUS$ 900 for a4 kilowattspower generator and US$ 4155 for 8 kilowatt generator, an annual operational cost reveals a financial benefit of solar kits beyond ecological benefits. An annual operational cost by a poor family gives an envelope of expenses estimated at 1130 dollars, cost of maintenance and externalities not included against 990 dollars for a solar kit.

For a middle class family, the annual envelope in terms of operating cost is estimated at $ 6335.8

for generator use against $ 4600 for a solar kit of 5 kW. Even at equal capacity, an 8-kilowatt solar kit that costs $ 7500 would be amortized after just under three years at a fuel cost of $ 3.14 per day to ensure the need for power consumption with a group of 8 kW. In other words, after two and a half years the user of a generator will have reached the investment required for a solar kit that would keep him safe from daily financial expenses and safe from health problems and free of the responsibility of negative externalities over the community.

It is therefore essential to consider awareness campaigns on the merits of adopting solar alternatives as well as to create household support systems to finance the acquisition of solar kits. On the other hand investment facilities in the solar field will have to be supported by government to promote electricity coverage and the social development of communities.

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A Study on the Integration Model of Sports Industry Serving for Health Care Industry

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Abstract: Through the literature review method, logic analysis and other research methods, starting from the social needs of the elderly population in China and the social significance of the development of sports for the aged, this paper analyzes the necessity for the sports industry to serve the health care industry for the aged, This paper discusses the main problems of the current sports industry serving the health care industry,and analyzes the model of the sports industry serving the community pension and the model of the sports industry service institutions and the development countermeasures. It is hoped that it can inspire the integrated development of China's sports industry and pension service industry.

Key words: Sports industry; Healthy old-age care service model; Integrated development; Existing problems; Development strategy

1 Introduction

Sports industry is a large and complex economy. In recent years, with the raise of people's health consciousness and increase of sports participation, the growing demand for all kinds of sports services, sports industry has entered a phase of rapid development.At the same time, with Chinese aging of the population rising importance of pension industry gradually highlights, countries began to advocate and encourage fully open pension market, let market main body into pension services industry. In 2013 the state council issued "the several opinions on accelerating the development of pension services under the state council, the land and resources issued 2014" land for old-age service facilities guidance";In 2017, the ministry of civil affairs issued a "about support the development of the integration of idle social resources endowment service of the notice, the country continues to promote the development of pension services, to satisfy the increasing of social endowment service needs.Physical exercise is an effective way for the elderly to keep healthy and enhance their physical fitnessSports industry (Wang Hongmei, 2012), how to fusion by means of industrial convergence and pension industry, all kinds of sports pension for the elderly sports industry resources, not only can effectively improve the service level of the pension industry, make endowment industry become more rich and colorfulbecause of the integration of sports service, At the same time, it is also possible to broaden the industrial field of the sports industry and make the sports industry more dynamic because of its entry into and development of the pension industry.

2 Necessity of the Sports Industry to Serve the Health and Old-Age Care Industry

2.1 Social needs of the elderly population

2.1.1 The growing elderly population

China entered the aging society in 1999, and now has a total population of 200 million, and the annual growth rate is 10 million.By 2020, China will have 270-280 million old people over 60, and 180 million old people over 65, which will be about 24% of the world's elderly population.It took only 18 years for China to enter an old-age society, and the aging process in developed countries lasted for decades to 100 years.In 2015 China's fifth national census data show that 88.11 million people have been more than 65 years old, accounting for 6.96% of the population, in terms of the structure of the population of international standard, China has basically entered the old-age society.By 2030, the number of elderly people will increase from 88.11 million to 310 million, accounting for 20.42 percent of the total population. By 2050, it will probably increase to 468 million, accounting for 27.77 percent(Wang Zhankun, 2013).

2.1.2 Declining health quality of the elderly population

In the field of gerontology research studies have demonstrated that aging population in terms of health, one of the most prominent feature is "weak", what is actually reflected is a real problem of the decline in the quality of the elderly population. According to Lockwood's study (2005) of elderly population "weak" status, can be subdivided into seven different categories, and in the "weak" state of the elderly population or health status evaluation, is the main reference of the body weak and mental

weak index.Chinese scholars refer to Lockwood's definition of using the physical weakness index and mental weakness index to evaluate the overall health status of the elderly population in China. It is found that the degree of weakness of the elderly population increases with age, in other words, the older the age, the higher the degree of weakness and the lower the quality of health.

2.2 The social significance of developing sports for the aged

2.2.1 Promote physical and mental health of the elderly

Physical exercise can reduce stress, regulate emotions, improve immunity, increase self-confidence, and promote mental health. Regular physical exercise can enhance the function of the elderly in various body systems. In the process of participating in the exercise, the elderly can strengthen the cooperation with others and help themselves to adjust the role of the elderly.The physical and mental weakness of the elderly were significantly reduced (Fan Chengwen, Liu Qing, 2012). The development of sports for the aged has positive effects on physical and mental health of the aged.

2.2.2 Promote the development of China's sports industry

China's elderly now account for only 10 per cent of total consumption. The annual demand for the elderly market is about 764.1 billion yuan. It reached 1.4 trillion yuan in 2010, but less than 100 billion yuan in supplies for the elderly. So there's a huge opportunity between supply and demand (Song Yawei, 2008). More and more senior citizens are willing to invest in health, which has played a positive role in promoting the development of sports apparel and sports equipment, sports leisure, sports consultation and guiding the development of the industry.

2.2.3 Promote the development of mass sports in China

The elderly population is an important strength of social cultural atmosphere. The development of old-age sports creates a good atmosphere of sports culture, plays a certain role in the fitness activities of the elderly, affects more people to participate in sports activities, and plays an important role in promoting the development of sports. (Chu Jijun, Chu Xiao, 2016).

3 Major Problems of the Sports Industry in Serving the Health Care Industry

3.1 China's sports industry is still in the development stage

China's sports industry has a weak position in the national economy. According to economic census data, the added value of China's sports industry in 2004 only accounted for 0.38 percent of the gross national product. In 2008, China's sports industry accounted for the highest proportion of 0.65%, but then showed a downward trend year by year, dropping to 0.41% in 2013, slightly higher than it in 2004, and failing to surpass the 2008 level. Compared with other major sports power in the world, in 2008 the United States, Britain, France, Germany, Australia, Spain, South Korea, Japan and Brazil and other countries of the sports industry average was 1.92%. In the same period, the proportion of China's sports industry was only 0.65%, there is a huge gap (Ren Ha, 2015). It shows that China's sports industry is still in its infancy, which is not optimistic.

3.2 The unbalanced regional development between sports industry services and healthy pension industry

The imbalance between the sports industry service and the healthy pension industry is mainly reflected in the two major aspects of the imbalance between the provinces and the imbalance between urban and rural development. Firstly, there is a problem of imbalance between the sports industry and the health care industry in the province. At present, the development of the sports industry's service pension industry is clearly ahead of some regions and provinces with low economic development levels in cities and regions with high economic development levels such as Beijing and Shanghai. In areas with low levels of economic development, due to insufficient release of market consumer demand, it has caused certain obstacles for the sports industry to support the aged care industry, which has led to a situation of imbalanced regional development in the sports industry service pension industry. Second, the sports industry's service and health care industry has a problem of uneven development between urban and rural areas (Wang Jun,Gong Qiang, Wang Wei, 2012). As a whole, the urban elderly population has higher health awareness and more economic conditions. Therefore, the urban elderly population is more willing to accept the elderly sports service, and the participation of the elderly sports is also higher. In this case, the problem of uneven development between urban and rural areas has gradually emerged in China's sports industry serving the healthy old-age care industry. The development of urban areas is obviously better than that of rural areas.

3.3 Relevant laws and policies are not perfect enough

Perfect policies and regulations are an important guarantee for the healthy and sound development of industry. The integration between the sports industry and the pension industry is a new industrial development perspective and industrial development thought that has only emerged in recent years (Sui Xiaoqin, Zhao Baochun, Li Tian And Wan Zhongping, 2006). Therefore, there is no specific laws, regulations and policies for the current China and standardize various problems in the development process of the fusion, from the long-term perspective, imperfect laws, regulations and policies will inevitably affect the condition of the sports industry and the interaction between pension industry.Therefore, it is a key problem that needs to be solved urgently in the process of the integration and development of sports industry and old-age care industry to formulate specialized regulations and policies and establish a perfect regulatory and policy system.

3.4 The elderly have weak consumption awareness of health care

The nation's elderly does release the ten thousands of elderly endowment condition that occupy the home city survey shows that China's current pension in healthy older men, consumer consciousness remains generally weak, old people buy home endowment service consumer consciousness has not yet universal form, insufficient effective demand for health care (Wang Kaizhen, Wang Liu, 2014). Many old people in all think buy health care is a "waste of money, and even some of the elderly said understanding and willing to buy health care, but expectations of health care of the price is relatively low, with the actual price there is a big gap between the current market, the questions and health of the elderly endowment also there is a large relationship between consumer consciousness is weak.

4 The Integration Model of Sports Industry Serving forHealth Care Industry

This paper proposes the service industry from two aspects. As shown in the figure 1, one is that the sports industry serves the community pension model, which includes the national physical fitness monitoring services, sports service, information service of sports facilities; the other is old-age pension model of sports industry serving forpension institutions includes a combination of medicine and nursing and a combination model of physical exercise and medical insurance.
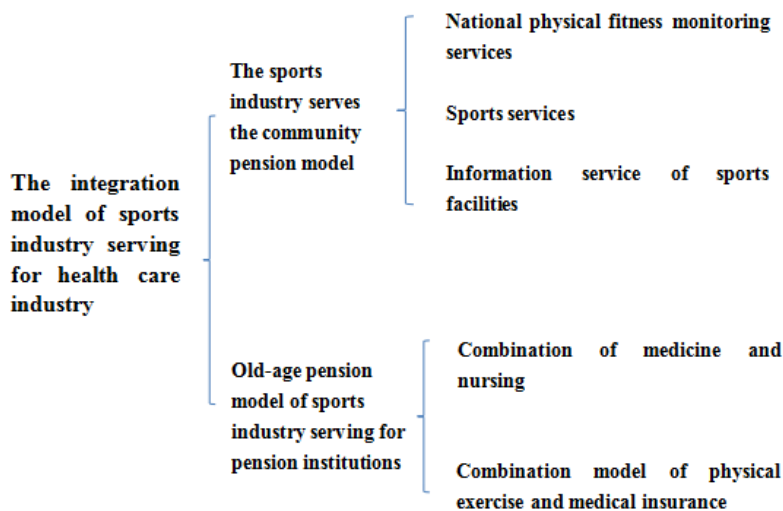
Figure 1   Integration Model of Sports Industry Serving forHealth Care Industry

4.1 The sports industry serves the community pension model

Community home care for the aged is a popular way of care in the world, which is widely valued by governments of all countries and welcomed by the elderly (Li Wenpu, Gong Zhengwei, 2014). Community home endowment has the following advantages: one is the community home endowment and institution endowment, compared with less investment, low cost, wide service, the characteristics of low charge, quick effect, still can release the pressure of the institutions endowment service; Second, the community day care center can meet the needs of home-based elderly people who leave home and stay away from home and spend less money on old-age care. Third, the embedded community pension can provide the community elderly with health care, TCM outpatient service, rehabilitation therapy, daily care, cultural leisure and other services, so that the elderly can live in the familiar environment. Integrated family endowment and community endowment, professional pension and other kinds of

resources, and establish a home endowment service project, launched "endowment service pack""personalized package", etc., the embedded community endowment service facilities built community for the elderly "one-stop" integrated services platform.

Taking Chengdu as an example, Chengdu has built 139 community nursing homes and 2,414 community day care centers, covering 91% of urban communities and more than 35% of rural communities. 150 rural home-based old-age care service centers have been set up to provide diversified home-based old-age care services for rural people over 60 years old. The city has 243 social organizations to develop old-age care services and set up 576 catering service centers for the elderly.

4.1.1 National physical fitness monitoring services

National physical fitness monitoring is an important standard to measure the achievements of national fitness activities and sports development, and it is also the main content of China's national fitness service. "National sports law", "national fitness plan" and "regulations on national fitness" clearly require the development of national fitness activities and physical fitness. National physical fitness monitoring is to establish a physical health monitoring service system. Using the scientific method to the subjects' body shape, body function and physical quality comprehensive evaluation, and the constitution monitoring and follow-up study on the different populations, the formation of physique monitoring and early warning mechanism. To publish the results of physical monitoring and guide citizens to pay attention to physical fitness and health.

Zhejiang province has established a number of provincial physical fitness monitoring centers, national physical fitness monitoring stations, county (city, district) national physical fitness monitoring stations (stations) composed of the national physical fitness monitoring network. In management, the system of classification is implemented, and the funds come from sports (culture and sports) departments at all levels from their operating funds or sports lottery public welfare funds. At present, Zhejiang province has established 119 provincial centers, more than 730 townships and street monitoring stations, providing more than 1,500 testing samples of different populations to the national physique monitoring database every year.

4.1.2 Sports services

The 18th national congress of the communist party of China (CPC) proposed that extensive national fitness activities and the development of mass sports and competitive sports should be carried out. Sports activities for the aged are an important part of national fitness. Good sports service for the aged is the unshirkable responsibility of building socialist cultural force (Ma Hongbin, 2015). The ideal public service supply structure for the elderly is the coordinated supply of government, sports organization and market. But at present, China's elderly sports service supply is relatively monotonous and the market development is not perfect. The elderly sports associations mainly rely on the government supply and the supplement of the elderly sports associations. The penetration rate of sports activities for the elderly is not high and there are not many participants.

4.1.3 Information service of sports facilities

Sports facilities are the hardware environment to meet the needs of elderly sports fitness services. Necessary sports facilities provide guarantee for the elderly to carry out sports and fitness activities, and are also important hardware indicators to measure the government's ability to provide public sports services. Sports information service mainly refers to the Internet. LED large screen, radio and television, sports health lecture and other channels to disseminate sports information, providing physical fitness knowledge, sports information, stadium information, sports training, elderly sports competition, etc. Sports skills, rules, etc. are conducive to elderly sports participation in sports public services (Ren Ha, 2006). Sports information service plays an important role in stimulating the demand preference of elderly sports public service. In terms of facilities, taking Chengdu as an example, a total of 18 public service facilities have been divided into eight categories. By 2020, there will be 2,557 new stadiums in the city, with a total investment of about 89 billion yuan. The overall implementation rate of sports facilities in urban built-up areas increased from 61% to more than 75%, and the "15-minute public sports service circle" was initially established.

4.2 Old-age pension model of sports industry serving forpension institutions

4.2.1 Combination of medicine and nursing

There are three ways to implement the mode of combining medical care with medical care: setting up a medical institution in a pension institution, setting up a service institution combining medical care with medical care in a hospital, and cooperating between pension institution and medical institution.In these ways, the sports industry exists as a value added to medical institutions, such as rehabilitation training or preventive care (Han Song, Wang Li, 2017).

However, from the perspective of China's national conditions and the development status of the pension service system, the institutional pension model plays an auxiliary role in the whole pension service system of China. The influence of Chinese people's concept of old-age care and filial piety, as well as the economic situation of different elderly people, most of them still choose to live in the community when they are old. Although some elderly medical problem can by expanding the service function of medical institutions or the construction of large aged care community to solve, but for the vast majority of the elderly is still difficult. Western nursing, prevention, health care, medical rehabilitation, training, education, entertainment and other services can only meet some of the elderly care needs, it is difficult to fundamentally solve the problem of China's elderly endowment.

Chengdu innovates the development model of "traditional Chinese medicine + endowment + community" to deliver health services to the masses. The venture of Chengdu museum with new good Angle of traditional Chinese medicine of traditional Chinese medicine is the epitome of "two house corner" construction of Chengdu, it from Chengdu on the basis of the demand of the elderly, innovative ideas, strengthen the construction of the museum of traditional Chinese medicine, Chinese medicine Angle make TCM service positions at the grass-roots level, efforts to build 15 minutes of traditional Chinese medicine health services. Venture "two house" in the corner of the construction of the organic combination of traditional Chinese medicine, pension, community three elements, the formation of "Chinese medicine + pension" and "Chinese medicine + community" innovation development pattern of traditional Chinese medicine, the traditional Chinese medicine service to the masses, make people at home can enjoy the high quality services of traditional Chinese medicine, more convenient to improve the masses get feeling, is worth learning and using for reference.

4.2.2 Combination model of physical exercise and medical insurance

"Combination of medical insurance and physical exercise" refers to the connection between medical insurance system and mass sports training system.Physical exercise can promote people's health and reduce the pressure and burden of medical insurance fund expenditure. The combination of medical insurance and physical exercise, physical exercise plays the role of preventing diseases, and medical insurance plays the role of assisting diseases. It not only solves the health problems of the elderly from the perspective of medical assistance, but also promotes the physical and mental health of the elderly from the perspective of disease prevention. Its common purpose is to protect the health of the elderly, which is also the connection point between medical insurance and physical exercise. The concept of health and health in the elderly, popularize health knowledge, help them to establish a scientific way of life, such as not smoking, drink less, moderate exercise, reasonable diet, happy mood, regular physical examination, etc. Benefit from some diseases. Present or relieve symptoms. If you don't get sick, you can not only save medical expenses, but more importantly, you can alleviate the pain of the elderly and make them healthy and enjoy life.

5 Countermeasures for the Integrated Development of Health Care Industry in Sports Industry

5.1 Increase investment in the development of healthy old-age care and elderly sports

The well-being of the elderly plays an important role in promoting social stability. We should pay more attention to health care and old-age sports, strengthen relevant policies and systems, and increase investment. We will formulate preferential policies, actively guide and support industries for the aged, and make full use of existing resources and facilities to provide conditions for the development of the old-age pension industry (Qu Tianmin, Xu Xia, Li Shufeng, 2011).

5.2 Improve welfare security and legal system

At present, China's sports industry serves a healthy and old-age industry with regional imbalances. In order to improve this situation, local governments at all levels should establish an old-age sports organization management system, manage and operate old-age sports organizations, establish a responsibility system, reward and punishment system, and establish a supervision mechanism for organizational members in accordance with relevant national laws and regulations and local conditions. Fair participation (DaiZhipeng, MaWeiping, 2013). Guide the sharing mechanism of foreign schools and community sports facilities to guide the healthy development of the elderly sports industry. Strengthen the government's macro guidance, introduce local laws and policy documents, strengthen the protection of the rights and interests of the elderly, and implement the healthy aging strategy into long-term planning. Serve the national economy and social development.

5.3 Take senior sports as one of the key points of community sports work

Taking the old-age sports as the focus of community sports has become an important measure to promote the effective integration of the sports industry and the old-age industry.Community workers should actively incorporate the elderly physical fitness service system into the community service system, and gradually promote the construction of community old-age sports associations, and improve the community's elderly sports facilities, and raise funds for sports activities for the elderly.It is also necessary to pay attention to building a team of senior sports instructors in the community to provide scientific fitness guidance services for the elderly.

5.4 Improve the management model of elderly sports organizations

In order to actively respond to the aging of the population, China should introduce organizations and systems for managing and organizing sports activities for the elderly.China should learn from the practices of developed countries and regions, combine China's national conditions, promulgate support policies, provide financial assistance, develop public welfare, and create a market-oriented and open comprehensive old-age sports organization.It also seeks sponsorship in funding and encourages companies to increase investment in the sports industry for the elderly. At the same time, innovation in business models, breaking the limitations of thinking, improving the efficiency of organizational institutions, and promoting the industrialization of the elderly sports.

5.5 Combination of sports industry and "Internet + pension"

With the help of "Internet +", we will build a new model of sports and residence for the aged. With the increasing economic level, "travel pension" is becoming a new trend of life for many old people in China. The elderly believe that travel can help them find more happiness and sense of belonging and reduce the burden on their children. As a new way of pension,how to combine the advantages of Internet technology with the traditional sports industry and tourism industry and the old-age industry is a new development direction for the sports and residential care service industry, which requires online and offline synchronization. In terms of "Internet + pension", Chengdu also has new measures. Launch "care map" of Chengdu, can understand the distribution of urban elderly, physical condition, economic income and pension service demand, understand the city's various pension institutions, community centers and other facilities, for the elderly endowment facilities and provide good service. It can make the service of the elderly more convenient and accurate and solve the problem of information asymmetry in the pension resources.

5.6 Explore the pension project of the sports industrial park

The current development of the sports health industry park pension project is strong. It is necessary to strengthen the planning of the sports health industrial park, improve relevant supporting services, encourage enterprises to practice hard and create new internal achievements, and promote the sustainable development of the sports great health industrial park. The first is planning to achieve a balanced and coordinated layout of sports and health industrial parks.It is suggested to strengthen the development planning and industrial planning of sports industrial park from the central level. Second, improve the supporting facilities, create a good ecological environment, and develop the sports and fitness industrial park. The healthy development of the health industrial park cannot be separated from perfect supporting policies and services, and the establishment of preferential industrial policies, investment and financing, taxation, achievement transformation and other related healthy enterprises. Third, deepen the combination of industry, education and research, encourage enterprises to give full play to their inherent advantages, and provide endogenous power for the development of the sports and fitness industrial park. Fourth, according to regional characteristics, the sports fitness industrial park should be built according to local conditions. Starting from the planning, the characteristics and target orientation of the development industry of the park will be clarified.

6 Conclusion

The sports industry is an economic complex. In recent years, the demand for various kinds of sports services has been increasing, and the sports industry has entered a rapid development stage.At the same time, as Chinese aging population rising, the Chinese sports industry is still in development stage, the imperfection of the relevant laws, regulations and policies, the elderly health pension problems of weak consumer consciousness.Therefore, to increase the pension to the health and the development of the elderly sports investment, perfecting the welfare safeguard and the legal system, and the elderly sports as one of the community sports work and improve the elderly sports organization management mode, the sports industry combined with "Internet + endowment", explore the sports industrial park project of provide for the aged, fundamentally solve the problem of China's elderly endowment.

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Study on Valuation Method of the Safety Awareness Based on the Gray Relational Analysis Model

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Abstract: Whether one's behavior is safe or not, it's mostly decided by his safety awareness. Most safety accidents show that the lack of safety awareness and wrong operation is the root reason of frequent accidents. Based on present material and documents upon safety awareness, this paper discusses the connotation and structure of it, expounds the relationship between safety awareness and safety behavior, puts forward the applicable framework of evaluation index system of safety awareness and builds the quantitative evaluation model of safety awareness by using the gray relational evaluation method, supplying basis of the quantitative evaluation of safety awareness level.
Key words: Safety awareness; Gray relational analysis; Evaluation method; Model

1 Introduction

In recent years, with the rapid development of the social economy, safety issues have drawn more attention from the government, enterprises and the public. As the main body of safety activities, human beings are the most frequent and active component in the safety system and the key factor for the achievement of safe production, whose unsafe behavior can be one of the main hidden risks of accidents (Dong Lixia, 2016). However, the safety of one's behavior mostly depends on the safety awareness. Therefore, a systematic analysis on safety awareness and an in-depth study on the evaluation index system of safety awareness and on its evaluation methods can be of great significance for improvement of people's safety awareness and reduction of safety risks, thus preventing and decreasing various safety accidents.

In the 1980s and 1990s, with the deepening of research on the causes of security incidents, security awareness has received more and more attention from researchers. Developed countries such as the United States and Japan, due to the early industrial development, have carried out investigations and studies on human factors in industrial security earlier in some fields, and have obtained some research results, which provides a large amount of basic data for security work in other countries(Gao Lina，2015). Compared with foreign countries, China's research on security awareness started late. Only in the 1990s, scholars gradually engaged in research in this area(Chen Lijuan, 2016).A lot of literatures have carried out research on the safety awareness of college students from problem solving to problem solving, but the general discussion is mostly. Although there have been special investigations on safety awareness through questionnaires, there is no good use of statistical data for in-depth analysis. The conclusions of the surveys are mostly shallow, and there is no major problem that can fully exploit the security awareness. Theoretical statements are more common in analyzing the main factors affecting the formation of safety awareness, but the emphasis on the reasons is not clear enough(Zou Yong, 2014).

In general, different industries and departments have studied the safety awareness of employees and their development status from the characteristics of their respective fields, and put forward many theories and methods worthy of reference. A lot of literatures have analyzed the safety awareness. At present, the research on safety awareness evaluation mostly adopts the form of scale. The method of using the scale to evaluate safety awareness has design flexibility and wide implementation, and has become a commonly used tool and means for studying safety awareness. However, the current assessment of safety awareness has not formed a unified standard, nor a unified evaluation indicator(Jiang Qinyao, 2016).Therefore, there is an urgent need to study the scientific evaluation method of safety awareness.

2 Establishment of the Evaluation Index System of Safety Awareness

2.1 Connotation of the safety awareness

Safety means that humans can successfully achieve their goals in the purposeful activities without violating their wills. Awareness defines a unique reflection of the objective existence, which can be called human observation (Wu Xiaoyong, 2017). Safety awareness is a branch of human awareness, and it is also a concept with a wide coverage. For many years, scholars have given various definitions to

safety awareness from different angles. Although different definitions are given from dissimilar perspectives, they are basically focused on a main factor——"the human psychological reaction to safety issues". Consequently, safety awareness is generally a mental state of alertness to the external environment in which personal injury and other damages may occur in the production process. It mainly includes two aspects of psychological activities: one is to judge the cognition, evaluation and consequence of the external objective world; another is to determine the individual's behavior and adjust oneself to an appropriate psychological state based on the judgement of cognition, evaluation and consequence so as to ensure a smooth operation of safe production (Wang Dangqing, 2013).

2.2 Relation between safety awareness and safety behavior

Safety awareness comes from human safety practices while it has a positive and subjective influence on safe production, which includes understandings of the working object, environment and other related factors, and assumptions and simulations of accidents under safe conditions as well as various behavior determinations. Safety behavior is materialized. It stems from the pushing and control of safety awareness, which is usually reflected in real daily operations and simulated special exercises. Awareness guides behavior and behavior comes from awareness.

Awareness should coexist with behavior, and they are tightly connected and mutually affected, which is not only the philosophical guidance for us to understand and transform the objective world, but also the primary condition for us to secure safety works. Once they are distanced or deviated from each other, accidents will be inevitable or hard to handle.

2.3 Structure of safety awareness

The structure of safety awareness refers to the various components of the awareness and their mutual relations. The academic circle holds several viewpoints on the structure of safety awareness. The first one is that safety awareness has three aspects——cognition, emotion and will. The second one is that safety awareness is divided into safety knowledge, safety attitude and safety action taken accordingly. The last one, as some researchers suggest, is that safety awareness contains safety ability, safety wisdom and safety knowledge. Safety awareness is a behavior-oriented element and a high-level psychological activity. As a result, to divide the structure of safety awareness should be based on its psychological characteristics and the divided structural elements should reflect the features of human psychological activities on different aspects. Based on the analysis of existing documents and research results, this paper divides the safety awareness of employees into four aspects: psychological quality, professional competence, safety attitude and safety behavior tendency.

2.4 Evaluation index system

The key to a quantitative evaluation of safety awareness is to build a scientific index system, which is directly related to the reliability and effectiveness of the evaluation. Based on the existing research foundation, the author refers to the connotation and structure of safety consciousness explained in the previous article, and based on the principles of science, purpose, independence, system and measurability, from psychological quality, professional quality, safety attitude and safe behavior. Tend the four dimensions to establish a safety awareness evaluation index system, which is shown in Table 1.

Due to the wide coverage of safety awareness, it requires specific focuses towards different human groups. Therefore, the fourth level of safety awareness (i.e. subdivision indicators) are not specified here, except for only when necessary.

Table 1   Evaluation Index System of Safety Awareness

Number	First-Level Indicator	Second-Level Indicator	Third-Level Indicator
1	safety awareness	psychological quality	service awareness in work
2			responsibility in work
3			self-discipline in safe production
4			ambition in work
5			braveness in improving and creating safe production
6			emotional stability
7			satisfaction for work
8		professional competence	basic and essential knowledge for safe production
9			significance of safety
10			understanding of policies and regulations related to safe production
11			experience and operative ability in safety work

Number	First-Level Indicator	Second-Level Indicator	Third-Level Indicator
12			general attitude towards safe production
13			attitude towards accidents
14		safety attitude	attitude towards management
15			attitude towards disobedience against rules
16			judgement and cognition of safety
17	safety awareness		attitude towards current jobs
18			positive and active attitude towards safety training and related activities
19		safety behavior tendency	obedience to normal operation rules
20			ability to plan safe production work
21			working practices
22			coordination with colleagues and leaders

3 Establishment of the Evaluation Model of Safety Awareness

3.1 Gray relational theory

The gray system theory was created in 1982 by Professor Deng Julong, which has been widely applied in various fields such as industry, agriculture and social economy. The gray relational evaluation method is the most important component of the gray system theory, and has unique advantages in the fields of quantitative analysis and evaluation of nonlinear, discrete and dynamic data (Yu Dingyong, 2015). And its basic principle is to distinguish the correlation degree of multiple factors in a system by comparing the geometric relation of statistical sequences (Zeng Sheng, 2013), and then rank the calculated correlation degrees, and finally obtain the correlation degree sequence, that is, the sequence of the evaluated data sequence. It means that the greater the correlation degree between certain evaluated data sequence and the standard data sequence is, the closer the evaluated sequence is to the standard.

3.2 Determination of the evaluated data sequence and the standard sequence

According to 4 second-level indicators and 22 third-level indicators shown in Table 1, the evaluated data of each subject is determined to form an evaluated data sequence. Supposing that n employees are involved, the evaluated data sequence is described as:

$$\begin{pmatrix} X_1 = \left\{ X_1(1), \ X_1(2), \cdots, \ X_1(22) \right\} \\ X_2 = \left\{ X_2(1), \ X_2(2), \cdots, \ X_2(22) \right\} \\ \vdots \\ X_n = \left\{ X_n(1), \ X_n(2), \cdots, \ X_n(22) \right\} \end{pmatrix}$$

With regard to each evaluated indicator, different values are obtained among the tested employees. And the maximum values for each evaluated indicator are taken by the author as a reference for the standard data, thus forming a standard data sequence described as:

$$X_0 = \left\{ X_0(1), \ X_0(2), \cdots, \ X_0(22) \right\}$$

3.3 Initialization of data

In the evaluation index system, the priority of data processing is to quantify the qualitative indicators because of the existence of quantitative and qualitative indicators. While some indicators present the "minimum-type" (smaller data, better result), some are the "maximum-type" (bigger data, better result), which causes the need for the data conformance processing like turning the "minimum-type" data to the "maximum-type" one by using the reciprocal method in mathematics. In the evaluation process, given that data dimensions of each indicator are dissimilar, the evaluated data have a large difference in quantity and the correlation evaluation cannot be performed. Therefore, the data of each indicator need to be normalized. The normalization processing model is：

$$X_i^*(k) = \frac{x_i(k) - \min x_i(k)}{\max x_i(k) - \min x_i(k)}$$

where $k = 1, 2, \cdots, 22; i = 1, 2, \cdots, n$

3.4 Gray relational coefficient

In order to calculate the gray relational degree, the first step is to calculate the gray correlation

degree for each indicator in the standard data sequence corresponding to that in the evaluated data sequence, which is called the gray relational coefficient. The gray relational coefficient $\gamma_{0,i}(k)$ for certain indicator $x_0(k)$ in the standard data sequence corresponding to certain indicator $x_i(k)$ in the evaluated data sequence is defined as (Liu Sifeng, 2014):

$$\gamma_{0,i}(k) = \frac{\min\limits_{i}\min\limits_{k}\left|x_0(k) - X_i^*(k)\right| + \xi \cdot \max\limits_{i}\max\limits_{k}\left|x_0(k) - X_i^*(k)\right|}{\left|x_0(k) - X_i^*(k)\right| + \xi \cdot \max\limits_{i}\max\limits_{k}\left|x_0(k) - X_i^*(k)\right|}$$

where

$\left|x_0(k) - X_i^*(k)\right| = \Delta_i(k)$; $\min\limits_{k}\left|x_0(k) - X_i^*(k)\right|$ is the first-level minimum difference;

$\min\limits_{i}\min\limits_{k}\left|x_0(k) - X_i^*(k)\right|$ is the second-level minimum difference;

$\max\limits_{i}\max\limits_{k}\left|x_0(k) - X_i^*(k)\right|$ is the second-level maximum difference;

ξ is the distinguishing coefficient, a given number from researchers, which is used to weaken the influence of data distortion caused by the maximum absolute difference so as to improve the difference significance among gray correlation coefficients, ranging from 0.1 to 1.0, normally taken as 0.5.

3.5 Gray relational degree

Given that gray relational coefficients $\gamma_{0,i}(k)$ are numerous, the data is scattered and cannot be compared in a comprehensive way. Therefore, the average number γ_i for each coefficient in every group of the evaluated data is taken as:

$$\gamma_i = \frac{1}{n}\sum_{k=1}^{n}\gamma_{0,i}(k)$$

The number γ_i is defined as the gray relational degree between the overall evaluated value of safety awareness of employee $No.i$ with the standard value.

3.6 Overall evaluation

The number γ_i is ranked to obtain a correlation sequence which is the result sequence of the evaluated data sequence, and the safety awareness evaluation on each subject is obtained.

4 Conclusion

4.1 Meaning

The connotation and structure of safety awareness have been studied and the evaluation index system of employee safety awareness has been generally established from 4 aspects, such as psychological quality, professional competence, safety attitude, safety behavior tendency. Safety management staff can improve safety work according to various indicators and improve the safety awareness of employees. This paper proposes a quantitative evaluation method, which can accurately measure people's safety awareness, so as to fully understand the employee's safety state, and provides an important reference for employee training, assessment and selection. At the same time, it can also provide employees with guidance for the job allocation. For example, employees with lower evaluation results can be arranged at the position with lower accident rate, thereby reducing the probability of accidents and improving the efficiency of safety management.

The evaluation model in this paper uses the method of grey relational analysis to make up for the shortcomings of system analysis using mathematical statistics method. It is suitable for the case where the sample size is small and the sample size law is unknown, and the calculation amount is small, which is very simple. It is judged based on the degree of similarity of the sequence curve geometry. Evaluate safety awareness and provide reference for improving safety awareness and safety education.

4.2 Discussion

The evaluation index system of safety awareness has been initially established in this paper but its rationality and practicality need to be proved. Meanwhile, the quantitative evaluation method of safety awareness is also proposed, however, due to the dynamic conditions and complexity of employees, it is difficult to achieve a complete quantitative evaluation of people's safety awareness. Some indicators of the evaluation index system in this paper are ambiguous because the objective data is difficult to obtain. For example, indicators such as emotional stability are difficult to quantify. In view of the above

problems, it is necessary to combine the knowledge of psychology, behavioral and other academic fields, and draw on feasible means and methods to measure the accurate data of various indicators so as to achieve an objective evaluation. In addition, this paper has not considered the primary and secondary relationship of each indicator. In this paper the weights of each indicator are equal, but they are actually different according to different evaluation objects and evaluation targets in the practical application, which leads to complex calculation. However, it can be programmed with computers to achieve efficient and intelligent evaluation. These areas will be researched in the future.

The value of the resolution coefficient in the paper is selected with reference to the existing literature. It is also the research direction of this evaluation method to further adjust whether different populations and industry backgrounds need to be adjusted.

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The Impact of Corporate Governance Practice on Firm Performance in Ghana

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Abstract: Corporate governance practice is perceived as a major factor that can either contribute to corporate failure or efficient corporate management, hence influencing the performance of firms. This paper establishes how corporate governance practice affects the performance of firms in Ghana. The study adopted a survey to cover 40 firms in Ghana using Analysis of Variance (ANOVA) to test the data collected and hypothesis formulated.The results revealed that, with the exception of corporate governance code which shows adverse relationship with firm performance, corporate governance practices, number of independent directors, board size, and corporate disclosure reported positive associations with firm performance. Adherence to good corporate governance practices contributes to higher firm performance. Managers of firms need to implement effective systems that permits control of operations, promotes good corporate governance practices and reduces agency cost so as to maximise corporate value.
Key words: Corporate governance practices; Firm performance; ANOVA; Ghana

1 Introduction

The need to show more emphasis on corporate governance increased in global business from a relative obscurity after the collapse of high profile companies around the world. Enron and World Com stunned the business world in terms of the scale and age of their unethical and unlawful operations,worse, they appeared to indicate only a hint of a risky situation for business operation. While corporate practices in companies came under serious attack, it seemed that the problem was far more prevalent. From big and reliable companies to the multinational groups came the revelation of significantly inherent problems in corporate governance. Unilateral decision making, nonexistence of transparency in audit and financial reports, ineffectiveness and mismanagement are some of the challenges that can arise in situations where corporate governance practices are not applied. Nonetheless, this imperatively proposes how the concept of corporate governance is of great importance. Undeniably, corporate governance practices are relevant tools which when ignored could have adverse consequence on the performance of firms in Ghana. Internationally, the commencement of corporate governance is seen as a response to many corporate failures and wide spread dissatisfaction about the functioning of the corporate sector. Corporate governance is pictured as a distinctive brand and yardstick in the profile of corporate excellence. Corporate governance attempts to initiate prevailing systems by which organizations can be directed and controlled so as to make them more accountable to shareholders in particular and the stakeholders at large. Corporate governance is the guidelines and practices that govern the association between managers and shareholders of a corporation, including stakeholders. Corporate governance which is seen as the structures and procedures for the direction and control of companies contributes to growth and financial stability by reinforcing trust and integrity in the financial market and economic efficiency (Organization for Economic Cooperation and Development (OECD), 2004). As a result, corporate governance allocates the rights and responsibilities amongst the numerous participants in a company, such as the board, managers, shareholders and other stakeholders; it also guarantees that guidelines and procedures for making decisions regarding corporate affairs are clear (Feleaga et al., 2011). Corporate governance practice is considered an internal mechanism for monitoring management. Ghabayen (Ghabayen, 2012) posits that good corporate governance is an effective device for assisting a firm to reach improved performance and contributes to maintainable economic development by improving the performance of companies and enhancing their access to external capital (IFC, 2011). Okeahalem and Akinboade, (Okeahalem and Akinboade, 2003) states that, a survey conducted by the Institute of Directors (IOD) in 2000 for top 100 private companies and some public-sector enterprises with the aim to examine the state of corporate governance practices in these organizations revealed that firms in Ghana and several sub-Saharan countries have adopted good corporate governance practices. Mulili and Wong (Mulili and Wong, 2011) concluded that developing countries vary from developed

countries in many ways and as such, there is the necessity for developing countries to come out with their own corporate governance models that consider the cultural, political, and technological changes in each African country.

A poor corporate governance practice is one of the major factors that contribute to poor performance among the firms in developing countries which includes Ghana. Soludo (Soludo, 2004) posits that, weak corporate governance practice is attributed to factors such as fragile internal control systems, extreme risk taking, override of internal control measures, lack of or non-adherence to bounds of authority, neglect for cannons of judicious lending, nonexistence of risk management processes, inside abuses and fraudulent practices, and these remain a worrying feature of the banking system. Subsequently series of major corporate failures and scandals in the 1990s, made it apparent for something to be done to rein in the way limited companies are directed, controlled and governed. The problem was more prominent with the public limited companies which have directors, some of whom are external. The principal-agent problem came to a head as shareholders anticipations frequently departed extensively from those of directors, who notwithstanding poor performances, awarded themselves weighty annual bonuses which in some circumstances were unmaintainable and undeserved, executive mansions and vehicles, paid-for holidays, and many other mouth-watering fringe benefits.However, it not automatic that those corporate bodies that embarks on good governance processes will perform well or be immune from failure.The current study intends to explore how corporate governance practices impacts on the performance of firms in Ghana. We therefore propose that the corporate governance practices adopted by firms influence firm performance, hence the hypotheses for this study is:

H: Corporate governance practices positively affects firm performance.

The rest of the paper is arranged in the following order; a brief review of the extant empirical literature, the research methodology, presentation of empirical findings, and conclusions.

2 Review of Empirical Literature

This section presents the review of studies on corporate governance and firm performance conducted by earlier researchers to enable us understand and appreciate the current study so as to meet the purpose of the study. Presently, academicians and professionals have shown growing interest in the study of corporate governance which enhances the knowledge of how corporate governance influences firm's management, strategies and performance. Researchers have come out with many definitions of corporate governance and is challenging to come across a generally acceptable definition for corporate governance. The definition may be country, environment or context-specific.Corporate governance is a system by which companies are directed and controlled (Cadbury, 1992). Corporate governance is explained as a set of interactions between an organization's management, the board, owners and other stakeholders in which power is exercised in the management of economic and social resources for enhanced performance and sustainable development (OECD, 2004).It concentrates on the configuration of control mechanisms that attempts to limit problems arising from potential conflict of interest between the different members in the firm, that is, managers, shareholders, employees, creditors and others. Aoki (2000) defines corporate governance as the structure of the privileges and tasks of stakeholders in a firm. It is a system of checks and balances put in place by stakeholders to ensure accountability and socially responsible behaviour of firms (Solomon, 2007).Corporate governance is also explained by Gillan and Starks (2000) as a scheme of laws, rules and issues that regulate operations of a corporation. They further explained that, it refers to the spreading of rights and accountabilities among different members in the organization such as the board of directors, managers, shareholders and other stakeholders. It similarly details the guidelines and processes for making decisions on corporate affairs. After extensive review of various schools of thought on corporate governance definitions, Pillai and Al-Malkawi (Pillai and Al-Malkawi, 2017) conclude that the definition of corporate governance is either shareholder based or stakeholder based. Complete corporate governance makes companies stronger, extra effective and answerable, and supports implementation of good environmental and communal practices. Evidence from literature suggest that, good corporate governance creates investor goodwill and confidence. Gompers et al. (Gompers et al., 2003) stated that, the existence of good corporate governance upsurges the firm's valuations and lifts the bottom line. Claessens and Yurtoglu (Claessens and Yurtoglu, 2013)contends that improved corporate frameworks profit firms through greater access to financing, lower cost of capital, improved performance and more favourable treatment of all stakeholders. Corporate governance enhances corporate disclosure (Gruner, 2002), it ensures detection and analysis of

failure (Parker et al., 2002) and enhances value creation within the firm (Isshaq et al., 2009; Villanueva-Villar et al., 2016). According to Shleifer and Vishny (Shleifer and Vishny, 1997), corporate governance mechanisms guarantee investors in corporations of receiving sufficient returns on their investments. They are of the view that, if these mechanisms are not present or function appropriately, external investors would not lend to firms and firms would be forced to depend completely on their own internally generated cash flows and accumulated financial resources to finance continuing operations and lucrative investment opportunities. In order to reduce agency costs, a good corporate governance scheme should combine some type of large investors with lawful safeguard of both their rights and those of small investors (Shleifer and Vishny, 1997). From the perspective of agency theory, corporate value can be maximized by decreasing agency costs as well as encouraging managers to behave in the interests of shareholders. Accordingly, an essential objective of governance research is to ascertain which precise mechanisms contribute to the boosting of corporate value.Erkens et al. (Erkens et al., 2013) provided evidence that weak corporate governance practices affected the performance of financial firms during the global financial crises.

Sylvie (Sylvie, 2012) investigated the relationship that exist among corporate governance practices or mechanism and firm value, measured by accounting and market data, resorting to a structural approach by using a partial least square regression model, reported that, governance practices such as independent directors on the board, the use of stock options and the frequency of board meetings are significantly and adversely associated with the firm's net book value or income, while most individual governance practices had no significant impact on the firms' market value.Munisi and Randøy (Munisi and Randøy, 2013) concluded that, companies in sub-Saharan African had partially executed good corporate governance practices, and reported a positive link between the constructed index of good corporate governance practices and accounting performance and a negative relationship with that of the market valuation. Their sub-indices reported that, the board of directors and the audit committee are related positively and significantly with accounting performance, with the audit committee associated negatively and significantly with market valuation. Akbar et al. (Akbar et al., 2016) used a more robust methodology, Generalized Method of Moments (GMM) Estimation and reported that,compliance with corporate governance regulations is not a causative factor of corporate performance in the UK, arguing that, results from previous studies showing a positive influence of corporate governance on firms' performance may be influenced as they failed to control for possible endogeneity.

3 Research Methodology

Mouton (Mouton, 2001) views research methodology as concentrating on the research process and the kind of tools and techniques to be applied. Our work takes into account the location of research participants (firms), tools of data collection and time frame for the study. Mixed method approach in form of survey design is adopted along with quantitative, exploratory and explanatory designs to carry out this study. Firms operating in Ghana were considered as the population for the study. The statistical analysis and inferences are based on variables extracted and modelled from the published annual financial and corporate governance reports of 40 firms operating in Ghana.

3.1 Model specification of the regression

The study adopted the regression model by Arshad and Safder (Safder, 2009) for data analysis. The general form of the model is specified as below:

$$LEV_{it} = \beta_0 + \beta_1 (Log\ BZ)_{it} + \beta_2 (\%\ NEID)_{it} + \beta_3 (\%\ CORPDIS)_{it} + \beta_4 (CORPGOV\ \%)_{it} + \beta_5 (ROA)_{it} + \beta_6 (Log\ SZ)_{it} + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$$

Where:*LEV = Leverage on corporate governance*
BZ= Board size (Logarithm of total number of board members)
NED= Number of independent Directors
CORPDIS = Corporate disclosure
CORPGOV = corporate governance code
ROA = Return on Assets (company's net earnings divided by its total assets)
SZ = Size of Firm (as logarithm of total assets)
ε= Error Term
β 0 = Intercept of the equation
β = Marginal effect of variable
$FIRPERM_{it} = \alpha + \beta * Y_{it} + \theta_{it}$ corporate governance variables+ φ_{it} control variables $\chi_i + \gamma_t$

+εit …….2

Where:

Y$_{it}$is alternatively ROA$_{it}$andROE$_{it}$, and Return$_{it}$for firm at a time,the firm performance is the natural logarithmof executive pay for i$_{th}$ firm at time t.

The variables for the study serving as a predictor of a firm's performancewere identified as corporate governance practice, number of independent directors, board size, corporate disclosure and corporate governance code. The control variables are number of independent directors, board size, corporate disclosure and corporate governance code.

3.2 Presentation and analysis of data

We used inferential statistic to analyze the data for our work. Analysis of Variance (ANOVA), an inferential statistic was employed to test the data collected and hypothesis formulated. Regression analysis was adopted to explore the link between corporate governance practices and firm performance. The regression model consists of three tables which include the model summary, ANOVA and the coefficient table. The adjusted R^2 in the model summary table provides accurate estimation of the true population value. It is the percent of the variance in the dependent explained by the independents variable, the value of F-ratio explains the overall significance of the model in the ANVOA table. The Beta parameter under standardized coefficients was used to compare and also determined the influence of the independent variable on the dependent variable. The significant value was used to measure the statistic significant contribution of each independent variable.

4 Results of Analysis

The study sought to examine the correlation between corporate governance practices embraced by firms in Ghana and their performance.

4.1 Regression analysis between corporate governance practices and firm performance

The Model summary in Table 4.1 shows the R Square is 0.060 and the Adjusted R Square 0.057 representing 6 percent of the observations explains the model. This is very weak but it may be due to the small sample size used in the estimation.

Table 1   Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.245[a]	.060	.057	1.30020

a. Predictors: (Constant), Corporate governance practices

The ANOVA which is the overall regression model shows F ratio of 17.148 for the regression model, significant at 1% level. This is because p-valve= (0.00) < 0.01. The cumulative effect of the predictors on the dependent variable was significant as reported by the ANOVA in Table 4.2.

Table 2   ANOVA

	Model	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	28.989	1	28.989	17.148	.000[b]
1	Residual	453.059	268	1.691		
	Total	482.048	269			

a. Dependent Variable: Firm performance
b. Predictors: (Constant), Corporate governance practices

The output report indicates that corporate governance practice and corporate governance code are statistically significant at 1% level. Whereas the corporate disclosure was significant at 10% level, the rest of the variables were not significant but the research was to show the path casual effect of the variables on the dependent variable, firm performance. All the variables attained their hypnotized directions of effect which is positive relationship except corporate governance code which shows negative relationship with firm performance. Corporate governance practices explains 24.5% of the variations in the firm performance. Number of independent directors and board size explains about 8% each in the variations. Corporate disclosure account for 31.5% of the changes in firm performance and lastly corporate governance code impacted negatively of about 58%. The results of the study is in line with the findings of Munisi and Rand øy (2013), but contrary to the findings ofAkbar et al. (2016), who reported that corporate governance practice has no effect on frim performance.

Table 3　Regression coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.101	.243		16.887	.000
	Corporate governance practices	.660	.159	.245	-4.141	.000
2	Number of independent directors	.007	.012	.081	.599	.554
3	Board size	0.13	.022	.085	.592	.558
4	Corporate disclosure and	.717	.396	.315	1.809	.080
5	Corporate governance code	-6.706	1.890	-.585	*3.548	.001

a. Dependent Variable: Firm performance

5 Conclusion

The study aimed to explore the impact of corporate governance practices on the performance of firms in Ghana, using Analysis of Variance (ANOVA), an inferential statistic to test the hypothesis formulated. The results revealed that, with the exception of corporate governance code which shows negative relationship with firm performance, the rest of the predictors, corporate governance practices, number of independent directors, board size, and corporate disclosure reported positive association with firm performance. It can be concluded that corporate governance practices contributes to higher profit margins. Therefore, it is imperative for management of firms to work in the interest of shareholders by reducing agency cost as well as practicing effective corporate governance practices to maximise corporate value.

Acknowledgement

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On Language Dilemma and International Promotion Strategies of Chinese University English Websites

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Abstract: With the penetration of the Internet into all fields of society, major universities in China are also using the Internet as a medium to promote themselves and build their own websites. However, on English websites of some Chinese universities, a large number of errors and inappropriate translations could be found, and the translation quality of university websites urgently needs to be improved. This paper has a systematic study on the English translation of Chinese university websites, sorting out the translation errors that have appeared in the classified university English websites, and contrasting them with the parallel texts of famous American universities, and putting forward some corresponding translation strategies based on Reception Aesthetics.
Key words: English translation of university websites; Reception Aesthetics; Translation errors; Translation strategies

1 Introduction

With the penetration of the Internet into all fields of society, the Internet has become an important carrier of information dissemination and has become an indispensable part of people's work and life. Major universities in China are also using the Internet as a medium to promote themselves and build their own websites, including the corresponding English versions, making them an important window on the external publicity of colleges and universities. However, due to the influence of many factors such as the differences of language and culture between China and western countries, the number of translation errors in university English websites has increased which not only affects the effective external publicity of universities, but also damages the international reputation of relevant universities. Therefore, the research on English websites of Chinese universities is of great significance, and the translation quality of university websites urgently needs to be improved.

Reception Aesthetics is a literary theory and an aesthetic theory based on the Phenomenology and Hermeneutics. In 1987, Yang Wuneng published a paper entitled *The circulation of Hermeneutics, Reception and Recreation* which marked the fact that Reception Aesthetics has been introduced into the field of translation studies in China. Reception Aesthetics shifts the focus of literary theory and aesthetics research from the text to the reader, placing more emphasis on the reader's position in aesthetic activities. English websites of Chinese University are also facing the readers, thus the reader's status shall not be ignored. Many studies on Chinese university English websites have been done from various perspectives. Gao Hui (2009) has a comparative study on the translation of Chinese and American university website profiles based on a self-bulit parallel corpus and comparable corpus. From the perspective of Meme theory, Bao Jing and Yuan Yinning(2013) compare the English translated text of 10 Chinese colleges and universities' profiles with that of ten well-known universities from the Britain and American. They suggest reproducing the language meme of foreign universities' profiles to provide guidance for the text form and text content of the English translation of Chinese colleges and universities' profiles. According to those studies, some translation strategies and existing problems on English websites of Chinese universities can be found out. Some scholars try to use all kinds of theories to guide university websites translation, but it seems very superficial. The present study will look into the existing problems and conduct error analysis in a more systematic way.

2 Research Design

This paper employs qualitative methods, including comparison, induction, analysis, and synthesis for conducting the research. Comprehensiveness, objectiveness, and logicality are the major principles. The paper will analyze the major problems of Chinese university websites translation by comparing with American university websites. Then, based on the theory of Reception Aesthetics, appropriate translation strategies will be suggested to help translators engaged in the university websites translation.

    The paper will analyze the major translation errors on English websites of Chinese universities by comparing with some well-known American university websites as parallel texts, or "*native texts of the same type or genre in different cultures*" (Nord, 2001: 56), in order to ensure the objectivity of the analysis. Then, based on the theory of Reception Aesthetics, appropriate translation strategies will be suggested to help translators engaged in the university websites translation. The research object selected in this paper is the English websites of 30 Chinese "211 Project" universities, which are randomly sampled from 116 "211 Project" universities in China by using the random sampling website (https://www.graphpad.com/quickcalcs/). The reason for choosing "211 Project" universities is that these universities have strong potential for development and demand for outreach, and the status of websites translation is also representative and researchable. The sampling result has been shown in the following Table 1.

Table 1   Random Sampling Result

Sequence	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Group	29	89	51	48	4	81	12	39	41	50	36	105	76	42	90
Sequence	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Group	15	14	86	26	17	78	112	99	79	2	8	84	100	38	66

3 Error Analysis

    Profile is one of the most important sections in Chinese university websites, which includes several parts, such as general information, history, message from the president. Readers can look through the profile to get many important and necessary information quickly. So the quality of English translation of profile shall be taken into consideration. According to analyzing errors in profile translations of the 30 Chinese universities, errors can be classified into linguistic errors in translation, cultural errors in translation, pragmatic errors in translation and errors in metric units conversion and layout, and some causes of the translation errors can be preliminarily explored. The proportional distribution of specific translation errors can be found in Figure 1.
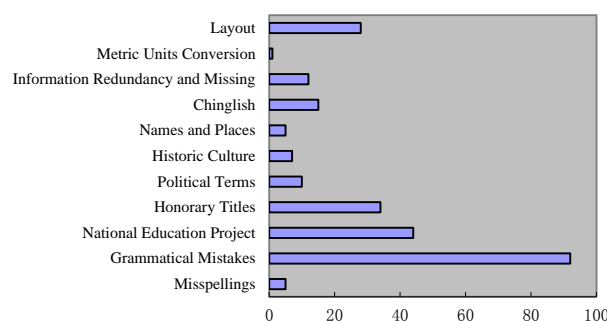
Figure 1   Proportional Distribution of Translation Errors

    As is shown in the results above, the most frequently occurred translation errors in the profiles of the 30 universities' English websites are grammatical mistakes, followed by the translation errors of national education projects and special honorary titles, and of layout. For analyzing the proportional distribution of the translation errors, the translator's competence might be the major reason, since the number of grammatical mistakes accounts for the highest proportions. However, the national education projects and special honorary titles are all cultural specific items. It is the translator who has not handled the transfer between the two cultures very well. The translators might have not taken into account the cultural background of target language readers due to their own negligence, or they might not be able to completely interpret the meaning of the source text due to the translator's lack of target language cultural knowledge thus have influenced the target language readers' acceptance of the translation.

    "*Wolfram Wilss(1976) outlines three aspects of translator competence: first, receptive competence in a source language; second, productive competence in a target language; and third, transfer competence between two languages.*" (Chu Dongwei, 2012:20) So a qualified translator is required to have competence in source and target language as well as transfer competence between two languages and two cultures. If the translators' competence is not proficient enough, they may not be able to use both languages flexibly, thus affecting the accuracy and practicality of the translation.

3.1 Linguistic errors in translation

Linguistic errors in translation mainly refer to errors that violate the linguistic norms or conventions of the target language. Although its impact on the translation is not as serious as errors in pragmatic translation and cultural translation, its influence on the effective communication cannot be neglected. Linguistic errors in translation not only affect the fluency and naturalness of the translation, but also reduce the readability and acceptability of the target text, or even seriously affect the effectiveness of the external publicity of university websites. Linguistic errors in translation can be divided into misspellings and grammatical mistakes, where grammatical mistakes include misuse of part of speech, misuse of single and plural forms, and missing sentence components and so on. For example:

(1) After *gruaduation*, students from the base class may has the following jobs: researches in universities or *instituts*, (http://www.ncepu.edu.cn/xxgk/xxjj/index.htm)

(2) As Vice President Member of China Electricity Council, ……to undertake important *researches* and development projects, ……(http://english.ncepu.edu.cn/hdgk/29718.html)

In example 1 the spelling of "graduation" and "institutes" is incorrect. In example 2, the word "research" is an uncountable noun, and cannot add suffix "es", acting as a plural. The same error can be found in many university websites, which have been pointed out by some scholars, but it has not attracted much attention.

3.2 Cultural errors in translation

Translation is not only the communication between two languages, but also the communication between two cultures. Cultural translation errors refer to translations that conflict with the culture of target language in translation. They are the concrete manifestation of pragmatic translation errors. Because of the cultural differences between the source language and the target language, there are no corresponding cultural words or phrases in the target language. Cultural errors in translation of Chinese university websites will be elaborated from the translation of national education projects, honorary titles, political terms, historic culture as well as names and places. As shown in examples below:

(3) It is also one of the "*211 Project" and "985 Project*" universities with full support in the construction and development from the central and local government of China. (http://en.whu.edu.cn/About_WHU1/Overview.htm)

(4) 43 Chair professors invited by "*Cheung Kong Scholar Award Program*" (http://en.hit.edu.cn/about/statistics)

(5) For the past 70 years, the university has kept serving for the main tasks of the Party and the country and stuck to the *Yan'an spirit* in running the school and educating the students. (http://english.bit.edu.cn/AboutBIT/History/index.htm)

According to italics in the above examples, "211 Project" and "985 Project" are important education projects taken by the Chinese government to promote the development of higher education. "Cheung Kong Scholar" is a kind of honorary titles. Yan'an Spirit is a kind of revolutionary spirit created by the Communist Party of China, which related to the historic culture. All of these cultural factors are intended to reach effective external publicity, but they were translated literally without any annotation or explanation. For target language readers who do not have knowledge on Chinese social and cultural background, they are unable to understand the meaning of the important information and affect the effective external publicity.

3.3 Pragmatic errors in translation

In some Chinese universities' English websites, there are often sentences that are very fluent in language expression and also conform to grammar rules of the target languages, but they do not meet the pragmatic rules, which make the target language readers difficult to understand. Pragmatic errors in the English translation of university websites can be divided into chinglish and information redundancy and missing.

"*Chinglish is that misshapen, hybrid language that is neither English nor Chinese but that might be described as 'English with Chinese characteristics'*" (Joan Pinkham, 2012:1) Since the translator focuses too much on the original words and wants to translate the source text word by word. These kinds of translation seem to be faithful to the source text. However, in fact, the true meanings of the source text have been missed. For example:

(6) Dalian University of Technology is the first *formal university of a new type* founded by the Communist Party of China *on the eve of the founding of the People's Republic of China,* for the construction of China's industrial system.

In the example 6, this translation word for word is not necessary. The expression "the eve of" can be omitted and the meaning expressed will be more accurate. "The first formal university of a new type"

will also cause misunderstanding, readers might be wondering whether there are informal universities in China, except the formal universities. Meanwhile, in the parallel texts of overseas university websites, they usually describe their university as "a leading university" and "a research university", and never use "formal" or "informal".

Besides, translation is like writing. It transfers the meanings of the source text to the target text, while the language should be simple, the meaning should be clear. A redundant translation will not only increase the reading burden of target language readers, and will appear unidiomatic which looks like the Chinglish. If the translation is too long, with too many unnecessary words, it will become barriers for readers to read; the omission of important information will also affect the acceptance of the translation, and thus cannot meet the readers' expectations.

(7) At present, it has *an enrollment of* over 56,000 full-time undergraduates and 15,000 full-time postgraduates *enrolled from all over China* as well as 1,600 *international students from over 60 countries and regions.*(http://english.zzu.edu.cn/gaikuang_en.htm）

(8) The University, which is based in Cambridge and Boston, Massachusetts, has an enrollment of over 20,000 *degree candidates, including undergraduate, graduate, and professional students.* (https://www.harvard.edu/about-harvard)

In the translation of example 7 and 8, when the number of students is displayed, the term is too cumbersome. The expression "has an enrollment of" and "enrolled from all over China" have the same meaning, which is too redundant. Reference to the parallel text of Harvard University, the phrase "degree candidates" could directly be used before the specific type of students.

In addition to the three translation errors of language, culture, and pragmatics, errors in metric unit conversion and layout on the English websites of Chinese universities have also been found. Although such errors are not serious enough to affect the acceptability of the translation, it will still cause the translation to be not fluent. For example, there is "mu" in traditional Chinese metric units. The translation should retain both the traditional metric units of Chinese language and providing extra information on its counterparts in international metric units, indicating that the translators have taken into account the reception ability of target language readers.

4 International Promotion Strategies from the Perspective of Reception Aesthetics
4.1 Emphasis on the transfer of pragmatic information in translation

In the process of translation, the translator is first a reader of the source text, and communicates with the source text by using his horizon of expectations. The translator understands and interprets the information contained in the source text according to his pre-existing ideas, culture, knowledge, abilities, experiences, habits, etc., and concretizes the "blanks", "indeterminacy" and "gap" of the source text. The translator's horizon of expectations of his aesthetic experience has determined his aesthetic perception and understanding direction.

After a careful reading and comprehension of the text, the translator shall try his best to realize the fusion of his horizon of expectations with that of the source text, so that the translator can understand the meaning of the source text maximally and interpret them in translation as much as possible. This requires translators to have sufficient social and cultural knowledge of the source language and the target language, as well as bilingual and cultural transfer competence.

Although pragmatic errors in translation are the most difficult translation errors to be resolved and have the greatest impact, language and cultural errors in translation can lead to pragmatic errors. The reason is that the pragmatic meaning of the source text cannot be expressed in the translation; as a consequence the translation will be inaccurate, thus affecting the reception of target language readers, where the target language readers may not achieve the same text effect with that of the source language readers. Therefore, the translation of cultural specific items on university websites shall be processed appropriately. Translation methods such as explanation, omission and amplification can be adopted to accurately transfer the pragmatic information of cultural items in translation.

4.2 Emphasis on the reception level of the target language readers

As a recipient of a translated work, the reader is the ultimate part in the realization of translation values and meaning. Only after the readers accomplish their reading activities can the meaning of the translation be truly realized. However，the readership is a very complex group, "*who have been affected by too many factors: nationality, race, gender, age, occupation, level, hobby, experience, pursuit, etc. Even the same reader may often have various mental condition and aesthetic requirements in different time and space.*" (Zhang Boran, 2002: 10). Different readers will have different horizon of expectations,

different psychological motivation and needs, different emotion and affection, as well as different aesthetic needs. So they will have different requirements for translation. Therefore, the translator must consider the implicit readers' horizon of expectations, and the degree of fusion of their horizons of expectations and the translation; they shall also lay emphasis on the reader's aesthetic taste and reception level.

At the same time, the translation should conform to the cultural norms of the parallel texts of the English-speaking countries. On the one hand, the parallel texts can help the translators to properly process the content of the source text and delete information that are useless to the target readers. On the other hand, the parallel texts can serve as reference texts for translations. In order to meet the target language readers' horizon of expectations, needs of psychological motivation, emotion and information, as well as the reception ability and reading habits, there are three methods for adjustment that is simplification, conversion and restructuring.

5 Conclusion

Based on error analysis from the perspective of Reception Aesthetics, this paper has proposed some translation strategies from target language readers' horizon of expectations and translators' considerations for target language readers, including emphasis on the transfer of pragmatic information in translation and the reception level of the target language readers. Translation techniques, such as explanation, omission, amplification, simplification and restructuring, can be used to promote the quality of university website translation. Besides, translators need to improve their bilingual competence and cultural competence of both the source language and the target language as well as the transfer competence between the two languages. Meanwhile, the web texts should be paid attention to its characteristics of conciseness and the use of hypertext structures.

However, there are still some limitations of this paper. First, the research object selected in this paper is not comprehensive and the random sampled universities are not enough to represent the present situation of English translation of all university websites in China. Second, the examples presented are not comprehensive enough. Third, because of the author's limited academic attainments and most of the research materials come from books and the Internet, which cannot obtain the most direct feedback from the target language readers and may not be absolutely objective.

Therefore, the expectation is that more attentions shall be paid to the study of English translation of Chinese university websites in the future, and researchers who wish to engage in this field can make improvements to the above problems, propose more objective and effective solutions to the problems arising therein, and study the Chinese university English websites in a more systematic way so as to promote quality of Chinese university English websites for achieving effective external publicity.

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Research on Financial Performance Evaluation Index System in Colleges and Universities

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Abstract: How to quantify and evaluate financial performance of colleges and universities scientifically is always research hotspot in politics field and academic field. The Paper selects 5 general indexes and 18 sub-indexes to evaluate financial performance of colleges and universities, and traces out causal graph of all performance indexes by Vensim software and endows weight to all performance indexes by applying percentage model and correlation judgment matrix and constructs index system of financial performance of colleges and universities finally based on full consideration of scientificity, flexibility, relative property and integrality, etc. It is found out by research that the proportion of financial appropriation in total income, graduation rate of graduating students and annual increase percentage of teaching expenditure investment have great weight contribution in evaluating financial performance of colleges and universities, which shows that these indexes are important to evaluate financial performance of colleges and universities. Therefore, suggestions to improve graduation rate of graduating students by utilizing financial appropriation are provided for reference significance of improving financial performance of colleges and universities.

Key words: Financial performance of colleges and universities; System dynamics; Judgment matrix; Evaluation index system;

1 Introduction

General Secretary Xi proposed to develop educational industry in priority, deepen educational system reform and accelerate education modernization in report of the 19th National Congress of the Communist Party of China. In the same year, the Ministry of Education proposed to implement effectively and control comprehensively to integrate performance concepts into various financial systems. Since strategy of revitalizing the country through science and technology and strategy of reinvigorating China through human resource development were put forward in 1990s, the government has increased continuously investment and attention degree to educational business. As the cradle of personnel training, universities should demonstrate the effect of demonstration. Improve the utilization efficiency, efficiency and efficiency of educational resources (Wu Yingjuan, Qin Huimin, 2013), and train high-quality talents for the country. Li Rui, a scholar, puts forward that financial performance evaluation in Colleges and universities is based on a comparative analysis of the financial status, profitability and operational ability of universities. (Li Rui, 2014) at present, there are still many problems in the construction of financial performance evaluation index system in Chinese universities. If the system put forward by relevant scholars in 2012 lacks the corresponding legal support, lacks integrity and lacks unified standards. (Xu Yueli, 2012) Fu Qiang and other scholars also stressed that the construction of the evaluation index system of financial performance should meet the requirements of science, flexibility, contrast and integrity. (FU Qiang, 2013) therefore, how to quantify the efficient use of educational funds and optimize the allocation of educational resources has always been a hot topic in the political, educational and academic circles.

The Paper has collected and sorted out financial performance index data of 75 colleges and universities that are directly subordinate to Ministry of Education and has borrowed and integrated relevant research achievements of domestic and foreign excellent scholars and has constructed research system to evaluate the performance index by utilizing system dynamics, centesimal system and correlation judgment matrix (Han Fengmei, 2016) to evaluate financial performance of all colleges and universities in scientific quantitative angle, explore route to promote financial performance of colleges and universities and put forward reasonable suggestion for theory reference significance of improving financial performance of colleges and universities.

2 Existing Problems of Financial Performance Evaluation Index System for China's Colleges and Universities

2.1 Colleges and universities' financial performance evaluation system lacks the corresponding

legal supports

Nowadays Chinese colleges and universities' financial performance evaluation index system is determined by governments at all levels according to the relevant national policies and strategies. Since the policies and strategies can be adjusted and updated due to the social and economic developments, the corresponding financial performance evaluation index system is time-sensitive and uncertain. The newly-established evaluation system can be abolished when some new policies are launched. Laws, as the behavioral regulations, are guaranteed by the coercive force of the state, with some features, such as preciseness, ever-lasting and general applicability. Currently, laws and regulations directly relevant to the financial performance evaluation haven't been enacted in China. The imperfections in the legal construction reduce the validity of evaluation system, and its implementation is also greatly restrained.

2.2 Colleges and universities' financial performance evaluation lacks integrity

In evaluating the financial performance, the unavailability of some data leads to the lack of integrity of evaluation results. Besides, some indexes are unlikely to be quantitatively processed, such as the reputation of school. The lack of those index and data will cause big flaws of the whole evaluation system.

2.3 Colleges and universities' financial performance evaluation lacks unified standards

Colleges and universities have different standards of selecting indexes to evaluate the financial performance (Xu Yueli, 2012). Due the differences in size, majors and infrastructure, some problems may occur regarding data selection and standardized processing in computing indexes and data. For example, the graduation rate of current year's graduates can be used to evaluate the quality of graduates, or the monthly salaries of current year's graduates after their graduation can be used to evaluate this index. The selection of different data corresponds to the different evaluation standards. If the colleges and universities use no quantitative standards to evaluate and compare this index, the comparison has no significance.

3 Empirical Research

3.1 Index selection

A large number of domestic and foreign documents have been collected in this paper. Based on the index system established by relevant scholars, in consideration that construction of financial performance evaluation index system of colleges and universities shall meet requirements of scientificity this paper has added several new indicators. After screening and screening, 5 omnibus indicators were selected, including scientific and research performance, asset performance, teaching performance (Meng Fang, 2010), fund performance and social benefit performance (Gu Xiaoyu, 2018). Sub-indexes are set for each general index. Sub-indexes of science and research performance include: annual increase percentage of science and research investment, annual increase percentage of the number of people for national awards, proportion of annual average science and research expenditure of all colleges on total expenditure of the college in that year, annual science and research expenditure of teachers per capita and annual increase percentage of researchers. Sub-indexes of fund performance include: annual increase percentage of fixed asset purchase investment, annual increase percentage of fixed asset repair, recovery of scrap value of fixed assets, annual average number of books per student and annual increase percentage of book purchase in library. Sub-indexes of teaching performance include: graduation rate of graduating student, annual ratio of teacher to student and annual increase percentage of teaching expenditure investment. Capital performance indexes include: proportion of financial appropriation on total income, annual increase percentage of financial appropriation and annual increase percentage of school fellow support on total income. Sub-indexes of social benefit performance include: proportion of financed students on the number of students in whole school, green area per capita and annual revenue increase percentage of teaching and administrative staff per capita. To describe relation among all performance indexes, this paper has described causal relationship among financial performance, general index and sub-index by adopting causal relationship diagram in system dynamics, as shown in Figure 1.
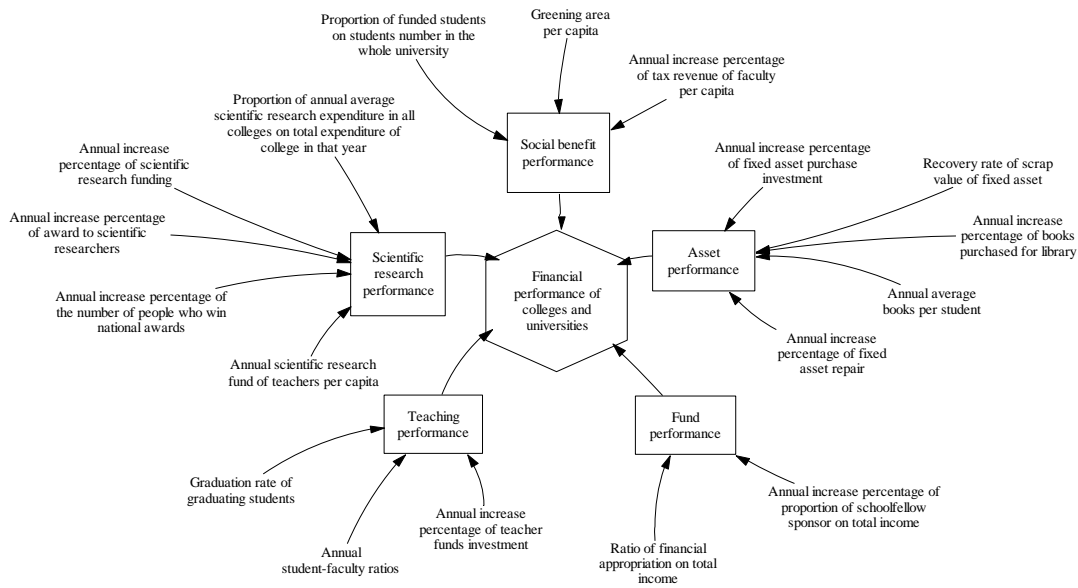
Figure 1   System Dynamics-Causal Graph

Table 1   Construction of Financial Performance Evaluation Index System in Colleges and Universities

	General index	Sub-index	Calculation standard
Financial performance evaluation index system in colleges and universities	Scientific research performance (A_1)	Annual increase percentage of scientific research funding (A_{11})	(Investment amount of scientific research fund in that year - investment amount of scientific research fund in last year)/investment amount of scientific research fund in last year
		Annual increase percentage of the number of people who win national awards (A_{12})	The number of people who win national awards in that year - the number of people who win national awards in last year/the number of people who win national awards in last year
		Proportion of annual average scientific research expenditure in all colleges on total expenditure of college in that year (A_{13})	$\sum$(scientific research funds expenditure of colleges in that very year)/total number of colleges in the university
		Annual scientific research fund of teachers per capita (A_{14})	Total of scientific research funds expenditure in that year/total of teachers in the university in that year
		Annual increase percentage of award to scientific researchers (A_{15})	(Award to researchers in that year – award to researchers in last year) / award to researchers in last year
	Asset performance (A_2)	Annual increase percentage of fixed asset purchase investment (A_{21})	(Investment of fixed asset purchase investment in that year – investment of fixed asset purchase in last year)/investment of fixed asset purchase in last year
		Annual increase percentage of fixed asset repair (A_{22})	(Fixed asset repair expense in that year – fixed asset repair expense in last year)/fixed asset repair expense in last year
		Recovery rate of scrap value of fixed asset (A_{23})	Recovery rate of scrap value of fixed asset in that year/original value of fixed asset

Continual Table 1

	General index	Sub-index	Calculation standard
Financial performance evaluation index system in colleges and universities	Asset performance (A_2)	Annual average books per student (A_{24})	Total number of books in college library in that year/total number of students in college in that year
		Annual increase percentage of books purchased for library (A_{25})	(The number of books in library in that year – the number of books in library in last year)/ the number of books in library in last year
	Teaching performance (A_3)	Graduation rate of graduating students (A_{31})	(The number of people of graduating students accrued in that year – the number of students for graduation delay – the number of students who cannot graduate normally for other reasons)/the number of graduating students accrued in that year
		Annual student-faculty ratios (A_{32})	The number of faculty in that year/students enrollment in that year
		Annual increase percentage of teacher funds investment (A_{33})	(Teaching funds investment in that year – teaching funds investment in last year)/teaching funds investment in last year
	Fund performance (A_4)	Ratio of financial appropriation on total income (A_{41})	Financial appropriation amount/(financial appropriation + undertaking revenue + schoolfellow contribution amount + social donation)
		Annual increase percentage of proportion of schoolfellow sponsor on total income (A_{42})	(Proportion of schoolfellow sponsor on total income in that year - proportion of schoolfellow sponsor on total income in last year)/ proportion of schoolfellow sponsor on total income in last year
	Social benefit performance (A_5)	Proportion of funded students on students number in the whole university (A_{51})	The number of students funded in that year/the number of students in university in that year
		Greening area per capita (A_{52})	University greening area/$\sum$ (the number of faculty in that year + number of students in that year)
		Annual increase percentage of tax revenue of faculty per capita (A_{53})	$\sum$total tax payment of faculty in that year/$\sum$the total number of faculty in that year

3.2 Weight allocation

Considering that the influence degree of all general indexes to financial performance is different and all sub-indexes occupy different loads on general index evaluation, different weights are endowed to all general indexes and all sub-indexes to reflect its important degree. Because distribution of all index weights is not easy to be confirmed and has very strong subjectivity, to reach uniform quantitative criteria (Jin Yan, 2011), this paper endows all-level index weight by adopting centesimal system based on analyzing a lot of data and literatures and distribution condition and reason of weight are as follows.

In 5 general indexes, teaching performance and scientific research performance can better reflect actual teaching level of colleges, but teaching level influences indexes, such as graduation rate of graduating students, annual increase percentage of teaching funds investment and general income of financial appropriation, etc. Thereby, teaching performance and scientific research performance can directly or indirectly influence financial performance of colleges and influence on financial performance of colleges is more profound, so this Paper endows 20% weight of the two indexes. Asset performance reflects hard power of facility in colleges and level of facility equipment will influence teaching performance and scientific research performance to certain degree; therefore, 30% weight is endowed. Fund performance reflects income and expenditure condition of college funds and can better reflect operation ability of colleges compared with social benefit performance, therefore, 18% weight is

endowed to fund performance and 12% weight is endowed to social benefit.

Because correlation of sub-index under all general indexes is significant, this paper endows weight to all sub-indexes by adopting correlation judgment matrix (Wang Shihong, Su Qianqian, 2017). See Table 2-6 specifically.

Table 2   Sub-index Judgment Matrix of Scientific Research Performance

Index	A_{11}	A_{12}	A_{13}	A_{14}	A_{15}
A_{11}	1	0.5	0.33	0.25	2
A_{12}	2	1	0.25	0.2	1
A_{13}	3	4	1	0.5	2
A_{14}	4	5	2	1	3
A_{15}	0.5	1	0.5	0.33	1

Table 3   Sub-index Judgment Matrix of Capital Performance

Index	A_{21}	A_{22}	A_{23}	A_{24}	A_{25}
A_{21}	1	0.5	2	0.33	0.33
A_{22}	2	1	0.5	0.25	0.25
A_{23}	0.5	2	1	0.33	0.33
A_{24}	3	4	3	1	2
A_{25}	3	4	3	0.5	1

Table 4   Sub-index Judgment Matrix of Teaching Performance

Index	A_{31}	A_{32}	A_{33}
A_{31}	1	4	3
A_{32}	0.25	1	0.2
A_{33}	0.33	5	1

Table 5   Sub-index Judgment Matrix of Fund Performance

Index	A_{41}	A_{42}
A_{41}	1	5
A_{42}	0.2	1

Table 6   Sub-index Judgment Matrix of Social Benefit

Index	A_{51}	A_{52}	A_{53}
A_{51}	1	4	3
A_{52}	0.25	1	0.33
A_{53}	0.33	3	1

Value in relevant judgment matrix shows important degree of horizontal index compared with longitudinal indicators. Therefore, weight of all sub-indexes in general index and financial performance index evaluation can be calculated and calculation formula is:

Weight of certain sub-index in corresponding general index=∑Important degree of the sub-index on rest sub-indexes/∑Important degree of all sub-indexes on rest sub-indexes

Weight of certain sub-index on financial performance evaluation=Weight of the sub-index on corresponding general index × Weight of corresponding general index of the sub-index on financial performance index evaluation

Table 7   Weight Distribution Table of Financial Performance Evaluation Index System in Colleges and Universities

	General index	Weight	Sub-index	Weight of sub-index on general index	Weight of sub-index on financial performance evaluation	Ranking
Financial performance evaluation index system of colleges and universities	A_1	0.2	A_{11}	0.095	0.0190	12
			A_{12}	0.106	0.0212	10
			A_{13}	0.294	0.0588	8
			A_{14}	0.433	0.0866	4
			A_{15}	0.072	0.0144	13

Continual Table 7

	General index	Weight	Sub-index	Weight of sub-index on general index	Weight of sub-index on financial performance evaluation	Ranking
Financial performance evaluation index system of colleges and universities	A_2	0.2	A_{21}	0.099	0.0198	11
			A_{22}	0.095	0.0190	12
			A_{23}	0.099	0.0198	11
			A_{24}	0.377	0.0754	6
			A_{25}	0.330	0.0660	7
	A_3	0.3	A_{31}	0.548	0.1644	2
			A_{32}	0.035	0.0105	14
			A_{33}	0.417	0.1251	3
	A_4	0.18	A_{41}	0.962	0.1732	1
			A_{42}	0.038	0.0068	15
	A_5	0.12	A_{51}	0.642	0.0770	5
			A_{52}	0.053	0.0064	16
			A_{53}	0.305	0.0366	9

4 Results

As shown in Table 7, it can be known that proportion of financial appropriation on total income and weight of financial appropriation on financial performance evaluation has reached 17.32% and the weight ranks the first, which shows that the index is representative in evaluating financial performance of colleges and universities. However, weight of greening area per capita on financial performance evaluation is 0.64% and weight ranks the No.16 and weight in financial performance evaluation of colleges and universities is the minimal, which shows that persuasion of the index is not strong enough when evaluating financial performance of colleges and universities and shall not be used separately. Weights of graduation rate of graduating students and annual increase percentage of teaching funds investment on financial performance evaluation index system of colleges and universities are respectively 16.44% and 12.51%, ranking No.2 and No.3, which shows that contribution rate of the two indexes to construction of index system is relatively large and the two indexes are more persuasive on evaluating financial performance of colleges and universities compared with other indexes. Annual increase percentage of proportion of schoolfellow sponsor on total income and weight of annual student-faculty ratio are respectively 0.68% and 1.05%, which shows that evaluation influence of the two indexes on financial performance is very small compared with that of other indexes.

5 Conclusion

This paper has selected 5 general indexes of scientific research performance, asset performance, teaching performance, fund performance and social benefit performance and annual increase percentage of scientific research funds by taking 75 colleges and universities directly subordinate to the Ministry of Education as research objects. Mechanism diagram of casual relationship of financial performance of colleges and universities and all general indexes and sub-indexes is deduced by casual relationship and weight is endowed to general index and all sub-indexes by establishing percentage model and correlation judgment matrix and financial performance evaluation index system of colleges and universities is constructed finally. It is found out by research that contribution rate of proportion of financial appropriation of colleges and universities on total income is the maximal compared with the whole evaluation system and proportion of annual increase percentage of graduation rate and teaching funds of graduating students ranks the second when evaluating financial performance of colleges, which shows that the three indexes have very strong credibility when evaluating financial performance of colleges and universities. However, greening area per capita is the minimal compared with the whole evaluating system and accumulated weight contribution rate of the index with annual increase percentage of schoolfellow sponsor on total income and annual student-faculty ratio is only 2.37%, which shows that credibility of the three indexes in evaluating financial performance of colleges and universities is not strong and performance of colleges and universities can be evaluated by support of other indexes with larger weight.

In the existing research, the proportion of the income of the teaching activities in the total income

generally believes that the contribution rate of the financial performance index system is the largest, while the annual growth rate of the scientific research activities is the smallest. The reason for the difference between the conclusion of this paper and the general research conclusion lies in the view that the financial appropriation has the largest proportion in the sources of funds, and it can represent the performance of funds more, thus giving it a greater weight. And the performance of social benefit is also a part of financial performance. Therefore, this paper has added social efficiency performance to build a financial performance evaluation system on the basis of the existing research. Through the quantitative calculation, the proportion of per capita afforestation area in social benefit performance is the smallest in the whole system.

Therefore, this Paper puts forward the following suggestions for improving financial performance of colleges and universities. Make use of financial appropriation efficiently. The Ministry of Education and the Ministry of Finance adopt quoted special subsidy mode for financial appropriation of colleges of universities. No matter quoted subsidy or special subsidy, colleges and universities all implement in place and record income and expenditure condition per fund in details and apply financial appropriation to practical place. Improve graduation rate of graduating students. Graduation rate of graduating student is influenced by the number of graduating students accrued and the number of students who cannot graduate normally for various reasons; because the number of graduating students accrued in that year cannot be changed, improvement of graduation rate of graduating students can be implemented by reducing the number of students who cannot graduate on schedule for various reasons. Try to avoid graduation delay of students for objective factors by strengthening management to lessons and life of students. Increase investment of teaching funds phase by phase. Sufficient funds shall be invested to teaching, one of the most important businesses in colleges and universities to ensure health and continuous proceeding of teaching.

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The Analysis of Exports-led Growth Hypothesis under the Condition of Inwards Foreign Direct Investments in Rwanda

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Abstract: The export-led growth hypothesis is most likely to be an option of creating national competiveness of economies. This paper employs the Autoregressive Distributed Lag (ARDL-Bounds) and Granger causality to analyze time series over the period 1990-2016.   The ARDL results present the long run nexus between variables and granger causality only testifies one-way causation running from exports to economic growth which implies that exports act as initiator factor not as transit factor to economic growth as FDI doesn't neither granger cause exports nor economic growth. Based on findings, the export-led growth hypothesis is confirmed for the case of Rwanda. Making exports diversification and exports quality policies should be promoted as well as policies that induce FDI to go for imports substitutions or for exports production which will reduce the current large trade deficit otherwise the adopted wide openness policies can will not be rationally exploited.
Key words: Exports; Economic growth; FDI; Rwanda

1 Introduction

The importance of exports to spur economic growth has widely been a matter of researchers over time till today. Illuminating this linkage is valuable for developing countries in order to serve them in their development plans. Despite disagreements in research findings the positive linkage of exports-growth nexus got a good number of supports. Most of researchers, advocate that best exporting practices and trade openness induce economic growth through more specialization that sustains the comparative advantage, more innovative ideas, large market size and technological progress (J. Aboret al.,2008).A big number of researches employing both time –series or cross-sectional   data has been focused too much on exports -economic growth long- run nexus (Anne O. Krueger, 1978; Fosu, 1990; Jarreau & Poncet, 2012; Yee, 2016;   Fatemah & Qayyum, 2018). However, a significant number of researchers stated that ignoring the direction of causality in the relationship studies may mislead policies formulation and leads sometimes to adverse results.

To fill this gap of knowing ways of causation between exports and economic growth was vital in their works of (Ahmad & Kwan,1991;Szkorupová, 2014; Tekin, 2012; Foon,W., & Ozturk, 2015; Mahmoodi & Mahmoodi, 2016). Knowing where the causality runs from between exports and economic growth, successfully serves in crafting appropriates exports policies that incite the economic growth.

Although, numerous studies rigorously examined the long–run relationship and causality between exports, FDI and economic growth; the context of checking the effects of leading economic strategies that an economy is applying towards the economic growth was not much considered while it is important to policy makers to know how the economic strategies that they believe are engine of the growth are rewarding and influencing other factors of growth.

However, this work intends to verify the export-led growth hypothesis in the context of open economy where FDI is expected to play a vital role to empower the exports capacity and economic growth through availing finance, acquiring new technologies and know-how by less developing countries. It is essential to study how FDI affect the interactions between exports and economic growth in Rwanda as since 2000, Rwanda adopted open up economic policies Rwanda has adopted   open up in order to become more business friendly place. To achieve this goal, Rwanda became a member of different economic integration communities at regional and international level and has done various investment reforms in order to attract foreign direct investments such providing investment incentives to investors according to their sector of activity. As results of those reforms, the global competitiveness report 2015- 2016, ranked Rwanda the 3rd country of fast growing economy after Mauritius and South Africa and World Bank Doing business report ranked in 2016 as 2[nd]in Africa. Even if the Rwanda's economy recently reported a large trade deficit but the value of exports increased and kept the positive trend as per World Bank database 2016.

In addition to the contribution made by other researchers in this field, this paper aims to add to the literature in two aspects. First, to employ foreign direct investments (FDI) promotion policies context in

order to appraise and argue how much exports affect economic growth. Second, this work wishes to enlarge the realistic literature by presenting the existing and current status of variables as well as providing recommendations in order to assist policies formulation process in order to achieve the middle income level that Rwanda has planned to achieve by 2020.

2 The Theoretical Debate on Exports-Led Growth

There exists a huge amount of empirical evidences study the nexus between FDI and exports, exports and economic growth as well as the existence of linkage between the three variables in various contexts. At the country level, (Chaido. et al.; 2014) found a bidirectional linkage between exports and economic growth in Croatia; (Szkorupová, 2014) found the same results in Slovakia. At cross-country level, (Tekin, 2012) found that exports cause GDP in some least developed countries under study. Chia Yee Ee (2016) found exports-led growth hypothesis valid in Sub-Saharan African Countries. The export-led growth hypothesis is empirically witnessed by numerous studies in different scenarios but the emphasis on the source of exporting capacity was not extensively verified especially for less developing countries. This study seeks to check if exporting capacity that spurs growth is driven by FDI in country like Rwanda that has prioritized the trade and economic liberalization.

3 Data and Methodology

Normally less developed countries open up when they want to attract FDIs, so that they can gain either through imports substitution or sophisticated exports production due to learning from higher competencies that foreign companies have or simply local companies imitate new ideas from strong foreign companies. Advanced technologies from MNCs which will spur growth through job creation, increase of aggregate demand and it will correct the persistent trade deficit which has negative impact even on the value of domestic currency. In order to clearly figure out the contribution of this work, the research structure is designed in a way to check if the efforts made by Rwanda to attract foreign direct investments result into economic growth through empowering export capacity. It is useful to know whether there exist interactions between variables under the study and how they affect each other in order to assist the accurate economic growth policies formulation. To test the hypothesized study, the following hypotheses are arranged as follow:

H1: The economic growth resulted from empowered exports capacity by FDIs. In the literature researchers evidenced that FDI may affect economic growth through promoting exports (Baliamoune-Lutz, 2004; Zhang, K. H. (2006); Khan, 2007). It means that policies regarding exports promotion have to care about FDIs policies in Rwanda.

H2: Exports affect growth independently without sourcing from FDI. In this case the exports promote economic growth due to various exports promotion policies initiated by the country itself(Fatemah & Qayyum, 2018) It means that exports promotion policies and FDIs policies works independently to yields growth. Reference made on (Szkorupová, 2014), the model is specified as follow:

$$\text{Light} = \alpha 1 + \varphi \text{LEXPt} + \Psi \text{LFDIt} + \varepsilon t \qquad (1)$$

Where, (Y_t) proxies real gross domestic product per capita, (EX) stands for exports and (FDI) represents foreign direct investment net inflows serve as a conditional factor as the factor of the hypothesized study. The φ, Ψ are coefficients of independent variables, α= constant, L=logarithm ε = error term, study time series data expressed in millions of American dollar for 1990-2016 sources from World Bank database 2016.

3.1 Methodology

In order to verify the hypothesized study, the ARDL-Bounds and Granger causality methods are to be used.

3.1.1 Autoregressive Distributed Lag (ARDL-Bounds)

This article utilizes Autoregressive Distributed Lag (ARDL-Bounds) testing approach introduced by (Pesaran et al.,2001) as advantageous to analyze variables with mixtures of level of integration (I(0) or I (1) and it provides efficient and consistent test results in small and large sample sizes. The ARDL model is arranged as follow:

$$\Delta LYt = \alpha 1 + \sum_{i=1}^{p1} \beta 1i\Delta LYt\text{-}i + \sum_{j=0}^{q1} \varphi 1j\Delta LEX1t\text{-}j + \sum_{k=0}^{r1} \Psi 1k\Delta LFDI2t\text{-}k + \gamma 1LYt\text{-}1 + \gamma 2LEXt\text{-}1 + \gamma 3FDIt\text{-}1 + \varepsilon 1t \quad (2)$$

The long run among variables is tested by F-test where joint significance of the coefficients of

lagged variables is checked. The absence of long-run relationship between the variables is (Ho: ɤ1= ɤ2= ɤ3=0) while the existence of long run relationship among variables is proved by the rejection of Ho if F-value > upper bound, if F-value < lower bound the Ho is held which means the non-long run relationship among variables while F-value≥ lower bound and ≤ upper bound, then the decision is inconclusive. Once long run exists, the next step is the estimation of short run and long run relationships stated as follow:

$$\Delta LY_t = \alpha2 + \sum_{i=1}^{p2} \beta2i\Delta LYt\text{-}i + \sum_{j=0}^{q2} \phi2j\Delta LEXt\text{-}j + \sum_{k=0}^{r2} \Psi2k\Delta LFDIt\text{-}k + \omega ECTt\text{-}1 + \varepsilon2t \tag{3}$$

$$LYP_t = \alpha3 += \sum_{i=1}^{p3} \beta3iLYt + \sum_{j=0}^{q3} \phi3jLEXP_t\text{-}j + \sum_{k=0}^{r3} \Psi3kLFDIt\text{-}k + \varepsilon3t \tag{4}$$

Where Δthe difference operator, ω is the coefficient of error adjustment term that expresses how quick variables back to the equilibrium and it should be statistically significant of negative.

3.1.2 Causality Analysis

The vector error correction modeling of Granger (1987) is employed to verify the ways of causality. The error correction models are estimated based on residuals of long run model in Equation (4). Therefore, the VCE equations: 5, 6 and 7 are used to test the direction of causality among variables:

$$\Delta LY_t = \alpha4 + \sum_{i=1}^{p4} \beta4i\Delta_{LYt\text{-}i} + \sum_{j=0}^{q4} \phi4j \Delta LEXt\text{-}j + \sum_{k=0}^{r4} \Psi4k\Delta LFDIt\text{-}k + \varepsilon4t \tag{5}$$

$$\Delta LEXt = \alpha5 + \sum_{i=1}^{p5} \beta5i\Delta_{LYt\text{-}i} + \sum_{j=0}^{q5} \phi5j \Delta LEXt\text{-}j + \sum_{k=0}^{r5} \Psi5k\Delta LFDIt\text{-}k + \varepsilon5t \tag{6}$$

$$\Delta LFDIt = \alpha6 + \sum_{i=1}^{p6} \beta6i\Delta_{LYt\text{-}i} + \phi\Delta LEXt\text{-}j + \sum_{k=0}^{r6} \Psi6k\Delta LFDIt\text{-}k + \varepsilon6t \tag{7}$$

The error terms, ε_{4t}, ε_{5t}, ε_{6t} are autonomously and normally distributed with zero mean and constant variance. The null hypotheses rejection shows the meaningful impact of independent variables to the dependent variable.

4 Empirical Results
4.1 Unit root test for time series
The Augmented Dickey- Fuller (ADF) test helps to know the level of integration as a condition for using bound test.

Table 1　Results of Stationarity Test

Variable	At level	At First Difference	Conclusion of Stationarity
LY	- 3.74**	-	Integrated at level
LEX	-	-4.02***	Integrated at First Difference
LFDI	-	-8.72***	Integrated at First Difference

*, ** and *** indicates rejection of the null hypothesis of unit root at 10%, 5% and 1% significant level, respectively.

4.2 The analysis of ARDL bound test approach
The ARDL results prove long run relationship between real gross domestic product s and FDI. The calculated F-statistic of **7.00** is high than the upper bound critical value of 6.36; thus the no cointegration hypothesis is rejected even bellow at 1% level of significance.

Table 2　Results of ARDL Bound Test

Estimated equation	LY =f(LIEX,LFDI)	
Test Statistic	Value	k
F-statistic	7.002127	2
Critical Value Bounds		
Significance	Lower bound(I0)	Upper Bound (I1)
10%	3.17	4.14
5%	3.79	4.85
2.5%	4.41	5.52
1%	5.15	6.36

4.3 Cointagration results

Based on the ARDL cointegrating equation results, exports affect in long and short run the economic growth in Rwanda as well as FDI do. The outcome of this work supports. The disequilibrium will be annually adjusted at the rate of 45.5% per table 3.

Table 3   ARDL Results for Short Run and Long Run

Long run relationship among variables :$LY_t = 4.8752 + 0.1690LEX_t + 0.0834LFDI_t$				
Variable	Coefficient	Std. Error	t-Statistic	P-Values.
LEX_t	0.168976	0.079145	2.135022	0.0453
$LFDI_t$	0.083382	0.031333	2.661142	0.0150
	4.875152	0.396357	12.299895	0.0000
Short run relationship among variables				
CointEq(-1)	**-0.455578**	0.114171	-3.990321	0.0007
$D(LEX_t)$	0.076982	0.042833	1.797264	0.0874
$D(LFDI_t)$	0.056993	0.008560	6.658409	0.0000

4.4 Causality results

The occurrence of relationships by ARDL approach indicates that there must be one way or two ways Granger causality among proposed variables in equations (5), (6) and (7). The Granger causality findings are partially similar to results of (Mahmoodi, 2016). In this study, exports revealed unidirectional granger causality to economic growth that contradicts the hypothesized idea that Rwanda's exports are empowered by FDI in order to promote the economic growth comparatively results validated the hypothesis that exports independently affect economic growth as per findings of Zhang, K. H. (2006). The table 4 indicates results of Granger Causality among proposed variables.

Table 4   Results of Granger Causality Test

Null hypothesis	obs	F-Statistic	Prob.
LFDI does not Granger Cause LY	24	0.30715	0.7391
LY does not Granger Cause LFDI			
LEXP does not Granger Cause LY	**25**	**3.13640**	**0.0653**
LY does not Granger Cause LEXP		1.03779	0.3725
LEX does not Granger Cause LFDI	24	1.8917	0.1781
LFDI does not Granger Cause LEX		0.25540	0.7772

Note: ***, **, * are 1%, 5%and 10% significance levels, respectively

4.5 Results of diagnostic tests

To keep away from the miss-specification of the model, diagnostic tests for residuals and stability tests have been performed. The results of diagnostics tests revealed the following:(1) The strong stability and consistency of parameters for the model, as are rely on the plot of 5% critical bound by CUSUM proposed by Brown et al. (1975), (2) Absence of serial correlation up to the 2nd lag with F-statistics of 1.128822 and probability of 0.2483 greater than 10% level of significance. (3) The residuals were found normally distributed under Jarque-Bera normality test of 4.41 with probability of 0.119797 which is greater than 10%, (4) The Wald test confirmed that coefficients of independent variables jointly affect the dependent variable with F-statistic of 59.28and probability of 0.0000.

5 Conclusion

This paper intended to study the exports-growth hypothesis under condition of FDI in Rwanda for the sample period of 2000-2016. The ARDL bound test has confirmed the short and long run relationship between Economic growth, exports and FDI but granger causality test rejected that causation of exports to the economic Growth is not influenced by FDI. Making exports diversification and exports quality policies should be promoted as well as policies that induce FDI to go for imports substitutions or for exports production which will reduce the current large trade deficit otherwise the adopted wide openness policies will not be rationally exploited.

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Study on the Social Impact of Share Economy on Youth Groups Base on Three-dimensional Reshaping Model

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Abstract: With the developmentof the mobile Internet, the share economy becomes a new Internet form based on core elements of idleness, platforms, and people. Its development philosophy is highly compatible with young people. 'Share everything' has become a new way to participate in the Internet for young people. This article analyzes the social impacts of the share economy on youth groups from the three dimensions of resources, relationships, and emotions. It considers that the social interactions of young people have changed from atomization to intra-layer linkage in the process of share space and time, which provides new possibilities for the creation of the community. With the help of the Internet platform, the idleness resources in circulation has reallocated more efficiently, which has impacted the monopoly position of consumer society. At the same time, the youth's emotional model has undergone a sentiment change between expression and construction of feelings. This article proposes that the three-dimensional reshaping model of resources, relationships and emotions which has both positive values and some risks and predicaments for youth groups. It is necessary to promote the efficiency of resourceallocation, increase flexible employment and improve the color of social life to construct a new global and ecological economy.

Key words: Share economy; Resources; Relationships; Emotions; Reshape

1 Introduction

With the deep development of the information age, Internet economy is the most active field. In recent years, share economy has become a hot topic. At the same time, because the related concepts are highly compatible with young people, the share economy shows new vitality different from other economic forms and has broad prospects for development. The share economy is becoming more and more popular with the rise of the mobile Internet. It is a resource recycling mode with extensive social access by means of intermediary functionsof Internet platforms and through profitable or public benefit formsto increase the social utilization of idle resources or reduce the idle rate of potential resources. Formally, the share economy includes peer-to-peer market places, gift economy, commons-based peer production, solidarity economy/democratic wealth, collaborative consumption, P2P lending, crowdfunding, vehicle share and many other categories. There are four basic business paradigms: C2C (Customer to Customer), C2B (Customer to Business), B2B (Business to Business), and B2C (Business to Customer). They all have obvious Internet genes which emphasize that both supply and demand participate in direct transactions. It can be seen that the share economy covers a wide range based on internet technology, which everything can be shared whether it is food, clothing, shelter, or a spiritual world.

For the youth groups, because the share economyemphasizes on idle resources, share platforms, everyone's participation, varied participation forms and characteristics of multi-disciplinary novelties has strong affinity with their groups' characteristics. At the same time, compared with other groups, young people are the quickest ones to master mobile internet technologies. By using these tools, they see a world that is much larger than young people in any other era, which provides them with convenient conditions to enter the share economy. This article attempts to answer from a sociological perspective: What does the share economy mean for young people? What extent does it reshape their working lives and perceptions? How can young people promote the share economy into the future in the process of the subject's practice and participation experience?

2 The Social Impact of the Share Economy on Young People

From the perspective of the distribution of netizens in China, young people are indeed the main participants in the share economy. According to the 40th Statistical Report on Internet Development in China, as of June 2017, the number of Chinese netizens reached 751 million, and the number of mobile Internet users reached 724 million. The proportion of Internet users using mobile phones to access the Internet increased from 95.1% at the end of 2016. To 96.3%. Netizens are still dominated by 10 to

39-year-olds, accounting for 72.1% of the total. The proportion of netizens in the 20 to 29-year-old age group is the highest, which is 29.7%. According to China's Share Economic Development Report (2017), China's share economic market transactions in 2016 was approximately 345 billion yuan, the financing scale was approximately 171 billion yuan, more than 600 million people participated in economic activities and the number of service providers was approximately 60 million. (as shown in figure 1)
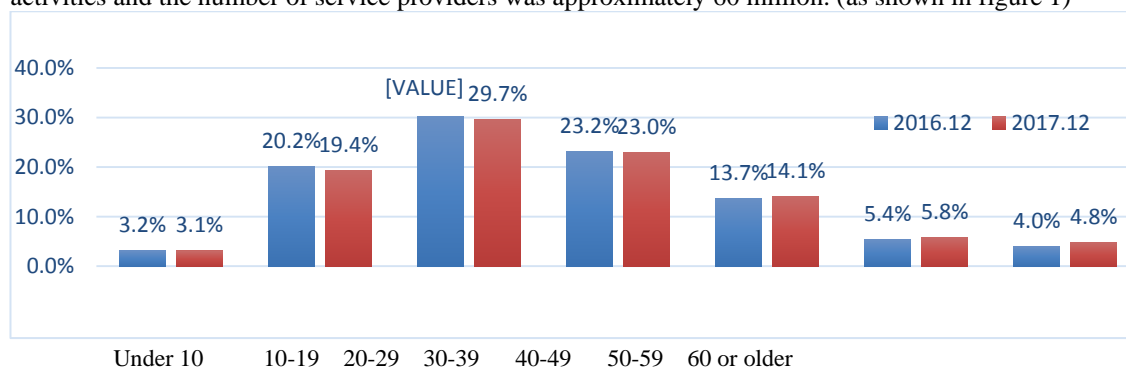

Figure 1   The age (years old)construction of Chinses netizen

Faced with such a large number of participator, there have been a growing number of share projects recently emerged in China, which are relatively mature ones, such as the sharing bicycles to provide convenient for city trips (such as OfO, Mobai) and sharing vehicles (such as Zipcar); the sharing house (such as Airbnb) that solves accommodation problems of domestic and overseas travel; and provides sharing knowledge and skills (such as Zhihu) for users with cognitive upgrade needs. Based on the reshaping of space and time in the mobile Internet, a livelihood of idle resources is achieved; but there also is only a traditional lease that is dressed in a share economic garment. The new network-share economy has refreshed the youth's online life. They have been attracted by rounds of share projects, and have participated and enjoyed them. More importantly, many entrepreneurs who share projects are also young people. They direct and plan many the share projects to share the traditional economic life.

Furthermore, the mobile Internet has played a shaping role in social interaction, social expression, collective action and social differentiation and has promoted social transformation in the Internet age. As part of the mobile Internet, the share economy has also played a unique role in reshaping society. For example, the share economy has brought about new changes in organizational models, competition order and patterns, new requirements for industry management and new property rights system. As young people are increasingly involved in the share economy, it has also increasingly reshaped young people. What is more important is that the share economy promotes resources flow processes, has also reshaped the relationship between people and opened up new emotional models, which have a far-reaching impact on the social life of young people.

3 Let the Resources Flow: Opposition to the Consumer Society for the Youth People

Judging from the concept of share economy, the recycling of idle resources is one of the most important points. It can integrate various types of scattered resources, accurately find diversified demands and realize optimal resource allocation methods that quickly match supply and demand. Botsman and Rogers directly equate the share economy with 'consumptive consumption' and believe that 'it has transcended the ideology between capitalism and socialism and found a common way of distributing social resources". Therefore, the essence of the share economy is to move resources through technology platforms. This sort of resource flow is the redistribution of idleness and clever resistance to waste. In Baudrillard's consumer society, people are in a position where consumption controls the entire life and the consumption 'substitutes all ideology alone, and at the same time carries the burden of overall social integration alone, just like the rank of the original society or what religious etiquettes do. Moreover, in the face of the growth and abundance of post-industrial society, it is practical significance to waste. People in the consumer age consume all things under the influence of mass media such as advertisements. With the deepening of the consumer society, this kind of resource usage patterns that emphasize individual and occupation also bring about excessive waste and environmental deterioration,

even meaning loss and community void. Thus, high consumerism that began in the 1950s has encountered reflection and resistance in the information age.

The resistance from the so-called "millennials" is particularly evident because Internet technologies such as big data and cloud computing provide them with basic conditions. Technology has greatly improved the matching range and efficiency between demand and supply of underutilized resources, which make possible to direct collaborative consumption between people. On the one hand, on account of the people after 85s' and 90s'of grow up in the era of excess abundance, they have not experienced material shortages and have not strong martial desire, which lead to that consuming everything is not particularly attractive to them. On the other hand, young people who witness environmental pollution by high consumption are gravely are deeply disturbed by the lack of community. Therefore, sharing everything can impress them higher. In fact, the share economy is prevalent in their main creation and personal participation.

From consume everything to share everything, the share economy relying on the Internet reshapes the youth consumer's world by resource flow. After making resources flow, it has indeed achieved the function of optimizing the allocation, reducing costs, improving efficiency and has contributed to the creation of a sustainable sharing era. However, it is not uncommon for resources to be wasted under the banner of the share economy. For example, the commercial war of share bicycles has forgotten the original intentions of saving and environmental protection. Unordered competition has led to the closure of most projects, the idleness created has been unreasonable and the concept of sharing and win-win has not yet fully penetrated the hearts of people.

4 Intra-layer Linkage: Reshaping Youth's Social Relationship

Kevin Kelly, the Silicon Valley prophet, thinks that technology has laid a foundation for the network economy, but only relationship can make it stand out. The relationship refers to the relationship that depends on technology. For this point, the share economy has a typical meaning how to achieve share in the process of resource circulation which depends on whether the relationship is stable and predictable to a large extent. It generally is believed that one of social consequence of share economic or collaborative consumption is to strengthen the community senses among community members which improve the unity and integration of the community. Botzman and Rogers think that the new rules of social networks have broken the original totalitarian rule and strict hierarchy and created a new society that is open, highly involved and fully free. In fact, this integration function is the common pursuit in the atomized society. Since the birth of the Internet, one of the reasons is that the respective types of online communication are different whether the Internet has been promoted the community through online connections or lack ties has made more alienated. As far as share economy is concerned, the so-called 'integration' of social relations for youth groups is expressed as an 'intra-layer linkage' including two aspects: one is that share economy has indeed increased people-to-people links with strong role of the weak ties; the other is that this reinforcement is more just happening within the stratum and the digital divide mechanism is still working with increasing trend.

Specifically, unlike Granovetter's 'the strength of weak ties', the integration role of share economy for young people is based on network technology which can still be to achieve a strong role in weak relations. As Kevin Kelly pointed out that the primary task of the network economy is to repair the symmetry of information to achieve the goal of requiring attention to the soft elements of reputation, privacy, loyalty and trust when creating relational technology. All share economic platforms are committed to providing information symmetry between supply and demand. The general share platform needs to conduct both parties' authentication (real name, real face, identity card information, etc.), provide fund guarantee platform and insurance service and open up the cumulative credit evaluation and so on. These means strengthen the share of trust between the two sides, develops the friendship brought about by the shared space and promotes the creation of a new small community. On the other hand, different youth groups have different levels of understanding and use of the share economy leading to infrequent exchange of relationships between classes, which limits the realization of the new society with openness, high participation and full freedom. The digital divide of young Internet users is evident which is reflected in the information use, online entertainment and communication and business transactions. It is significantly higher in urban areas than in rural areas, especially in the Internet literature, online shopping, and online payment, which leads to the gap between urban and rural areas is still increasing. This digital divide is not only manifested in the differences between urban and rural areas, but also the level of education, family status, and income levels affecting the achievement of relationships and differences of participation in

share economy. For example, in the field of knowledge share, different levels of youth participate in different types of knowledge share, which leads to a closer association of young people with the same cognitive level and it is impossible to meet for different levels of knowledge. In other words, differences in the degree of digitalization will lead to a greater digital divide and even social stratification and structural breakdown. The closer the internal strata are, the more obvious the gap between stratums becomes. Thus, the strengthening of intra-layer linkage may increase social differentiation.

5 Take Sharing as Feelings: Intertwining of Youth's Emotional Patterns

In the process of transferring of share economy, the mixed emotions are very obvious. The emotional phenomenon has undergone fierce changes in the period of social transformation, which intertwined with various forms such as happiness and deprivation, resentment and recognition, ecstasy and anxiety. Since young people are the most active, stand at the forefront of the times, grasping their emotional tone is catching the liveliest era pulse.

Judging from the individual level, young people practice the logic of emotional expression in the share economy. First of all, participating in the share economy for the youth is a kind of resistance to high consumerism since young people are willing to advertise greener and healthier slogans. The symphony of emotions in the three fields of work, communication and life embodies the combined effects of three kinds of emotional systems, including tricks, experiences and performances. In fact, the participation in share economy is the meeting point of the three main areas of work, communication and life for the youth. Second, the youth participating in share economy is a yearning for the community. Because different types of online behaviors may lead to different joining ways. The organic combination of the share economy (co-consume), online and offline, reflects a community trend. Sharing with others is a more respected value which reflects a yearning for the community and is a salvation in the individualized survival. Finally, the participation of youth in the share economy is a pursuit of deep emotions. Due to the speed and passion of the Internet, young people are emotionally caught up in the entertainment to death situation, but share economy is an exploration of deep emotions except shallow and thin. On the basis of the community's aspiration, young people have actively created a number of gatherings by share economy, when facial expressions, body movements, accents and intonations have all been untied from the line and entered face-to-face interactions. This is another attempt by the Internet to bridge virtual and reality to provide more possibilities for deeper emotions.

From the social perspective, share economy promotes the process of sentiment construction. The social media once promoted the 'consumption of everything' in the consumer society has shouted the slogan of 'share everything' with the help of the share economy. Because of changes in exchanges, experience, and power, social structures will more profound change under the influence of the Internet and form a brand-new network society. The online society and the consumer society are part of a post-industrial society with different emphasis. Under such circumstances, vocabulary such as green, environmental protection, equality, ease, fun, convenience, flexibility, trust and experience, etc. becomes the label for share economy which set the tone for share economy. These emotional elements are in line with the values of young people. Those who participate in share are constructed as people with feelings. In this way, share has become popular as a sentiment.

6 Share the Future: Reshaping the New Network Economy

As a new form of networking, the share economy that emphasizes idleness, platforms and everybody has brought about many changes in resources, relationships, and emotions to the social life of young people. The idleness in circulation has redistributed resources, changed the young people's life state of consumption of everything, which has become the main force against high consumerism. With the support of the Internet platform, the seamless link between online and offline brings together dispersed atomized individuals and creates conditions for the creation of communities. In the process of share everything, youth's emotional patterns have changed and they have transmitted the 'cool' cognitive style and 'love' attitude towards life. As a new social form, the online society has strengthened this feeling and constructed a feeling of share atmosphere in a more direct and powerful way.

However, it is not to say that the share economy has brought about pastoral and pastoral joys and with continuing chaos. The so-called idling is not idle, but the guise of saving energy is wasting. In other words, there are many people who are affixed with shared labels in the new network economy. They are mixed with leases, pseudo-needs or hot spots, which need to be carefully identified. The fact that a large number of share projects have closed down or have been suspended in recent years, so effective

supervision is particularly important. In addition, the social impact of share economy must also be thought-provoking, for example, new ideas for social integration due to social differentiation caused by intra-layer linkage; the road of sustainable development due to declining in share heat with the changes in social emotional trends and young people like novelty, and the share economy as a sport still has a long way to go. As a result, the three-dimensional reshaping of the youth by the share economy is both positive and negative (as shown in Figure 2). The former is a gift to young people's social life through the new network economy, while the latter is a possible side effect. It is necessary to manage in different ways.
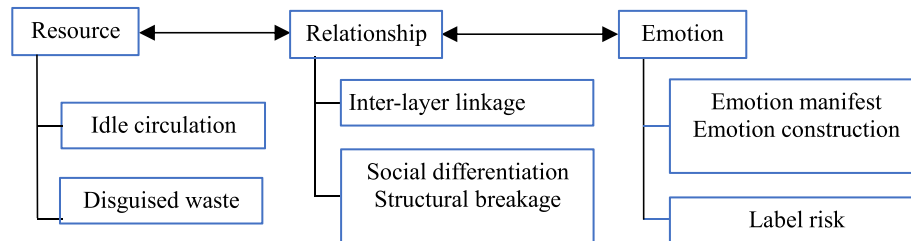
Figure 2   Three-dimensional reshaping model of Share Economy on Youth Groups

7 Conclusion

In general, the share economy is a new product of the information age and a new development brought about by technological progress., it is expected that the share economy will continue to maintain an average annual growth rate of around 40% in the next few years. By 2020, the share of the three-dimensional remodeling economy for youth groups will reach 10% or more of GDP. In 2025, the growth of share economy in GDP will climb to about 20%. Moreover, while the share economy is striving to resolve chaos and overcome the development difficulties, it will promote the efficient of resources allocation, increase flexible employment, increase color and social life, and promote the construction of new globalized and ecological economic form. Youth groups can play a huge role in this process who are not only active participants but also powerful creators. To share the future will be an important contribution to the information age for youth groups.

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Research on Hubei College Students' Identification of Excellent Chinese Traditional Culture Based on Factor Analysis

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Abstract: This paper analyzes the status quo of current Hubei college students' excellent traditional culture identity by questionnaire survey and factor analysis, then sums up four factors that identify the excellent Chinese traditional culture identification of Hubei university students: value identification, behavior identification, emotional identity and ideological identity. Through the analysis of these four factors, this paper infers: From the macro level, the current college students in Hubei Province have an intermediate level of recognition of the excellent Chinese traditional culture; from the micro level, there is a problem that current university students don't have a match between behavior and consciousness. Finally, through literature research and data analysis results, the authors found out the factors affecting the status quo of Hubei's college students' excellent traditional culture identity: First, the current status of social and cultural development; second, the collaborative education mechanism for outstanding traditional culture of college students is not perfect.
Key words: Excellent traditional culture; Sense of identity; Factor analysis; Influence factors

1 Introduction

　　Chinese fine traditional culture is the essence of the Chinese nation that has accumulated over thousands of years and has been built up. The contemporary college students' sense of identity in the excellent Chinese traditional culture plays an important role in advancing the development of socialist culture, making it prosperous, and enhancing national self-confidence.

　　Currently, the academic researches mainly focus on the definitions, categories and promoting strategies of the Chinese traditional cultural identification. In terms of the definitions of the advanced traditional culture, Taylor (Taylor, 1871) defines the culture or the civilization as a complex that contains all of the knowledge, belief, arts, morality, laws, customs and the capabilities and habits that people have had and accepted.Zhang Xinyue (Zhang Xinyue, 2017) considers that the Chinese traditional culture is the sum of the spiritual wealth, as well as the core and essence of Chinese traditional culture, which is created by the social and historical development in thousands of years.Related to the identification of the Chinese advanced traditional culture, Cai Zhiling (Cai Zhiling, 2013) thinks the identification as an emotional recognition and acceptance.Ding Daoqun and Jiang Shanshanbelieve that the identification is the positive perception and judgment, and the subjective emotional feeling which will not change over a long period time. Wang Xinqiang, Zeng Lihong, Zhang Dajun and Li Senthink the identification is to recognize and experience the Chinese advanced traditional culture.In terms of the categories of the Chinese advanced traditional cultural identification, Liu Xiaojie (Liu Xiaojie, 2016) considers that the psychological identification mechanisms contain mainly rational identification mechanism, emotional identification, belief identification mechanism and practice strengthening mechanism.As for the researches of the strategies to promote college students' advanced traditional cultural identification, Strong, LaToya (LaToya, 2016) thinks that the identification has a close connection with cultural activities in which college students take part.Wan Xiuyi (Wan Xiuyi, 2015) points out that we should take measures out of the college students' living environment and mental aspects to promote the their cultural identification.Wang Xiaoling (Wang Xiaoling, 2017)thinks that we should take advantage of the Internet such as the We chat, Micro-bloc and other websites to learn the Chinese advanced traditional culture in any time and any place.

　　In summary, academic research on the identification of excellent traditional Chinese culture mainly includes the following two aspects: in terms of research content, research on the identification of Chinese students with excellent traditional culture in China mainly focuses on the connotation, problems and strategies of identity. There is less measurement of the components of identity and evaluation of the status quo. In terms of methods, the relevant literature mainly adopts qualitative research methods, and lacks quantitative research methods such as questionnaire survey and factor analysis. Therefore, this paper adopts questionnaire survey and factor analysis methods to understand the current level of college students' overall recognition of traditional Chinese culture in the current stage. It also clarifies the

undergraduates' recognition of what content is low and causes. Finally, it proposes tactics to improve the outstanding students'recognition of traditional Chinese culture. The tactics of traditional cultural identity can achieve the purpose of improving the national identity and national identity of college students.

2 The methodologyof College Students' Identification of Excellent Chinese Traditional Culture in Hubei Province

2.1 Questionnaire design

This research combines the core values of socialism, the theory of cultural inheritance and integration, and the status quo and issues of domestic and international recognition of traditional Chinese culture .The research carries out the conceptualization of college students' excellent traditional cultural identity from six dimensions of cognitive, emotional, awareness, expectation, values, and behavioral identity，and conducts questionnaire design based on the six dimensions outlined. Finally, a total of 45 topics including basic information questions and multiple choice questions have been designed. The measurement type of the question which uses Likert scale form contains three, four, five grades.

2.2 Data collection and analysis methods

2.2.1 Data Collection

In this empirical research, Wuhan University, Hubei University, Wuhan University of Technology, Huazhong Agricultural University, Hubei University of Economics, and Wuhan Maritime Vocational and Technical College were selected to conduct a questionnaire survey. 340 questionnaires were distributed and 322 questionnaires were collected. Finally, the effective rate of the questionnaire was 93.6%. Among them, Wuhan University of Technology collected 57 questionnaires, Wuhan Maritime Vocational College collected 69 copies, Wuhan University collected 56 copies, and Huazhong Agricultural University and Hubei Economics College collected 80 and 60 copies respectively. In the sample data, all levels of education are involved, with sophomores accounting for 37.27%, freshmen, juniors, seniors, graduates and above accounting for 19.25%, 10.25%, 9.01%, and 24.22%, respectively.

2.2.2 Analysis Methods

Through the reliability and validity test of the questionnaire, the reliability and validity of the questionnaire are relatively high. The survey data is more suitable for factor analysis. The specific test conditions for data validity and reliability are as follows:

(1) Analysis of validity of college students' excellent traditional culture identity in Hubei Province.

The validity of the questionnaire refers to the degree of coincidence between the measurement result and the investigation content. The more consistent the measurement result with the investigation content is, the higher the validity is. Conversely, the lower the validity is. Before the validity analysis, this article first excludes topics that represent categorical variables, such as basic information questions and multiple choice questions. The remaining 26 topics are put into the SPSS for analysis, and appropriate sampling (KMO) and Bartlett sphere test to test the validity of sample data to test whether the results of this survey are suitable for factor analysis. KMO is the Kaiser-Meyer-Olkin sampling suitability measure (its value is between 0 and 1). If the KMO value is less than 0.5, factor analysis should not be performed. As shown in the following table, the KMO value of the questionnaire was 0.787, and the Bartlett test's significance probability (Sig.) was 0.000, less than 0.001, indicating that the survey data is of high validity.

(2) Analysis on the reliability of the research on the identification of excellent traditional culture among college students in Hubei Province.

After the validity analysis is completed, it is necessary to continue the reliability test at all levels of the questionnaire and the total table. Reliability refers to the stability and consistency of the results measured by the test or the scale tools. The greater the reliability of the scale, the smaller the standard error of measurement is. The most commonly used reliability test method in the Likert scale method is Cronbach's Alpha coefficient. Therefore, this research uses Cronbach's Alpha coefficient to test the reliability of the questionnaire. For the entire scale, Cronbach's Alpha is greater than 0.7 and the result is acceptable. After excluding divergence questions such as basic information and multiple choice questions, the Cronbach's Alpha coefficient of the questionnaire was 0.778, indicating that the overall reliability of the scale was high.

3 Empirical Research on the Status Quo of the Advanced Traditional Cultural Recognition

3.1 The research variables of the status quo of the outstanding traditional chinese culture

3.1.1 Descriptive Statistics of Research Variables

The research variables in this paper include 46 variables such as demographic variables, meanings and types of excellent traditional culture, and ways of dissemination, as shown in Table 1. For variables of the Likert scale type, the higher the value is, the more positive the respondent's attitude towards the subject's response to the question is. From the table, we can see that there is no extreme value in the statistical results, and the questionnaire can be analyzed in the next step.

Table 1　Questionnaire Variable

Variable	N	Min	Max	Mean	Variable	N	Min	max	Mean
V1 grade	322	1	5	2.82	V13-1 pathway :learning in the classroom	322	0	1	0.74
V2 Professional	320	1	3	1.74	V13-2 pathway : Internet and TV	322	0	1	0.75
V3 political outlook	322	1	4	1.83	V13-3 pathway :Newspaper or Books	322	0	1	0.62
V4 excellent traditional cultural meaning	320	1	3	2.70	V13-4 Pathway: Promotion Campaign	322	0	3	0.47
					……				
V12-2Mohist	300	1	5	3.55	V25 practice	319	0	1	0.79
V12-3Legalists	297	1	5	3.47					

3.1.2 Factor Extraction of Research Variables

In order to facilitate factor analysis, this research will exclude basic information, multiple-choice questions, and non-five-level evaluation questions before factor analysis, and finally includes the remaining 14 topics for analysis. In the course of the research, the validity and reliability of the subject were tested again. The test results showed that the remaining 14 subjects had their KMO score improved to 0.812, and the score of Cronbach's Alpha was increased to 0.804, which is suitable for factor analysis.

In this research, we used the principal component analysis method to extract common factors. After running the SPSS software, we extracted 4 common factors from 14 variables after the factor rotation. The explanation rate of these 4 common factors to 14 variables has reached 64.092%, and it can already explain most meaning of the 14 variables. In the rotation component matrix, the larger the factor load, the closer the relationship between the variable and the common factor. According to this principle, we can see from Table 3 that the variables of V12-1Legalist, V12-2Mohist, V12 -3Taoist, and V12-4 Confucianism have a higher load on Factor 1, and this research classifies this variable as Factor 1. The V9-1 Water Margin, V9-2 Romance of the Three Kingdoms and V9-3 Journey to the West have higher load on Factor 2, which is classified as Factor 2 in this research. The V8 Book of Songs, V8 Records, V8 Lao Tzu and V9-4 Dream of the Red Chamber have higher load on factor 3, which is classified as factor 3 in this research. the level of preference for poetry and painting, the willingness to participate in traditional festivals, and the love of Peking opera have higher load on factor 4, so we will sum it to factor 4. According to the characteristics and commonalities of the measured variables, this article names Factor 1, Factor 2, Factor 3, and Factor 4: values of identity, behavioral identity, emotional identity, and awareness of identity. The value of identity indicates the degree of coherence between ideals and beliefs conveyed by college students and excellent traditional culture. Behavioral identity indicates that college students consciously learn and practice Chinese excellent traditional culture, and take correct actions on the concepts and ideas reflected in traditional Chinese culture. Emotional identity represents a unique sense of pride and belonging that university students maintain about the excellent Chinese traditional culture. Awareness of identity expresses the university students' love of Chinese excellent traditional culture from the subconscious level and their willingness to accept and have a strong will to implement the ideas and concepts conveyed by traditional culture.

Table 2　Variance Contribution Rate

	Total variance explained								
Ingredients	Initial feature value			Extract square and load			Rotation squared and loaded		
	total	V.C.R.(%)	T.V.C.R.(%)	total	V.C.R (%)	T.V.C.R. (%)	total	V.C.R. (%)	T.V.C.R. (%)
1	4.454	31.812	31.812	4.454	31.812	31.812	2.721	19.435	19.435
2	2.062	14.727	46.539	2.062	14.727	46.539	2.466	17.615	37.050
3	1.405	10.034	56.573	1.405	10.034	56.573	2.127	15.193	52.243

Continual Table 2

Ingredients	Initial feature value			Extract square and load			Rotation squared and loaded		
	total	V.C.R.(%)	T.V.C.R.(%)	total	V.C.R (%)	T.V.C.R. (%)	total	V.C.R. (%)	T.V.C.R. (%)
4	1.053	7.520	64.092	1.053	7.520	64.092	1.659	11.850	64.092
5	.865	6.182	70.274						
6	.718	5.128	75.402						

<div align="center">Total variance explained</div>

……

Extraction method: Principal component analysis.

Note: The variance contribution rate is called V.C.R. for short, the total variance contribution rate is called T.V.C.R. for short.

<div align="center">Table 3   Rotating Component Matrix</div>

Rotating Component Matrix				
	Ingredients			
	1	2	3	4
V12-1 Legalist	.823	.079	.001	.075
V12-2 Mohist	.810	.071	.120	.004
V12-3 Taoism	.685	-.006	.236	.049
V12-4 Confucianism	.595	.110	.302	.183
V9-1 Water Margin	.103	.892	.054	.044
V9-2 Three Kingdoms	.176	.849	.077	.053
V9-3 Journey to the West	-.012	.760	.077	.010
V8-1 Book of Songs	.133	.063	.859	.115
V8-2 history	.410	.044	.690	.125
V8-3 Laozi	.497	.134	.598	.175
V9-4 Dream of the Red Chamber	-.029	.500	.522	.025
V10 the level of preference for poetry and painting	.128	.134	.146	.818
V6 the willingness to participate in traditional festivals	-.023	-.129	.001	.798
V11 the love of Peking opera?	.268	.202	.293	.497

3.2 College students in Hubei province have a modest level of recognition of Chinese excellent traditional culture

This research will use the calculation formula to grasp the overall status of the traditional culture of college students in Hubei Province. According to the four public factors extracted from this paper, the variance contribution rate has reached 64.092%, and it can already explain most of the information of the original variable. Therefore, the variance contribution rate can be used as the weight of the comprehensive evaluation. According to the variance contribution rate of the four factors, each factor is weighted and added. Its comprehensive evaluation formula is:

$$F=31.812\%*F1+14.727\%*F2+10.034\%*F3+7.520\%*F4 \tag{1}$$

According to the evaluation formula, the statistical results of the final score are shown in the figure below. The frequency distribution histogram roughly shows the characteristics of normal distribution. From this, we can infer that the majority of college students in Hubei province have a modest level of recognition of Chinese excellent traditional culture.

3.3 A mismatch between the behavior and consciousness of college students on the identification

Through the previous data analysis, the research extracted four common factors including value identification, behavioral identification, emotional identification, and ideological identification. According to the rotation scoring matrix, we obtained the formula for calculating the score of each factor as follows (F1, F2, F3 and F4 denote values, identity, emotion, and awareness, respectively):

$$F1=0.823*V12\text{-}1 +0.810*V12\text{-}2+\cdots0.268*V11 \tag{2}$$

$$F2=0.079*V12\text{-}1 +0.071*V12\text{-}2+\cdots0.202*V11 \tag{3}$$

$$F3=0.001*V12\text{-}1+0.810*V12\text{-}2+\cdots0.293*V11 \tag{4}$$

$$F4=0.075*V12\text{-}1+0.004*V12\text{-}2+\cdots0.497*V11 \tag{5}$$

As can be seen from the following table (Table 4), in the four public factors extracted in this paper, from the average of factor scores, the behavioral identity factor has the highest score, the emotional identity factor score has the second highest score, and the value identification and consciousness recognition factor have the lowest score. It can be seen that there is a certain degree of mismatch between the behaviors and consciousness of college students in Hubei Province on the identification of excellent Chinese traditional culture.

Table 4   Factor Ranking

Factor score descriptive statistics					
factor	N	Min	Max	Average	Average ranking
Value recognition	286	-4.02473094	2.63873942	-0.0000001399	3
Behavioral identity	286	-1.90035692	3.09178050	-0.0000003147	1
Emotional identity	286	-4.65879099	2.11578896	-0.0000002098	2
Awareness of identity	286	-3.02062888	1.73948203	-0.0000001049	4
Effective N	286				

4 Influencing Factors on the Status Quo of College Students' Recognition

4.1 The factor of current social and cultural development status

As China has moved from a traditional agricultural society to a new industrial society, the cultural landscape has undergone tremendous changes. In traditional agricultural societies, our country's economic shape is a self-sufficient small-scale peasant economy. As a result, cultural exchanges and collisions cannot be as intense and frequent as the new industrial society. In addition, people gradually realized that in order to be in an undefeated position in the competition of modern society, we must strengthen our country's cultural development and carry out cultural competition. Therefore, Western countries use their own economic and market advantages to infiltrate China's culture. For university students, they are in the period of shaping and forming the "three views," lacking a certain ability to discriminate and being vulnerable to foreign consciousness. [10] In addition, due to the profound Chinese traditional culture, traditional ideas and traditional literature and art are obscure to college students, resulting in the lack of learning and understanding of Chinese traditional culture. Therefore, to a certain extent, it has led to the recognition of excellent traditional Chinese culture in terms of emotion, values, and consciousness. However, under the influence of the public opinion environment, society requires college students to love our country's traditional culture and regulate their own behaviors. Undergraduates follow the trend, which shows that they have a higher recognition of Chinese traditional culture. Eventually this led to the problem of mismatched behavior and consciousness among college students in Hubei Province in terms of excellent traditional cultural identity.

4.2 The cooperative education mechanism of excellent traditional culture of undergraduates is not perfect

The shaping of college students' excellent traditional cultural identity is a systematic project. Specifically, the shaping of college students' excellent traditional cultural identity should start from the whole and establish a collaborative education mechanism for society, schools, families and individuals. [11] In reality, this mechanism has not been established, which can be shown as the following aspects: First of all, some unfavorable factors in the social environment have created resistance to the promotion of excellent traditional cultural identity of college students. In general, China's social environment is good, but there are still some undesirable phenomena, such as the bad culture of the network, the Sino-Kazakhstan culture, etc. Secondly, the Ministry of Education perfects the excellent traditional culture of college students. On the one hand, many universities set relatively few excellent Chinese traditional culture courses. Even if related courses are set, they take the form of elective courses, which greatly reduces the effectiveness of traditional culture education. [12] On the other hand, many courses offered in universities are not comprehensive in terms of content. Most of them are introduced to traditional thoughts, traditional literature and art, and traditional architecture. Students lack a comprehensive understanding of Chinese traditional culture; once again, at the family level, although many families give their children enough material support, they neglect the growth of their children's spirit. Due to the different styles of the family, the shaping of the children's recognition of the excellent Chinese traditional culture is not the same; finally, for the current college students, most of them belong to the 90's, and their individuality, self-centeredness, and ability to accept new things are strong. However, due to the diversity of its own environment and the instability of its own values, there are differences in the identification of excellent Chinese traditional culture.

5 Conclusion

According to Empirical study, we find out the status quo of outstanding traditional cultural identity among Hubei college students: one is that universitystudents in Hubei province have a medium-level recognition of Chinese excellent traditional culture; the other is that there is a certain degree of mismatch between the behaviors and consciousness of Hubei collegestudents'recognition of Chinese excellent traditional culture. Then, based on the results of empirical research and literature research, the authors find out the influencing factors of the status quo of Hubei University students' recognition of Chinese excellent traditional culture: First, the current social and cultural development, and second, the coordinated education mechanism of excellent traditional culture of college students is not perfect.

According to the current situation and influencing factors of Hubei University students' recognition of Chinese excellent traditional culture, there are following threesuggestions that may promote college students' cultural identification: first, to create a social environment suitable for the dissemination of excellent traditional culture, especially to pay attention to campus cultural environment，and handle well the relationship between ethnic culture and foreign culture, excellent culture and dross culture. It fundamentally enhances the recognition of Chinese students for their excellent traditional culture and actively accepts and learns the excellent traditional Chinese culture.The second is to guide college students to consciously practice the Chinese traditional culture and promote its internalization. First of all, from the individual college students, it is necessary to guide the students to establish a conscious cultural aesthetic taste and rational spirit. Secondly, from the peer group of college students, it is necessary to play a role model demonstration role among the peer group of college students, and actively guide the peers of the university to consciously integrate into the social and cultural life.[13] The third is to establish a collaborative education mechanism for society, schools, families and individualsto realize the healthy mutualcomplementarity among education in social, schools, families and individuals and to form social synergies.[14] Specifically, for the society, it is mainly to create a fair, equitable and harmonious social environment. For the school, it is mainly to actively promote the excellent traditional Chinese culture education for undergraduates, strengthen the construction of grassroots facilities, focus on improving the faculty, and rationally set the course content. For the family, it is mainly to create a harmonious and happy family environment. For college students themselves, it is mainly to consciously strive to improve their cultural accomplishment.

Acknowledgement

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Tax Reform and Earnings Management: A Study on Listed Firms in China

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Abstract: Using the natural experiment of "Business Tax-to-VAT Pilot Program" announced on November 16, 2011 and the variations in the implementation of the reform across different regions and industries, this paper explores the impact of the macro-level tax system on firm's tax avoidance and earnings management. Our empirical findings suggest that firms which enjoyed reduction in turnover tax tended to use accruals to reduce the taxable profit, while the impact on actual earnings management is uncertain. On the other hand, firms which suffered from increased turnover tax payments did not show significant changes in the behavior of earnings management. This paper provides empirical evidence for the reaction of private sector in response to a change in the taxation system.

Key words: Tax reform; Turnover taxes; Real earnings management; Accrued earnings management

1 Introduction

In this paper we focus on how the value-added tax reform has influenced earnings management of listed firms in China. The two main ways of earnings management, accrued earnings management and actual earnings management differ greatly in the ways of manipulation, manipulation risks and economic consequences. Poirier studies have focused on earnings management from the perspective of corporate governance and tax planning. However, few literatures focused on the impact of the tax reform on earnings management, especially on the choice of earnings management.

To replace the sales tax with a value-added tax is a part of the fiscal reform in China, also an important step of structural tax reductions. VAT differs from sales tax by using output tax minus input tax to eliminate duplicated taxation on fixed cost. The VAT reform can be separated to three stages: first in Shanghai in the beginning of 2012; then in 8 provinces (Beijing, Jiangsu, Anhui, Guangdong, Fujian, Tianjin, Zhejiang and Hubei) in the fourth quarter of 2012; finally expanded nationwide in 2013. Pilot sectors including transport industry, modern service sectors and radio, film and television industries also expanded gradually.

Thus, the VAT reform provided a new motivation for companies to manage their earnings: reducing turnover tax burden. Companies would manipulate their earnings to avoid tax, especially in the beginning of the reform. A company would adopt the best way of earnings management to achieve the goal of tax planning. Therefore, we further explore how companies with different turnover tax burden choose their way of earnings management.

In this paper we choose the listed companies of the real estate, construction and transportation industries as the primary samples. 250 listed companies are selected for empirical analysis after further screening. We use the revised Jones (Jones, 1991) model and Roychowdhury (Roychowdhury, 2006) model to quantify accrued earnings management and actual earnings management. Then we use them as dependent variables to analyze the impact of VAT reform on ways of earnings manipulation, controlling size of the company, ROA, asset-liability ratio and so on. We show that: firstly, levels of earnings management have improved significantly in the exact year of VAT reform; secondly, companies with different changes in turnover tax burden chose different earnings management methods to carry out tax planning, thus reducing overall tax burdens.

2 Hypotheses

2.1 Literature

Previous studies thatfocused on the impact of the VAT reform on earnings management are quite limited. Tax planning of small businesses could both increase profits and help the government achieve macro-regulation targets; see CarolineandPaul (Caroline, Paul, 2001). Expanding the procurement of raw materials and investment of fixed assets are new ways for earnings management for firms after the VAT reform; see Jiao Hu and Hui Peng (Jiao Hu, Hui Peng, 2016). A firm with more completed chain of VAT deduction adopts higher level of earnings management; see Zhen Yang (Zhen Yang, 2015). Firms could reduce turnover tax burden by appropriate tax planning at the beginning of the VAT reform; see

Lianhua Jin et al. (Lianhua Jin et al., 2017). Firms in transportation industry used actual transactions to reduce turnover tax burden after the VAT reform; see Lingxun Meng (Lingxun Meng, 2015).

2.2 Theoretical analysis

The VAT reform directly affects firms' operating incomes for sales tax is included in price while VAT is not. On the other hand operating costs can be influenced since outsourced labor cost and material cost can be deducted. Firms that enjoyed reduction in turnover tax payment could adopt actual earnings management such as constructing real trading activities to avoid tax. However this would directly affect their normal operating activities and increase operating risks; see Zengfu Li et al. (Zengfu Li et al., 2012). Adopting actual earnings management to reduce turnover tax payment couldsimultaneously increase operating risks; management of a firm should make a trade-off between the revenue and the cost of actual earnings management. Thus we make our fist hypothesis that:

H1: Behavior of actual earnings management is uncertain for firms that enjoyed reduction in turnover tax in the exact year of the VAT reform.

In the exact year of the VAT reform, firms mightadopt negative earnings management to manipulate accrued item, either by postponing the confirmation of receivables or advancing the counting of costs to gain time value of money.From the perspective of the cost of risks, accrued earnings management would not attract too much attention of regulators, reducing audit risks; see Cohen et al. (Cohen et al., 2005). Also, the increasing cost of actual earnings management leads to more accrued earnings management; see Qihui Gong et al. (Qihui Gong et al., 2015). Firms that enjoyed reduction in turnover tax have strong motivations to implement tax planning by accrued earnings management. Thus we make our second hypothesis that:

H2: Firms that enjoyed reduction in turnover tax tend to defer earnings in accrued items for tax avoidance in the exact year of the VAT reform.

Firms that suffered from increased turnover tax payments might have difficulties getting special invoices to deduct input tax, or they might experience a longer cycle to renew their fixed assets. Thus such firms' could have insignificant actual earnings management. As for accrued earnings management, compared with accrued earnings management, it can be reversal; see Mikko (2005). Firms have to consider the cost and revenue at present and in the future before adopting accrued earnings management. However, firms that suffered from increased turnover tax payments have various expectations of future tax burden, making different decisions on accrued earnings management. Therefore, firms of this kind would not adopt significant earnings management on the whole. The third hypothesis follows that:

H3: Firms that suffered increased turnover tax payments did not show significant changes in the behavior of both actual and accrued earnings managementin the exact year of the VAT reform.

3 Empirical Analysis and Results

3.1 Data

We choose the listed companies of the real estate, construction and transportation industries as the primary samples to study on their behavior of earnings management from the year before the VAT reform to the exact year of the reform. Then we screen out ST firms and firms with missing data and winsorize data at 1% level. Among the 250 selected firms, 117 are from real estate industry, 69 are from construction industry and 64 are from transportation industry (data source: CSMAR).Since turnover tax burden cannot be precisely calculated based on cash flow, we use Yue Cao and Jing Li's (Yue Cao, Jing Li, 2016) method, which is based on accrual basis to calculate turnover tax burden. 145 firms in the sample enjoyed reduction in turnover tax while the other 105 experienced increased turnover tax burden.

3.2Model

We use the revised Jones (Jones, 1991) model to quantify accrued earnings management as follows.

$$DA_t = TA_t/A_{t-1} - NDA_t \tag{1}$$

DA_trepresentsthe absolute level of accrued earnings management in year t;

TA_trepresents total accruals in year t, equaling $NI_t - CFO_t$ (net operating cash flow);

NDA_trepresentsaccruals that are not discretionary in year t, adjusted by total asset in year t-1:

$$NDA_t = \hat{b}_0\left(\frac{1}{A_{t-1}}\right) + \hat{b}_1\left(\frac{\Delta REV_t - \Delta REC_t}{A_{t-1}}\right) + \hat{b}_2\left(\frac{PPE_t}{A_{t-1}}\right) \tag{2}$$

ΔREV_trepresents the difference between revenue in year t and t-1;

ΔREC_trepresents the difference between accruals in year t and t-1;

PPE_trepresents the original value of fixed assets at the end of year t;

$\hat{b}_0$、$\hat{b}_1$ and $\hat{b}_2$are industry characteristic parameters, achieved by the following regression:

$$\frac{TA_t}{A_{t-1}} = b_0 \left(\frac{1}{A_{t-1}}\right) + b_1 \left(\frac{\Delta REV_t}{A_{t-1}}\right) + b_2 \left(\frac{PPE_t}{A_{t-1}}\right) + \varepsilon_t \tag{3}$$

According to Roychowdhury (2006) model, we use abnormal production cost, abnormal operating cash flow and abnormal discretionary expenditure to quantify actual earnings management, calculated as follows.

$$\frac{PROD_t}{A_{t-1}} = \alpha_1 \left(\frac{1}{A_{t-1}}\right) + \alpha_2 \left(\frac{REV_t}{A_{t-1}}\right) + \alpha_3 \left(\frac{\Delta REV_t}{A_{t-1}}\right) + \alpha_4 \left(\frac{\Delta REV_{t-1}}{A_{t-1}}\right) + \varepsilon_t \tag{4}$$

$$\frac{CFO_t}{A_{t-1}} = \beta_1 \left(\frac{1}{A_{t-1}}\right) + \beta_2 \left(\frac{REV_t}{A_{t-1}}\right) + \beta_3 \left(\frac{\Delta REV_t}{A_{t-1}}\right) + \varepsilon_t \tag{5}$$

$$\frac{DISEXP_t}{A_{t-1}} = \gamma_1 \left(\frac{1}{A_{t-1}}\right) + \gamma_2 \left(\frac{REV_t}{A_{t-1}}\right) + \varepsilon_t \tag{6}$$

According to Cohen and Zarowin (2010), the level of actual earnings management is positively related to abnormal production cost and negatively related to abnormal operating cash flow and abnormal discretionary expenditure. Thus we use $RM_t = AbPROD_t - AbCFO_t - AbDISEXP_t$ to represent the level of actual earnings management of a firm.

DA and RM are dependent variables. The independent variable, Reform is a dummy variable which equals 1 in the exact year of the VAT reform and equals 0 in the year before. The exogeneity of the VAT reform helps to solve the endogeneity problem of variables. As is mentioned above, the purpose of the VAT reform is to avoid double taxation, making the tax system and the model of tax collection and management more reasonable and more convenient. Control variables include SIZE (the natural logarithm of total assets at the end of the year), ROA (net return divided by total assets), H_5 (sum of squares of the top 5 shareholders' proportion of shares), LEV (total liabilities divided by total assets at the end of the year) and Big4 (dummy variable, equals 1 if audited by the big four accountancy firms and equals 0 if not).

To test the three hypotheses mentioned above, we construct the model as follows:

$$DA = \beta_0 + \beta_1 \textbf{Reform} + \beta_2 RM + \beta_3 SIZE + \beta_4 ROA + \beta_5 H_5 + \beta_6 LEV + \beta_7 Big4 \tag{7}$$
$$RM = \beta_0 + \beta_1 \textbf{Reform} + \beta_2 DA + \beta_3 SIZE + \beta_4 ROA + \beta_5 H_5 + \beta_6 LEV + \beta_7 Big4 \tag{8}$$

We divide the sample into two groups, one with increased turnover tax burden and the other with decreased turnover tax burden. Then we run the regressions separately to study on how changes in turnover tax burden influence earnings management.

3.3 Results

Table 1 reports summary statistics for the two dependent variables. It shows that most firms that enjoyed reduction in turnover tax squeezed profits by accrued earnings management and had roughly equal level of positive and negative actual earnings management. Firms that experienced increased turnover tax burden used negative accrued earnings management and used actual earnings management to squeeze profits. The means and medians of control variables are about the same, suggesting that their distributions are stable.

Table 1   Summary Statistics

Moving direction		Decreased tax burden (N=145)			Increased tax burden (N=105)		
Variable	Year	Mean	Median	Std.Dev	Mean	Median	Std.Dev
DA	he previous year	0.035	0.000	0.227	0.003	0.015	0.348
	the exact year	-0.036	-0.024	0.216	-0.041	-0.026	0.283
RM	the previous year	0.025	-0.015	0.355	-0.038	-0.021	0.437
	the exact year	0.000	-0.010	0.521	-0.009	-0.005	0.364

We perform t-test on the means of DA and RM to see whether firms with different changes on tax burden have different ways of earnings management in the year of the VAT reform. As is shown in table 2, only the difference in the mean of DA of firms that enjoyed reduction in turnover tax passed t-test. Thus the three hypotheses mentioned above are preliminarily verified.

Table 2   Difference Test

variable	Year Changes in tax burden	the previous year Mean	Median	the exact year Mean	Median	Difference Test Difference in mean	t value
DA	Decreased	0.035	0.000	-0.036	-0.024	-0.071***	-2.72
	Increased	0.003	0.015	-0.041	-0.026	-0.044	-0.15
RM	Decreased	0.025	-0.015	0.000	-0.010	-0.025	-0.32
	Increased	-0.038	-0.021	-0.009	-0.005	0.029	0.30

T-values are in the parentheses; *, ** and *** indicate statistical significance at 10% level, 5% level and 1% level, respectively.

According to model (3.7) and model (3.8), we perform multiple linear regressions to further test H1, H2 and H3. As is shown in table 3, the coefficient of Reform is significant only in the model (3.7) for firms enjoyed decreased tax burden. This again validates the three hypotheses. Compared with firms experienced increased tax burden, firms enjoyed decreased tax burden might have greater confidence in the management of VAT invoices, obtaining enough invoices to deduct input taxation. So they have stronger motivation to adopt accrued earnings management to further lessen turnover tax burden. Although actual earnings management could bring short-term tax deductions, it would adversely affect a firm's operating cash flow in the long run. Thus the reform had obscure influence on actual earnings management of both two kinds of firms.

Table 3   Results of Multiple Linear Regression

Changes in tax burden	DA Decreased	Increased	RM Decreased	Increased
Reform	-0.0597**	-0.0607	0.0297	0.0558
	(-2.92)	(-1.41)	(0.75)	(1.00)
DA			1.084***	0.468*
			(3.46)	(2.03)
RM	0.272**	0.303		
	(3.07)	(1.88)		

T-values are in the parentheses; *, ** and *** indicate statistical significance at 10% level, 5% level and 1% level, respectively.

As for coefficients of control variables, their signs are reasonable; however, most of them are not statistically significant. This might be caused by the limited scale of sample. At last, this paper conducted robustness test on the research results by replacing RM by $AbPROD_t$, $AbCFO_t$ and $AbDISEXP_t$ in model (4.8). The results are still consistent with the hypotheses, as is shown is table 4. Signs and significant levels of the coefficient of Reform are consistent with the three hypotheses.

Table 4   Robustness Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Model (3.7)		Model (3.8)					
	DA		AbPROD		AbCFO		AbDISEXP	
Changes in tax burden	Decreased	Increased	Decreased	Increased	Decreased	Increased	Decreased	Increased
Reform	-0.0510**	-0.0652	0.00651	-0.0107	-0.0366***	-0.0649***	-0.0000515	-0.00413
	(-2.90)	(-1.51)	(0.19)	(-0.18)	(-3.91)	(-4.21)	(-0.02)	(-0.74)
RM	0.268**	0.305						
	(3.06)	(1.88)						
DA			0.550***	-0.469	-0.905***	-0.859***	-0.0137	-0.0837***
			(3.44)	(-1.73)	(-21.68)	(-16.18)	(-1.35)	(-3.99)

T-values are in the parentheses; *, ** and *** indicate statistical significance at 10% level, 5% level and 1% level, respectively.

5 Conclusion

In this paper we study on how tax reform influenced earnings management under the background of the VAT reform in China. We show that firms that enjoyed reduction in turnover tax tended to use accruals to reduce the taxable profit, while the impact on actual earnings management is uncertain. On

the other hand, firms that suffered increased turnover tax payments did not show significant changes in the behavior of earnings management. On the one hand, firms can lessen turnover tax burden by appropriate earnings management after the VAT reform. On the other hand, the government should improve the intensity of collection and regulation. Also, outside investor should interpret the performance disclosure of a firm reasonably.

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Innovation Strategy of Intelligent Tourism Construction System of Sichuan Province in the Internet Era[*]

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Abstract: With the rapid development and application of China's Internet, especially the mobile Internet, it has had a profound and revolutionary impact on the tourism industry. In the face of the huge changes in the structure, content and form of demand in the consumer market, Sichuan provincial tourism authorities insist on implementing innovation driven strategy, taking the purpose of serving tourists as the basis, focusing on key projects, taking data integration and application promotion as the core, constantly consolidating the construction of infrastructure and information resources, and vigorously promoting tourism intelligence management and intelligence services, actively innovating the network marketing and public information services, thus have built a systematic thinking framework for the intelligent tourism construction system, and achieved remarkable results in practice.
Keywords: Internet; Smart tourism; Innovation driven; Practice in sichuan

1 Introduction

In 2014, the State Council issued A Number of Comments on Promoting the Reform and Development of Tourism Industry [National Issue [2014] No. 31], which made it clear that we should "formulate tourism information standards, speed up the construction of intelligent scenic spots, intelligent tourism enterprises, and improve the tourism information service system." In 2015, the general office of the State Council issued a number of comments on further promoting investment and consumption of tourism industry [State Office Issue [2015] 62], and again emphasized the active development of "Internet + tourism", pointing out that by 2020, the national 4A level scenic spots and intelligent rural tourism pilot spots will have been fully covered with free Wi-Fi, intelligent tour guide and electronic interpretation, online booking, information push and other functions, and 10,000 intelligent scenic spots and intelligent tourist villages will have been built throughout the country. It fully shows that the state strongly advocates and promotes the basic orientation of developing smart tourism throughout the country. At the same time, the Internet, especially the mobile Internet, has not only promoted the new tourism industry, but also significantly changed the consumption behavior of tourists, and pushed China into the era of self-assistance travel consumption. With the rapid change of the objective environment, how could the tourism industry apply information information and develop smartly has become the key to the tourism administration departments at all levels to meet the realistic challenges, and to promote the transformation and upgrading of the tourism industry from the traditional service industry to the modern service industry.

2 A Transformational Impact of the Internet on Tourism

On the basis of real-time, globalization, interaction, multimedia and other characteristics of the Internet, the mobile Internet, which is more portable, real-time, accurate, **personalized** has promoted profound changes in the behavior of three closely related subjects of tourists, tourism enterprises and government tourism authorities.

2.1 The influence of Internet on tourists' demand behavior

In the traditional era, tourists get information and share the travel experience and other needs, mainly by the traditional media, such as newspapers, books, radio, television, film, and other forms of conversation, letters and telephone with relatives and friends. With less information channels, limited information and **narrow information transmission**, tourists usually make purchase decision of tourism products depending mainly on the tourism products provided by various travel agencies and are often misled by the "induced product information" promoted by the suppliers. The asymmetry and the one-way transmission of the information often result in a lot of uncertainty, or even full of pitfalls and risks when tourists make the purchase decision. Not enough attention is paid to the tourists' personal

needs, thus it is difficult for them to obtain a satisfactory travel experience. In the Internet Age, especially with the mobility of mobile terminal and its application functions such as shooting pictures, sound recording, text input and geographical positioning, the Internet becomes completely "vivid", and the most subversive change is that tourists themselves become the makers and publishers of tourism information, which has not only greatly enriched and manufactured the tourism information, but also gradually promoted tourists to form the habit to get information online, customize personalized tourism products and share travel experience gradually.(Huang Ping, Su Qian, Ren Yun et al.2014)

According to the statistics report issued by the China Internet Network Information Center (abbreviated as CNNIC), by December 2017, the scale of Chinese netizens has reached 772 million and the Internet popularity rate is 55.8%, 4.1 percentage points more than the average global level and 9.1 percentage points over the average Asian level. Among them, the number of mobile phone users reached 753 million, and 97.5% of the netizens got on line through the mobile phones, and the mobile internet users in China outnumbered any other countries worldwide.[1] By June 2013, 133 million Chinese netizens had booked flight tickets, hotels, train tickets and holiday products on the Internet, accounting for 22.4% of the total number of Internet users, of which mobile subscribers accounted for 39.8%. [2] However, by December 2017, the number of Chinese Internet users booking travels on online had increased to 376 million, 243 million more, about 2.8 times of the number in June 2013. The number of mobile subscribers increased to 340 million, accounting for 91.9%, 50% more than the number in 2013.[3] In addition, in 2014, nearly 90% of Chinese tourists got information through Internet media, and 84% of the Chinese tourists used the social media, who spent as much time in sharing their travel experience as in travelin itself and their demand for internet in traveling is rising.[4]

The popularity of the Internet, the rapid development of electronic commerce and mobile APP have created huge space and freedom for the tourists to choose their own tourism products, promoted a large number of self-help tours and self-driving tours to a certain extent, and pushed China step into the era of self-help travel quickly. Under the influence of increasingly fragmented, personalized and experiential changes in the demand of tourists, the content of their demand has also expanded from the traditional offline six elements of "food, lodging, transport, traveling, phurchase, and amusement" to the "6+N" demand elements of online and offline interaction, including the "before trip" consultation, virtual experience, online travel booking and so on, tourism products purchase instant travel experience sharing "during the trip" , and sharing the journey or complaints "after the trip" etc. (Fig. 1).
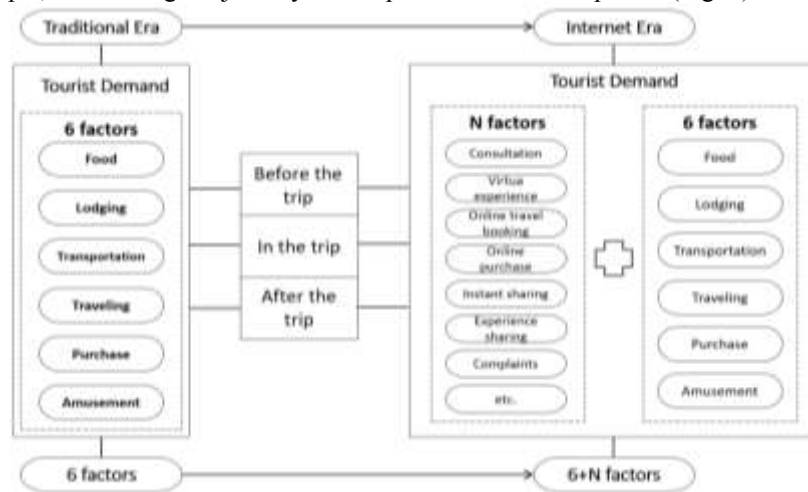
Figure 1 The "6+N" Transformation of Tourism Demand in the Internet Era

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2.2 The influence of Internet on the business behavior of tourism enterprises

In the traditional tourism era, the requirements of tourists are mainly completed by group tour organized by the travel agency. In the business model of the travel agency as the leading business model, the tourism enterprises focus on the stable cooperative relationship between "one to one", and the lack of two-way or multi direction communication mechanism between the upstream and downstream enterprises in the horizontal interest chain and the relevance. Although it is very strong, but the flexibility is insufficient, it is difficult for enterprises to skip over a value node with other enterprises to keep the contact and adjustment, the efficiency of tourism operation is low, and the mutual restriction is strong. Once the problem occurs in an important link in the interest chain, the business operation of the whole interest chain is easily lost to the total paralysis.(Hao Kang Li, Liu Jianyao,2014) Therefore, traditional tourism enterprises generally have such problems as single business, small scale, weak ability to resist risks and small competitive strength.

However, in the Internet age, traditional tourism enterprises, such as tourist attractions and hotels, can realize their own operation and management information, including enterprise resource management (ERP), customer relationship management (CRM) and so on. It can also use the Internet to combine entity services with virtual services, move from offline to online, and carry out e-commerce, so that the consumers can face tourism products and services directly without the participation of any travel agencies or other intermediary agencies. Therefore, it not only improves the relative single, formula, and homogenization of the products and services in the traditional tourism era, but also realizes the diversified cooperation mechanism of "one to many", "multi to many" and "multi to one", thus the traditional travel agency start to offer online services, realizing the transformation and upgrading of the traditional format. At the same time, there appear a large number of online tourism e-business enterprises based on Internet search, information integration and professional services, as well as new concept enterprises engaged in the network technology environment of tourism APP software development, thus the original combination mode of tourism industry has been radically changed and a group of online travel new giants are rapidly rising. For example, the comprehensive tourism enterprise represented by Ctrip and LY.COM, the professional tourism enterprise represented by Tuniu, the tourism social media represented by "Mafengwo"， the tourism group-buying e-business enterprise represented by Lvmama and Nuomi, have thrived in the e-commerce industry throughout China in recent years. As these brands compete fiercely, they gradually possess a strong development strength. According to the information issued by the China Tourism Research Institute, the number and ranking of the 2011-2017 years' list of the "China Top Twenty Tourism Group" have increased and upgraded (Table 1).

Table 1   The Online Travel Enterprises in the Top 20 Ranking of China Tourism Group in 2011-2017

Online enterprise name	2011	2012	2013	2014	2015	2016	2017
Ctrip Tourism Group	2	2	2	1	1	1	1
Qunar (Beijing Quna Software Technology Co., Ltd.)	20	10	7	4	2	—	—
LV.COM Network Technology Co., Ltd.	—	15	13	9	8	5	6
Joyu International Tourism Operation Group	—	16	17	18	18	12	10

Source: sorted information according to the Chinese Academy of Tourism, see http://www.ctaweb.org/html/. Ctrip merged and acquired Qunar in 2016

In the Internet era, the online tourism market released huge demand. According to the data published by ARI, the volume of China's online tourism market reached 220.46 billion yuan in 2013, increasing by 29% from 172.97 billion yuan in 2012, far exceeding the growth rate of 9% in traditional tourism industry. Among them, the online travel (OTA) market revenue grew from 9.4 billion yuan in 2012 to 11.76 billion yuan in 2013, and increased by 26.2% compared with 2012. China's online tourism market increased rapidly, mainly due to the increase of the subdivision markets in deferent degrees including air ticket, hotel, tourist holiday and so on. In specific, based on its highly developed booing system, the online booking of the flight tickets continues to permeate the traditional ticket booking at a faster rate; the hotel online reservation rate is low, but with the expansion of the online business of the core OTA and chain hotels, the market recognition of the prepaid products, such as the hotel group purchase, the hotel online reservation is fast growing; traveling on holidays, with the developing heat of the perimeter tour, outbound travel and the rise of destination marketing, traveling on holidays has become the fastest growing subdivision market. See ERI Consulting: China's online travel market trade

reaches 172. 97 million in 2013. [1]

In 2017, the trading scale of China's online tourism market reached 738 billion yuan, and China's online travel (OTA) market traded at 40 billion yuan, with its growth 4.26 times more than the number in 2012. If we say it is a transformational opportunity for the traditional tourism enterprise to step into the internet, then the mobile and wireless network services will become the second opportunity for the tourism enterprises to change, and the existing market pattern will also be subverted in the transition. Since 2013, online tourism enterprises have begun to snatch the mobile market share in succession. In addition to Ctrip and Yilong who carried out the mobile travel strategy, the Alibaba also upgraded "Taobao Travel" to a brand new independent tourism brand in October 2014, and put forward wireless, service, innovation and platform as four strategies, focusing on consumer demand for holiday travel. In 2016, when Ctrip bought and merged Qunar, Ali's travel "Go" also changed into "Flying pig", which set the market target in the independent travel of young people, opened a new round of competition, and fully demonstrated the huge business opportunities of Mobile Tourism in the Internet age. For tourism enterprises, the transformation and development trend has been determined whether they provide entity services or information services; whether they choose the operation mode of B2B, C2C, or B2C, O2O, the nature of providing services for the tourists will not change, and the only they will have to make is how to provide tourists with more satisfying service.

2.3 The impact of Internet on the management and service behavior of government tourism sector

As a national administrative organization, the government tourism sector not only plays an important role as an administrator and a coordinator in people' s social, economic and cultural life, but also shoulders a large number of management and service functions of tourism public affairs. The efficiency, interactivity and integration of the Internet provide unprecedented conditions and conveniences for the scientific, efficient and forward-looking management of the government. It has promoted the information construction of the government departments of tourism in China and constructed the new system of "e-government" based on the e-government affairs including the government to the government (G2G), the government to business (G2B), and the government to consumer (G2C).(Hao Kang Li, Pei Hongyi, 2012)

In the traditional tourism era, the management and service of government are top-down hierarchies with its information asymmetry, not timely and opaque, which reduces the scientificity and rationality of decision-making, and leads to low administrative efficiency. In the Internet age, the diversified tourism e-government platform, which is open to the public, is not only an important bridge and link between the governments, tourism enterprises and tourists at all levels, but also makes the management and service function of the government travel department close to the needs of the users, and promote the transparency and public management of the government. In order to improve the government's management level and efficiency, improve the government's competitive strength and scientific foresight, the government can play a decisive role in promoting the market's allocation of tourism resources, ensuring the healthy and sustainable development of tourism industry under the market rules and industry rules has a significant impact. Especially in the ways of management and service innovation, the Internet provides a great practical space for the government tourism department by establishing the tourism operation monitoring platform, the security emergency command management platform, the outdoor emergency rescue platform, the global customer oriented tourism information platform, the various new media platforms and the like. It will form an effective "push-pull" force in emergency management, image building, marketing communication and tourist services.

3 Innovative Thinking of Sichuan Intelligent Tourism Construction System under Internet Thinking

The transformation of tourism has become the development theme of the Internet age. In 2014, the state clearly pointed out that we should build "setting up a scientific tourism concept", "innovative development concept", "accelerating the transformation of development mode", and clearly pointed out the direction of China's government departments to take action and embrace change for the next period of time. Of course, in the Internet era, we must adapt to the "Internet thinking" and actively explore the intelligence development of tourism.

3.1 How to understand internet thinking

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[1] http://ec.iresearch.cn/reservation/20130128/192196.shtml. 2013-01-28.

Internet thinking is the topic that the media and industry have talked about at present, but people hold different opinions on what Internet thinking is. As we know, "Internet thinking" consists four aspects: innovation, user, win-win and reconstruction. Among them, innovation is the driving force, users are the core, win-win situation is the premise, and reconstruction is the most important foundation. The foothold of "innovation" lies in the "new" with its essence breakthrough, which means to breakthrough the old thinking set and the old conventional precepts, in order to make all the reasonable new ideas, new ideas and new activities possible. "User" means user-centered, understanding users' needs, guiding users' needs, and meeting users' needs. "Win-win" means equality and opening, breaking the competition between industry and related industries in the traditional tourism era, and turning to the healthy development mechanism of cooperation and win-win. "Reconfiguration" mainly includes the reconstruction of the business format, the product, the organization, the management and so on. Through reconfiguration, better conditions and opportunities have been provided for the innovation of tourism industry, tourism products and tourism service mode, to make it possible that all the innovative ideas of traveling meet the needs of the users based on the Internet thinking, thus truly promote the transformation and upgrading of tourism industry and leap-forward development. (Hao Kang Li, Pei Hongyi, 2013)

3.2 Intelligent tourism construction system

Although there is no unified understanding of the concept of Intelligent Tourism in the domestic tourism industry and academia, the construction of intelligent tourism has begun under the leadership of the government and has become a great success. (Zhang Lingyun, 2013) In July 2011, the State Tourism Administration proposed that China would spend ten years or so to realize the "Intelligent Tourism" based on information technology to make the business activities of tourism enterprises fully information-based, and to develop the tourism industry into a modern service industry with high information content and intensive knowledge. Then, in the China Tourism "12th Five-Year" Development Planning Information Special Plan", the State Tourism Bureau has identified 18 cities including Beijing and Chengdu as the first batch of national intelligent tourist cities, and the Qingchengshan Dujiangyan scenic area, the Mount Emei scenic area, and other 22 scenic areas are designated as the pilot of the national intelligent tourist attractions. In 2014, the national tourism theme year was determined to be "the year of China's intellegent tourism". Many cities focus on the theme of Intelligent Tourism, actively developing which intelligent tourism cities, intelligent tourist attractions, intelligent hotels, intelligent catering, intelligent transportation, intelligent travel routes and other types of intelligent tourism.

However, if it is not clear what the subject and content of the intelligent tourism construction system is, the promotion of the construction practice of Intelligent Tourism in various places is likely to take a roundabout course and cause unnecessary waste of construction. We believe that intelligent tourism is not the same as tourism informationization and the intelligent tourism can realize only when the tourism informationization serves tourists as the core or when intelligent tourism is regarded as the advanced stage of tourism informationization. It is mainly embodied in two aspects of technology and application. On the technical level, with the help of information technology and network platform, Intelligent Tourism realizes the integration, coordination, optimization and promotion of tourism informationization service in the whole process of tourism, the whole time and space, the whole media and all related interest groups. It eliminates the information asymmetry and incomplete phenomenon of tourism supply and demand, and truly achieves the goal that the information service is transparent and open, co-constructive and sharing, real-time interactive and highly efficient. From the application level, intelligent tourism has three application objectives: first, it aims to provide more convenient and intelligent tourist information service and tourism experience for all kinds of tourists; second, it aims to provide a more efficient and intelligent information management platform for industry management; third, it aims to promote the integration, developmen and utilization of the tourism resources, and to create new products and tourism destination service system of high quality and high satisfaction.

It can be seen that the construction of intelligent tourism is not only the responsibility of the government, but also the target of the main tourism market and the pursuit of tourists. Therefore, the main body of intelligent tourism construction system contains government management departments, tourism enterprises and tourists, among which the government mainly offers tourism public management and public service, tourism enterprises mainly provide professional business services while tourists share the experience of intelligent tourism and participate in the provision of tourism information. (Zhang Lingyun, 2012)The three main bodies are indispensable, influencial and promotive to one another. Meanwhile, under the intelligent tourism construction system with its core serving the tourists

and around the construction target, no matter what type of intelligent tourism construction is promoted in various places, all the three major functions should be met, that is, intelligent tourism management, intelligent tourism service, intelligent tourism marketing, and three major guarantees should be provided, that is, policies and regulations, Standards and specifications, and talent training.
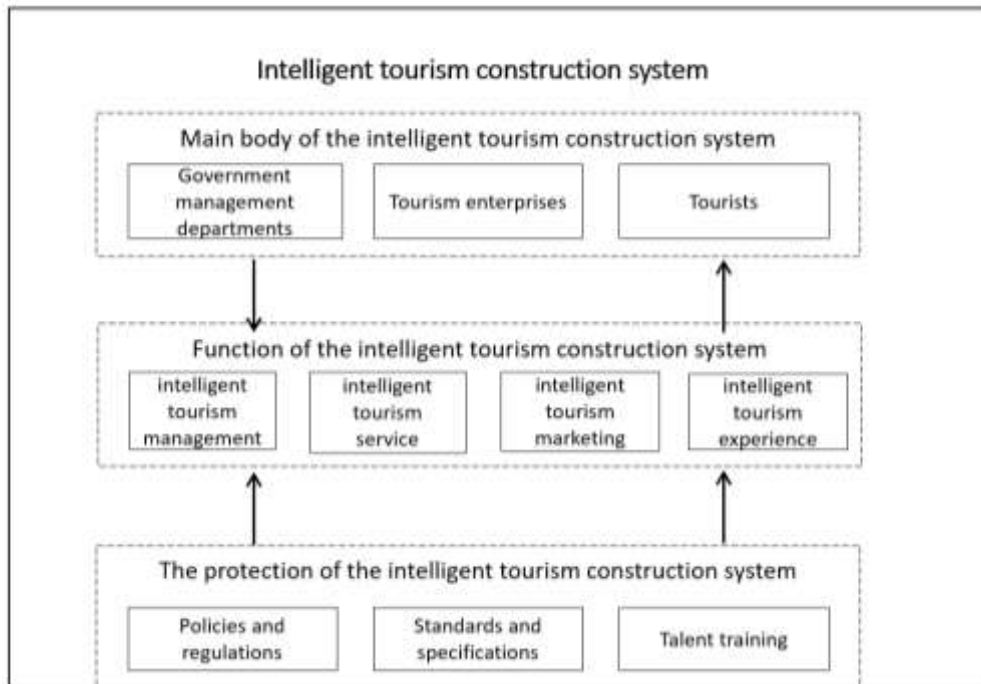
Figure 2   Intelligent Tourism Construction System

3.3 Innovative mode of intelligent tourism construction system in Sichuan

Sichuan province is located in the western region of China, but in recent years, it has attached great importance to the changing influence of the Internet on the tourism industry, actively complied with the changes of the times, made full use of the new generation of information technology, sped up the innovation of the intelligent tourism construction mode, and played a positive role in promoting the tourism industry to a new level in the whole province. In 2013, Sichuan's total tourism revenue in the country was ranked directly from ninth in 2012 to seventh, and in 2016, the total tourism revenue rose from seventh to fifth throughout China, and has always been the first in the western region. In order to accelerate the development of Sichuan from a province with rich tourism resources to a province with strong tourism economy, the Sichuan Tourism Development Committee (former name Sichuan Tourism Bureau) is closely related to the goal of "promoting the leap of strong tourism economy and building a world-known tourist destination" put forward by provincial Party committee and provincial government. In accordance with the "overall planning, improving the mechanism, government guidance, market leading, overall construction, and strengthening the service, giving full play to the boosting role of intelligent tourism in the transformation and upgrading of the tourism industry, taking information as the main way, comprehensively promoting the development level of modern tourism service industry and accelerating the construction of the world tourism destination"(Sichuan Provincial Tourism Bureau,2012), the committe has established the innovation mode of intelligent tourism construction system which is "taking planning and standard construction as the guide, improving the work mechanism as the basis, focusing on key projects, taking data integration and application promotion as the core, taking first trial and demonstration promotion as a breakthrough. (Figure 3).

Figure 3   Innovation Mode of Sichuan Intelligent Tourism Construction System
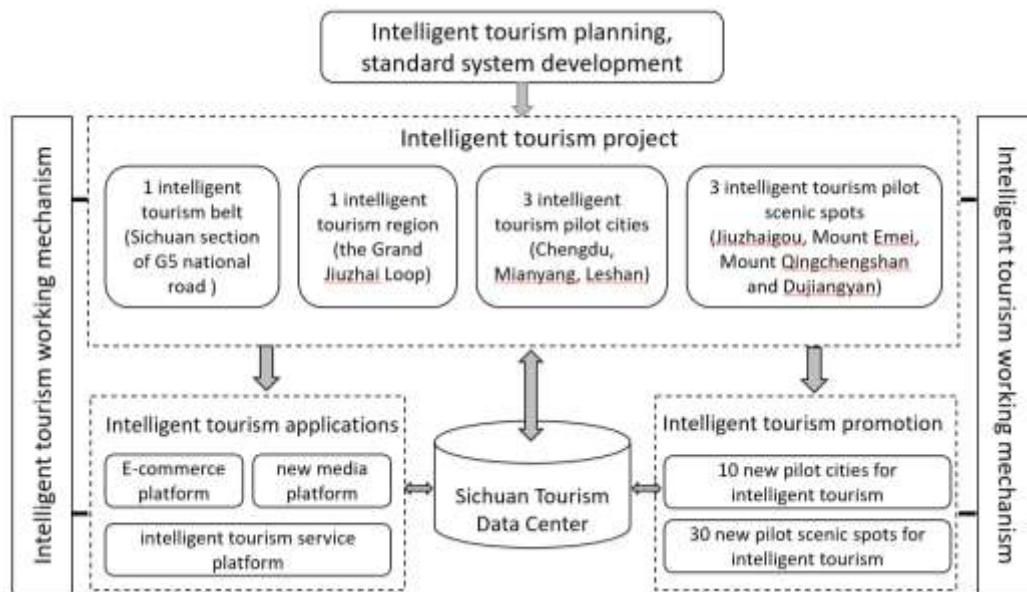
The mode includes the following main aspects:

1) Intelligent tourism planning and standard system construction. In order to promote the construction and promote the quality by standard, we should not only compile the development planning of the Sichuan tourism informationization, but also make a breakthrough in the key areas, compile a series of regional intelligent tourism construction plans, establish the standards of all kinds of intelligent tourism construction at all levels, and build a standard system of intelligent tourism.

2) Establish and improve the intelligent tourism working system mechanism. We should construct the intelligent tourism construction system of three levels in the province, the city (state), the county (city and the district), and actively unite the relevant departments, integrate the tourism enterprises, and realize the intelligent tourism construction working mechanism through vertical and horizontal links.

3) Promote the construction of key projects of intelligent tourism. The key projects include the construction of 1 Sichuan tourism data center, 1 intelligent tourist belt (G5 National Road Sichuan tourist belt) demonstration project, 1 Intelligent Tourism Areas (the grand Jiuzhai Loop line intelligence tourism area), 1 tourism operation supervision and safety emergency management linkage command platform.

4) Intelligent tourism application service. We should adhere to the service of tourists as the core, constantly improve the breadth and depth of application of tourism informationization in management, service and marketing, and demonstrate the ability of innovation and development of intelligent tourism at the application level.

5) Demonstrate and promote intelligent tourism. Pilot work of intelligent tourism has be done on 13 cities and 33 pilot scenic spots as a demonstration, and the construction of intelligent tourism in the whole province has been widely applied.

4 Practice and Exploration of the Intelligent Tourism Construction in Sichuan Province

4.1 Clear positioning, overall planning, establishing standards, quality first, and comprehensively speeding up the construction of intelligent tourism

In 2012, Sichuan Province compiled the Sichuan Province "12th Five-Year" Tourism Informationization Development Program (2012-2015) according to the National "12th Five-Year" Tourism Informationization Development Plan and Sichuan Province "12th Five-Year" Tourism Development Program". The overall goal of the Sichuan province "12th Five-Year" tourism informationization construction based on the Outline of the Development Program is "providing e-administration for the functional management departments, providing informationization management and e-business marketing for tourism enterprises and providing intelligent tourism services for tourists".

It has made clear the main task of "building a center, three clusters, five flatforms and a demonstration project" [1] , completed The Overall Plan of the G5 (108) National Road (Sichuan section) and the Grand Jiuzhai Loop, and started the Overall Planning of the 318 National Road Intelligent Tourism Belt (Sichuan Provincial Tourism Bureau, 2014) . Meanwhile, in view of the safety emergency of peak time tourist attractions in peak season, the Standard of Tourist Attractions in Peak Time Period (A++ standard) has been supplemented, the Construction Standard of Sichuan Intelligent Tourism City and the Construction Standard of Sichuan Intelligent Tourist Attractions have been compiled. In addition, some cities of Sichuan like Chengdu, Mianyang, Leshan, Guang'an, etc. have formulated the overall planning of the local intelligent tourism construction, and a batch of 4A and 5A scenic spots such as Jiuzhaigou, Mount Emei, Mount Qingchengshan and Dujiangyan have formulated the planning and implementation plan of the intelligent scenic areas. Through the overall planning and the guidance of standards, Sichuan province has accelerated the construction of intelligent tourism.

4.2 Linkage between upper and lower levels, government and enterprise integration, vertically and horizontally link up, departmental coordination, establishment of the intelligent tourism promotion working mechanism

Sichuan province adhered to the principle of "government guidance, department coordination, enterprise main body and social participation". On the one hand, Sichuan Provincial Tourism Bureau led to establish an integrated intelligent tourism management system consisting of provincial, municipal (state), county (city, district) tourism bureaus and scenic spots (enterprises) in Sichuan province; on the other hand, under the coordination of the leading group of Sichuan Tourism Industry Development, the cooperative working mechanism of intelligent tourism has been established among the Provincial Tourism Bureau, the Development and Reform Commission, the Commission of Economy and Information Technology, the Department of Finance, the Department of Communications, the Meteorological Bureau, the Department of Environmental Protection, the Bureau of Surveying and Mapping, the Public Security Department and other departments. In addition, Sichuan Tourism Bureau has developed the strategic partnership with the three major communications operators including Sichuan Telecom, Sichuan Mobile and Sichuan Unicom, the relevant financial institutions and digitized scenic spots, constructed a mechanism for sharing and exchanging information and cooperation in tourism in order to ensure the effectiveness of intelligent tourism construction through multi-channel, multi-form and diversified cooperative mechanism.

4.3 Platform first, project leading, key breakthroughs, pilot promotion, promoting perfection the function of the intelligent tourism system

4.3.1 Strengthen the construction of intelligent tourism management system

Firstly, the Sichuan tourism e-government administration website system integrating with provincial, municipal (state) tourism administration network has been set up, and the tourism video conference system throughout Sichuan and the intelligent meeting system of Sichuan Tourism Bureau have been built. Secondly, a tourism emergency rescue management system has been established. In 2012, under the support of the Sichuan Provincial Development and Reform Commission, the Commission of Economy and Information Technology, the Development of Finance and the Development of Science and Technology, the Sichuan Provincial Tourism Bureau has completed some major platform projects including "Sichuan tourism operation supervision and safety emergency management linkage command platform", "outdoors emergency rescue platform based on the Beidou compatible system" and "the application of mobile information technology". In November 2013, the emergency command platform was officially launched, which can monitor and warn the daily operation of the tourism market in real time, carry out emergency command and dispatch to the emergency including monitoring the video in scenic spots at any time, tracking the track of the tourist vehicles, predicting the traffic flow in advance and remote distributing tourists, integrating the electronic travel list with the track of vehicles, transmitting mobile emergency communication and other functions to achieve the goal of intelligent construction of "visibility, connection and interaction" in tourism emergency management. During the "National Day" golden week in 2014, the first official operation of the platform gave full play to the emergency command role. Through the comprehensive application of

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[1] One center: Sichuan tourism data center; three clusters: Tourism e-government website cluster, marketing and consulting service site cluster and e-commerce site cluster; five platforms: tourism operation supervision and safety emergency management linkage command flat platform, tourism industry management platform, tourism standards Management platform, tourism marketing and consulting service platform, tourism e-commerce platform; a demonstration project: G5 freeway (Sichuan) "Intelligent Tourism" demonstration project.

information and large data analysis technology in all aspects, the platform released the passenger flow early warning 1 time, the security early warning 12 times, which effectively promoted the real time monitoring, orderly diversion and safety early warning of the tourism market in Sichuan, therefore it played a positive role in ensuring the rational scheduling and smooth operation of the tourist market in recent years. At the end of 2013, the main function of the outdoor emergency rescue platform based on the Beidou compatibility system was built, popularized and applied in several scenic spots in the whole province, which provided a powerful security service for the tourists to carry out outdoor tourism projects. (Sichuan Tourism Bureau Tourism Information Center, 2014)

4.3.2 Perfect the intelligent tourism service platform system

First, the multilingual Sichuan tourism information website service system (www.tsichuan.com) of "1+21 (21 cities and states) +N (Multilingual)" has been established. Different versions have been launched online including English, French, German, Spanish, Russian, Japanese, Korean, traditional Chinese, simplified Chinese, and so on. The website system has realized the function of self-adaptive language version, and carried out the server image landing in 12 countries and regions. By October 2014, the website had had over 100,000 information of variou kind, 60,000 pictures and 100 videos. Secondly, cooperating with 5 famous tourist network operators such as Ctrip, eLong, Mango, Tuniu and LY.com, the online flagship shop of Sichuan tourism has been established to promote constructing the e-commerce platform of tourism enterprises in Sichuan. Ctrip has developed to be the largest tourist network operator in Sichuan by investing in Chengdu to set up a branch. Thirdly, we should strengthen the management of the multi platform application of the new media by developing "Fun in Sichuan" APP client, Sichuan tourism WeChat subscription, micro-blog service platform, multi-media interactive multi-media intelligent tourist map, scenic spot micro card, intelligent tourism multi-media enquiry terminal along G5 (108) National Road and the broad Jiuzhai loop lines. More than 70% of the cities (states) and major scenic spots in Sichuan province have developed their official micro-blogs and WeChat platforms and APP clients to provide tourists with convenient information and consulting services.

4.3.3 Innovate intelligent tourism marketing mode

First, we should make full use of the advantages of the Internet, focusing on integration and event driven, and plan to integrate and promote marketing activities through the linkage between the official micro-blog and the official WeChat. By October 31 of 2014, the number of the official micro-blog fans of the Sichuan Provincial Tourism Bureau has reached over 140 million, including 620 thousand Sina official micro-blog fans, more than 840 thousand fans of the Tencent official micro-blog, 100 thousand fans of Sichuan Tourism official WeChat platform. The official micro-blog of the Sichuan Provincial Tourism Bureau was awarded "Sichuan Top Ten overnment Affairs Micro-blog of Provincial Departments", "Top Ten Influential Provincial Tourism Bureau Official Micro-blog" and "Southwest Government Affairs Influence Award" both in the year 2013 and 2014. Secondly, the introduction of "Love, in Sichuan" series of micro films, which broke through the traditional form of tourism propaganda, has enjoyed extensive popularity on the Internet, and effectively enhanced the popularity of Sichuan tourism. The official micro-blog's network demand has exceeded 50 million times, which has brought huge download flow and created a new hot spot of tourism information consumption. Thirdly, Sichuan Tourism Bereau promoted the interactive marketing between the traditional media and the new media by launching the first outdoor reality show "Two Days and One Night" in China, implanting tourism elements in the traditional TV entertainment show, which have widely spread through the Internet and the self media, exceeding 300 million times of the network on demand, and it was awarded the "2013 TOP 10 China Tourism Marketing Innovation" at the third annual meeting of China's Tourism Industry Development. Fourth, online and offline interactive marketing was promoted. The activity named Looking for "the most beautiful starry sky in Daocheng Aden" was promoted on Taobao, and more than 1000 products were sold out within 5 minutes after the launch of the activity. At the same time, Sichuan Tourism Bereau launched activies of "filming 365, painting Sichuan", "look for the 100 most beautiful sightseeing and filming spots of Sichuan", collected and published over 40,000 beautiful pictures, thus improved the popularity of the scenic spots that participated in the activities. Fifthly, Sichuan Tourism Bereau cooperated with internationally famous network channels and enterprises in marketing including 20 network platforms like Google, TripAdvisor, Youtube, Baidu, Ctrip, and Taobao to build domestic and foreign network marketing platform and channel system. It also collaborated with the world's largest video website Youtube in producing creative videos on traveling in Sichuan, setting up the video area to present a beautiful image of Sichuan Tourism as a whole via the interactive videos, pictures, text, maps and other multi-media elements, and achieved the click rate nearly 1 million times.

Sixth, Sichuan Tourism Bereau held Global Tourism Network Operators Cooperation and Exchange Conferences for three consecutive times, built exchange and cooperation platforms for tourism enterprises and OTA at home and abroad, and pushed forward the development of the online tourism industry in Sichuan.

5 Conclusion

Internet technology is rapidly changing the patterns of tourists' purchase, which drives the government to promote its service such as launching innovation service, management process re-engineer, marketing models refactor, and new industry formats exploration. 'Internet + tourism' is not only a technological revolution, but also a reformation of smart tourism led by the Internet thinking. The essence of smart tourism is the tourism informatization with the service on tourists as the core, which the 'human wisdom' is the criteria.

In terms of operating smart tourism, Sichuan is at the leading position of China by establishing the '1+3' smart tourism system to link province-city-county government and enterprises, organizing the first provincial-level tourism industry operation supervision and the command platform of safety emergency management, and constructing an outdoor emergency platform based on Beidou compatible system and multilingual travel information service (www.Tsichuan.com)- the '1+21 (21 cities and counties) + N (Multilanguage)'. Moreover, based on the combination of multi-sectoral and multi-domain information resources, Sichuan has initially built up its tourism big data system. Therefore, under the assistant of the Internet platform, Sichuan has obtained many achievements in tourism marketing.

However, in the face of the popularity of the Internet, especially mobile Internet users, there is a need for the government to accelerate the construction of smart tourism from the perspectives of concepts, policies, and measures to ensure the sustainable development of smart tourism：

5.1 Tourism informationization that serves tourists is Intelligent tourism

The essence of intelligent tourism is the application of intelligent technology, including information and communication technology, in the tourism industry. It aims at innovating tourism management, promoting tourism service, improving tourism experience and optimizing the utilization of tourism resources. It is a modernized project to enhance the competitiveness, improve the management abilities and expand the scale of the industry. (Huang Ping, Guo Xirong, Su Qian, He Yuan et al, 2016)

5.2 Top-level designing and overall planning, developing intelligent tourism according to local conditions

The top-level design should be forward-looking, scientific, systematic, suit the local conditions, and conform to the reality to make it feasible in every step of the strategy implementation. We must ensure the continuity, flexibility and extensibility of the construction and implementation of intelligent tourism, making it an integral part of the intelligent city.

5.3 Giving full play to the leading government and market

The "government + market" model should be used to promote the healthy and rapid development of intelligent tourism, and the interaction and cooperation between the government and the enterprises will help construct the intelligent tourism with more vitality and timeliness. The problems should be solved in fund-raising during construction and its use after construction, and the relationship between public service of the government and market management of the enterprises should be handled successfully.

5.4 Building a working promotion mechanism in the integration of provinces, cities, counties and enterprises

The government should take the lead with graded responsibilities; different departments should interact, co-construction and share with one another; enterprises should work as the main body together with the market operation; and the society ought to participate to win from all aspects. The department linkage and information resource sharing mechanism should be established, applying the principle of "not seeking all, but seeking to use", integrating and sharing the existing information facilities and resources by the society and departments.

5.5 Ensure the policy support and create a favorable environment for intelligent tourism development

The second revolution of the tourism industry will be lead by intelligent tourism with the vigorous support at the national policy level, the increasing investment of special funds, and the participation of private capital. A good environment will be created for the development of intelligent tourism as it has received the attention of governments at all levels, support for various departments, active innovation

and the initiative taken by the tourism authorities, participation of the enterprises and the promotion of the whole society.

5.6 Strengthen personnel training and develop strong human resource backup

The essence of intelligent tourism is "people-oriented", which aims to make the tourist experience more intelligent. The intelligent tourism takes into consideration the wisdom management and intelligent service of the government and enterprises. Intelligent talents with intellectual knowledge are the key to the construction of intelligent tourism. The integrated training system of the country -province-city-county-scenic spot (enterprise) should be set up to provided a strong human resource backup for intelligent tourism construction.

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Study of the Positive Impact of Intelligence Introduction on the Open Innovation at Chinese Universities

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Abstract: Intelligence introduction is an important part of promoting internationalization of education at Chinese universities. With the development of globalization and the increasing deepening of educational opening-up, intelligence introduction has become a strategic long-term task at Chinese universities. Based on the theory of open innovation, this article discuses the positive impact of intelligence introduction on the open innovation at Chinese universities from the perspective of the cultivation of innovative talents, the promotion of scientific and technological innovative capacity as well as the reform and innovation of Chinese higher education. It also makes useful exploration about how to develop intelligence introduction and bring the significant role of intelligence introduction into full play, so as to better promote the open innovation at Chinese universities.
Key words: Intelligence introduction; Chinese universities; Open innovation; Positive impact

1 Introduction

Chinese universities bear great responsibilities of scientific and technological research and the cultivation of innovative talents. They make up an important part of Chinese innovative system as the source of knowledge innovation and the major participants in technology innovation (Chen Juan, Li Jianqing, 2015). Under the new circumstances of the globalization of science and technology and the internationalization of education, intelligence introduction becomes not only a necessary requirement for enhancing the level of educational internationalization, but also an important approach to boost the open innovation and increase the core competitiveness of Chinese universities. Since China's reform and opening up, Chinese universities have achieved significant progress in expanding educational opening-up and introducing excellent foreign educational resources. In the new era, with the increasing deepening of opening Chinese higher education to the outside world, intelligence introduction, as a strategic long-term task, has been included into National Program for Medium and Long Term Talent Development (2010-2020) and National Outline for Medium and Long Term Education and Reform (2010-2020). Intelligence introduction is sure to play a unique and significant role in the open innovation at Chinese universities as well as the educational internationalization.

2 The Idea of Open Innovation at Universities

In the beginning of the 21st century, American scholar Chesbrough first put forward the idea of open innovation which is "realized through innovative resources that are complemented internally and externally in the process of innovation" (Yang Murui, Du Huaigang, 2009). Open innovation introduces open strategies into innovation activities. It is a new innovative mode to attract, integrate and share innovative resources. Open innovation aims to promote exchanges, cooperation and integration among all innovative subjects and elements, explore and develop new innovative resources so as to achieve comprehensive collaborative innovation. Open innovation is a necessary requirement of modern economic society and innovative development (Chesbrough, H., 2003).

In the context of globalization, the flow of talents, knowledge and technology is becoming freer. It is hard for traditional closed innovation to get adapted to the development of higher education. By adopting open measures like overseas introduction of talents and intelligence, industry-university-research cooperation and so on, open innovation could attract and share innovative resources including talent resources, knowledge resources, information resources, discipline resources, technical resources, and overseas cooperation resources, etc. To carry out comprehensive collaborative innovation is important for universities to improve educational level, cultivate innovation awareness and abilities and develop innovative achievements. It also enables universities to train internationalized talents who are capable of participating in the international competition with international vision and a good knowledge of international rules.

Intelligence introduction at universities refers to introducing foreign talents resources and foreign intelligence resources (Li Yi, Feng Xinglei, Xu Yao, 2009), which includes the introduction of excellent

foreign experts, professors, specialized talents, advanced foreign scientific and technological knowledge, administration modes, teaching methods, educational ideas, etc. It promotes the open innovation at Chinese universities through the introducing and sharing of the overseas innovative resources.

3 The Positive Significance of Intelligence Introduction to the Open Innovation at Chinese Universities

3.1 Intelligence introduction promotes the cultivation of innovative talents at chinese universities

The fundamental task of higher education is to cultivate talents. Strengthening faculty team construction and curriculum construction by introducing foreign experts and excellent teaching resources is an important way to improve the quality of talent cultivation and promote the connotative development of Chinese higher education. By giving academic lectures, offering international courses to undergraduates and giving academic guidance to young scholars, PhD students or master graduate students, the introduced foreign experts contribute to the work of talent cultivation at universities. Meanwhile, universities introduce overseas high-level experts to jointly establish Chinese-foreign cooperative platforms or high-level Chinese-foreign cooperative innovation teams, which enables more excellent young scholars and PhD students to keep up with international frontiers of science and technology and the development directions of it. Under the joint guidance of introduced overseas academic masters, they improve the scientific and technological innovative abilities and publish papers in international top journals and get influential international academic awards. In general, Intelligence introduction plays an irreplaceable role in promoting the cultivation of innovative talents at universities as well as improving the internationalization ability of the young scholars and talents.

3.2 Intelligence introduction enhances the scientific and technological innovative capacity of chinese universities

As the main driver of the innovation of overseas talent-introduction policies and implementation of the overseas talent-introduction projects, the Ministry of Education and State Administration of Foreign Experts Affairs initiated a series of major talent-introduction projects in recent years to support universities to enhance the scientific research capacity. For example, the "Overseas Expertise Introduction Projects for Discipline Innovation" ("111 project" for short) aims to introduce about 1000 overseas academic masters and academic mainstays from the top 100 universities and scientific research institutes in the world to form high-level innovative teams with Chinese scientific research backbones to carry out high-level scientific research jointly. The overseas academic masters should be academicians from foreign academy of science, academy of engineering or internationally recognized first-class experts and scholars. The overseas academic mainstays are supposed to have innovative ideas and have made innovative achievements acknowledged by the international peers. In face of the needs of national strategic development and the frontiers of international science and technology, the "Recruitment Program for Foreign Experts" ("one-thousand talents program" for short) is targeted at key areas and key technologies, emerging industries and strategic industries to introduce overseas talents engaged in important original innovation and disruptive technology research. The introduced high-level foreign experts based on this long-term project shall work for 3 consecutive years in China with no less than 9 months per year. They shall put forward forward-looking, strategic and innovative scientific conception and construct the innovative teams to reach Chinese leading level and international advanced level in the field. Under the leadership of the introduced experts, the innovative team shall apply for and undertake national major projects, key projects or international cooperation projects.

Relying on various major talent-introduction projects such as "111 project", "one-thousand talents program", "high-end foreign experts' program", Chinese universities introduce high-level overseas talents, build up innovative teams and construct international platforms or bases for international scientific research. By forming high-level international innovation forces, universities will conduct international collaborative research to make breakthroughs in key technologies and solve international difficult problems, thus to promote the innovative capacity, discipline strength and international influence.

3.3 Intelligence introduction advances the innovation reform and development of chinese higher education

Intelligence introduction is an important part of speeding up the process of internationalization and promoting reform, innovation and development of Chinese higher education. To strengthen the construction of international capacity, universities should introduce not only overseas high-level talents, but also the management mode, curriculum system and teaching methods, etc., from foreign universities

to realize the internationalization in curriculum system, team management mode, teaching and scientific research personnel (Sun Xi, 2014). In 2014, "Internationalization Demonstration College Promotion Plan" was jointly launched by State Administration of Foreign Experts Affairs and Ministry of Education. The plan supports universities to recruit foreign experts in groups and introduce internationally standardized modes of management, scientific research and teaching. The recruited foreign experts cover the ranges of management, science research and teaching. Foreign experts who are responsible of teaching or scientific research should be disciplinary leaders or well-known experts and scholars in concerned international fields, while those who take charge of management should have experience of working as management with strong cohesion ability and high international prestige at foreign universities or colleges. The internationalization demonstration college takes the cultivation of top innovative talents as the core and aims to help build the world-class university. Through constructing internationalized curriculum system and management mode, Demonstration College will inevitably play the role of demonstration and promotion step by step. It will continue to carry out the explorative practice to speed up the modernized construction of governance system of Chinese higher education, and to promote the innovation, reform and development at Chinese universities.

4 How to Develop Intelligence Introduction for the Promotion of Open Innovation at Chinese Universities

In the new era, the development of the higher education puts forward higher requirements and new challenges for intelligence introduction at universities. With the forming of a multi-level, multi-channel and wide-ranging development pattern, Intelligence introduction at universities is taking on new development to better promote the open innovation at Chinese Universities.

4.1 Expanding of recruitment fields and promotion of the intelligence introduction level

The focus of intelligence introduction at universities has already transferred from employing foreign language teachers to professional experts. In addition, the professional fields and professional coverage for overseas talents recruitment are also expanding. The introduction direction has changed from "teaching-oriented" to "the comprehensive kind of teaching, scientific research and development" (Liu Sian, 2003). In face of disciplinary development and the needs of talent cultivation, universities take initiative to carry out intelligence introduction which centers on the construction of preponderant and characteristic specialties, key disciplines and emerging disciplines. The proportion of introduced disciplinary leading talents and urgently-needed talents is increasing year by year (Chen Weihua, 2008). By strengthening the leading role of high-end overseas experts, universities carry out talent cultivation and make scientific breakthrough with joint efforts, which contributes to the promotion educational strengths and innovation capacities of the universities.

4.2 The innovation of intelligence introduction mode

Universities shall positively innovate intelligence-introduction modes to introduce excellent teaching resources. Various ways like academic exchanges, lecturing, collaborative research, international conference, Chinese-foreign cooperative education and so on are taken to communicate and interact with international peers to keep in line with the latest developments of international academic and research frontiers, to upgrade professional levels and broaden academic horizons. The forms of foreign experts' recruitment at universities are becoming more diverse: the combination of full-time and part-time jobs, of short-term and long-term employment, and of individual expert and teams of experts. While stressing "bringing in", universities also put emphasis on "sending out "(Guo Jianmin, 2002). Universities need encourage teachers to go abroad to carry out academic exchanges, make academic visits, or attend international academic conferences with a view to promoting interdisciplinary development, speeding up the update of academic ideas, and thus to enhance management experience, teaching methods, scientific research level and innovative ability (Chen Dongli, 2017).

4.3 More attention to the efficiency of intelligence introduction

Attention should not only be paid to the quantity of intelligence introduction, but more to the quality and substantial efficiency. The efficiency of intelligence introduction is the measurement standard for the work of intelligence introduction at universities as well as the foundation of the sustainable development of it. Universities are more and more concerned about the function of intelligence introduction in talent cultivation, scientific research and social services. Through intelligence introduction, universities expect to enhance teaching and scientific research level, promote disciplinary development and speed up the faculty team construction. Meanwhile, as Chinese higher

education develops towards marketing and industrialization, it becomes necessary for the intelligence introduction at universities to serve for the transformation of scientific and technological achievements (Wang lei, 2016). In recent years, based upon the actual intelligence introduction conditions, universities have already begun to explore and establish scientific and effective performance evaluation mechanism and rewarding mechanism for the innovative achievements. A long-term and sustainable working mechanism for talent-and-intelligence introduction should be established.

Figure 1   Features of Intelligence Introduction and Promotion of Open Innovation

4.4 The requirement of innovating management mechanism

To advance the development of intelligence introduction and push ahead the open innovation at Chinese universities, the government needs to improve policies and regulations concerning introducing of foreign talents and intelligence and set up linkage mechanism among relevant departments. Universities themselves should integrate intelligence introduction into the overall development plan and strengthen overall coordination by innovating management system, exploring and establishing flexible systems and mechanisms in talents introduction and talents employment. Universities should also provide support and guarantee to intelligence introduction with favorable policies, funds, and teaching resources. Still, it is important to create favorable environments for intelligence introduction such as providing high-level scientific research platform, good working and living conditions and international atmosphere. Concrete measures shall be adopted to reform the mechanism of personnel management in professional title evaluation and post employment. Scientific and effective performance assessment and awarding methods shall be implemented to mobilize overseas talents' enthusiasm in order to further improve the efficiency of intelligence introduction. Meanwhile, universities need increase service awareness and enhance the cultural integration among foreign talents (Wang Xiumei, 2013). Only by innovating and reforming the management systems and mechanisms, could universities keep the work of intelligence introduction developing in a stable and sustainable way so that intelligence introduction could better play its important part in promoting open innovation at universities.
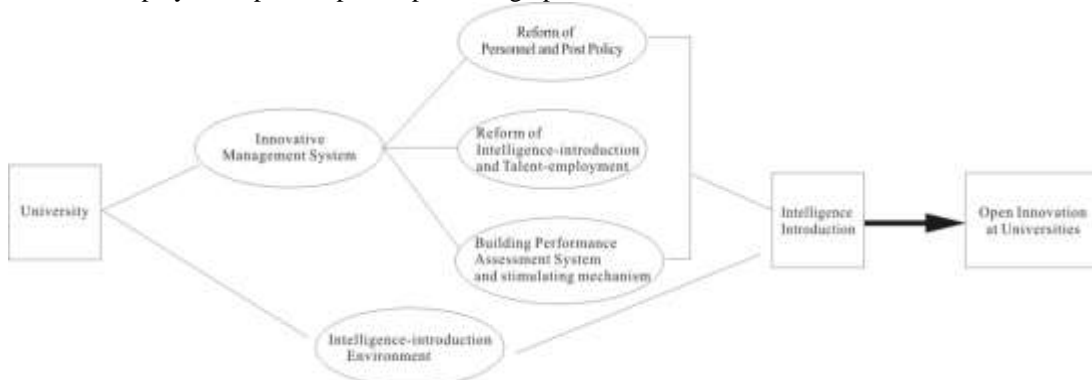
Figure 2   Innovative Management System and Development of Talent Introduction

5 Conclusion

In face of the strategic needs for national development and the construction of key disciplines, to actively implement the work of intelligence introduction is an important approach to cultivate innovative talents, promote scientific research innovation and educational reforms at Chinese universities. In an open way, China universities attract and make use of foreign talents and foreign intelligence resources to form innovative educational ideas, management modes and curriculum systems which are in line with the international standards. By means of introducing overseas talents and intelligence, universities also build up joint international platforms and international collaborative innovative teams to carry out high-level collaborative innovation and scientific cooperation in face of

international scientific frontiers, major industry demands and regional innovation development. Intelligence introduction will significantly promote open innovation at Chinese universities in its international collaborative way. In the new era, Chinese universities should speed up the internationalization process and strengthen the work of intelligence introduction by improving quality, innovating introducing modes and reforming the management systems and mechanisms so as to bring into full play the unique and important role of intelligence introduction in the open innovation at Chinese universities.

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Statistical Analysis of Academic Papers Published by Colleges and Universities Based on Web of Knowledge: A Case Study of Wuhan University of Technology

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Abstract: According to the high demand of scientific research output of the "National First-class University First-class Discipline Strategy", this paper is based on the database Web of Knowledge which included the SCI papers of Wuhan University of Technology. By using the metrological analysis method, this paper makes a detailed and deep statistical analysis of all the SCI papers during the period of 2000-2017, from the article types, the research directions, hot cooperative organizations and nations, hot source of publications and authors etc. According to the statistical analysis, the total number of papers published by Wuhan University of Technology has been increasing continuously. Especially since 2013, the number of high-level papers has increased dramatically with the introduction of overseas high-level talents. It finds out that the review articles with higher academic level account for less than two percent of the total papers published by this university, and half of its academic papers can be classified into materials science, which testifies that it is the preponderant discipline of the university. The study gives an objective evaluation of the development status and trend on Wuhan University of Technology's research capacity since it was merged in 2000. It can also provide reference for the university on improving teaching and scientific research as well as on publishing scientific papers.

Key words: Web of Knowledge; Reference Statistics and Analysis; Wuhan University of Technology; SCI papers

1 Introduction

Web of Knowledge is the world's largest comprehensive academic information resources, covering the most disciplines and including more than 8700 core academic journals. All are the most authoritative and influential journals in the world. The content covers all fields of research such as natural science, engineering technology and biomedical science (Sun, 2013; Hou, 2017). The published academic papers which are included or cited by Web of Knowledge have been used by many countries in the world as an important reference index to measure the academic level of universities and institutions and to evaluate the academic level of scientific research workers(Sun, 2013). The Times Higher Education World University Ranking is one of the four most influential global universities ranking. Its ranking method is based on five indicators. One of the main indicators 'Citation' of papers accounts for 30%, which mainly investigates the influence of a college or university in scientific research. The factors of U.S. News Best Global Universities rankings are more refined. The journals published and cited indicators account for up to 50% of the rankings (Ren, 2014). The scientific research level is also regarded as an important index in Overall Plan for Promoting the Construction of the World's Leading Universities and First Class Disciplines issued by the State Council.

Therefore, detailed sub–index ranking research is carried out from the viewpoint of reference statistics. It has very important reference significance. And it can be also used as guidance for decision - making and planning in scientific research (Ou, 2010). However, there is not much research focusing on such statistical analysis on journal publications. Nowadays, big data analysis technologies have been extensively improved and being used in many specialties to obtain clear information out of massive data. It could be used to understand basic phenomena of scientific publications of a colleagues and university.

This research is based on the SCI papers included in Wok of Wuhan University of Technology (WUT) in the period of year 2000 – 2017. By using the method of statistical analysis, it can evaluate the development state and trend of scientific research level of Wuhan University of Technology since the year of coeducation in 2000.

2 Database and Research Method

This paper is based on the core collection of Web of Knowledge (WoK) by Thomson Reuters, the world's most famous bibliography and index service provider, and it only takes the papers of Wuhan University of Technology which is included in the database of "Science Citation Index Expanded

SCI-EXPANDED from 2000 to present" as the data source. The data collected from 2000 to September 29, 2017 are analyzed by the method of statistics analysis. By taking "Address: Wuhan Univ Technol" as the key word, a total of 11165 search results were obtained, indicating that 11165 SCI papers have been published under the name of Wuhan University of Technology since the year of 2000.

Figure 1 shows the annual increase in the total number of published papers. It can be clearly found that the annual total number of published papers continues to grow, especially after 2013, with Wuhan University of Technology making great efforts to introduce high-level overseas talents and young talents with overseas doctorate degrees. The number of high-level papers published has risen sharply; the total number of papers published in the year of 2016 has doubled in just three years compared with the year of 2013.
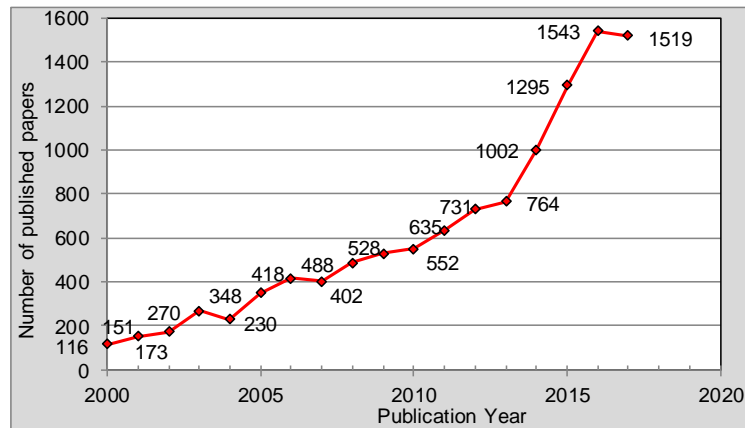
Figure 1   Annual Increase of the Total Number of Published Papers

Figure 2 shows the proportion of open access journal papers in all SCI papers. Although the open access journals include some high level sub-journals of Nature, such as Nature Communications, the open access journals have not gained high international recognition (Huang, 2009; Zhang, 2007; Chen, 2015). Figure 2 presents that the ratio of open access journal papers in Wuhan University of Technology is only 5.5%, which indicates that the researchers of WUT seldom choose open access journals to publish their academic results.
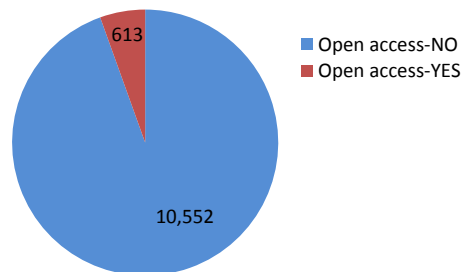
Figure 2   Open Access or Not

3 Research Result Analysis

Based on the retrieval results of WoK, this paper makes a detailed analysis of document types, research areas, countries and regions, organization, source titles, high yield authors and so on. In the following analysis, the sum of the percentage of classifications in the indicators is usually much greater than 100%. It ascribes to the overlap in the classification of papers. For example, a paper can be classified into conventional scientific paper as well as conference paper or review paper.

3.1 Types of article

Table 1 shows the distribution statistics for article types. The proportion of conventional academic articles published by WUT is 96.1%. The following type is conference papers, accounting for about 5.4%, while academic review papers accounts for less than 2%. On the one hand, this indicates that the research achievements of WUT are main originality; on the other hand, it shows that there are few review papers with guiding significance in a certain field. The authors who have higher academic level and higher attainments in their fields must collect and consult a great deal of data. The review paper is

written by classifying and analyzing comprehensively the raw data. The paper needs to reflect the current research progress in this field with strong logicality and foresight. The paper should have general guiding significance and guiding function for the development prospect of this field (Huang, 2009; Lei, 2008; Yang, 2013). That is critical of a review paper to get be published in WoK. At the same time, the review papers can gain more attention from researchers in the same field than the conventional scientific research papers. Therefore, the university should pay more attention to the review papers.

In addition to conventional scientific research papers, conference papers and review papers, the sum of other types of articles does not exceed 3%, which is statistically negligible.

Table 1   Distribution Statistics for Article Types

Article Types	Records	Percentage
ARTICLE	10729	96.10%
PROCEEDINGS PAPER	605	5.42%
REVIEW	216	1.94%
MEETING ABSTRACT	144	1.29%
EDITORIAL MATERIAL	45	0.40%
LETTER	19	0.17%
CORRECTION	12	0.11%
RETRACTED PUBLICATION	4	0.04%

3.2 Research areas

In September 2017, the Ministry of Education, the Ministry of Finance and the National Development and Reform Commission released a selected list of world class universities and first class disciplines (referred to as "double-first class"). The "Material Science and Engineering" discipline of Wuhan University of Technology was selected for the first-class disciplines construction plan. The construction plan is completely consistent with the preponderant research area reflected by the published academic articles of the university. Table 2 summarizes the distribution of SCI papers by research areas, with the number of papers in materials, chemistry, engineering and science occupying the top four respectively. According to the "Implementation Plan for First-class University and First-class Disciplines Construction" of WUT, by the year of 2020, one discipline (material science) of the university will be selected into the forefront of the world's top disciplines (entering 1 ‰ in ESI and the top 20 in the world), and 5 disciplines (material science, engineering, Chemistry, physics, computer science) will be listed in the ranking of the world's top disciplines (entering the top 1% of ESI). The university's implementation plan is highly consistent with the statistical results of the research field distribution in Table 2.

Among them, nearly half of the academic achievements can be classified into material science, reflecting the strong position of material science in Wuhan University of Technology. WUT is the only one university or college which has two national key laboratories (the State Key Laboratory of Advanced Technology for Materials Synthesis and Processing and the State Key Laboratory of Silicate Materials for Architectures) in China. In the field of material science, the university not only owns the innovation research group of the National Natural Science Foundation, but also cultivates many high-end talents, such as several Chinese Academy of Engineering, the scholars of the Yangtze River. As a result, under the influence of the top four disciplines, the following disciplines, metallurgical engineering, new energy devices, computer science, composite materials, electrochemistry, architecture engineering, mathematics, optics, mechanics and etc., also have better academic achievements.

Table 2   Distribution Statistics of SCI Papers by Research Areas

NO.	Research Areas	Records	Percentage
1	MATERIALS SCIENCE	5095	45.63%
2	CHEMISTRY	2910	26.06%
3	ENGINEERING	2411	21.59%
4	PHYSICS	1851	16.58%
5	SCIENCE TECHNOLOGY OTHER TOPICS	967	8.66%
6	METALLURGY METALLURGICAL ENGINEERING	652	5.84%
7	ENERGY FUELS	539	4.83%
8	COMPUTER SCIENCE	521	4.67%
9	POLYMER SCIENCE	395	3.54%
10	ELECTROCHEMISTRY	380	3.40%
11	CONSTRUCTION BUILDING TECHNOLOGY	369	3.31%

NO.	Research Areas	Records	Percentage
12	MATHEMATICS	332	2.97%
13	OPTICS	318	2.85%
14	MECHANICS	269	2.41%
15	ENVIRONMENTAL SCIENCES ECOLOGY	238	2.13%
16	INSTRUMENTS INSTRUMENTATION	188	1.68%
17	THERMODYNAMICS	181	1.62%
18	AUTOMATION CONTROL SYSTEMS	151	1.35%
19	TELECOMMUNICATIONS	126	1.13%
20	OPERATIONS RESEARCH MANAGEMENT SCIENCE	120	1.08%

3.3 Hot cooperation Countries and regions

Based on the features of WoK, by analysis the detailed information of published articles, it can present countries or regions that cooperate most closely with one designated unit. Table 3 shows the distribution of countries or regions that the academic cooperation units with WUT belong to. Table 4 shows the statistical results of the distribution of hot cooperation units with the university. In addition, the data in Table 3 have filtered the domestic records, and only the non-Chinese regions or countries with the most closely cooperative units are statistically analyzed.

It is known from Table 3 that the countries with the closest scientific research cooperation and communication with Wuhan University of Technology are the United States, Japan, the United Kingdom, Australia, South Korea and Canada. Among them, the United States, Japan and the United Kingdom are internationally recognized as the most scientific and technological powers in the world. So far, there are more than 300 Nobel winners in the United States, which is the top of the world. Especially in the field of Natural Science (Physics, chemistry, biology, medicine), the United States is overwhelmingly awarded the Nobel Prize (far more than the sum of the rest of the world). In the top 20 universities of the world, whether it is the Times Universities ranking or QS ranking, the United States usually occupies more than 10 universities (Liu, 2013). After the 21st century, the Nobel Prize winning scientists in Japan were only second to the United States in the world. And in the ranking of top global universities, Japan is only after America and Britain (Wang, 2016). Britain was only second to the United States in the number of Novel Prize, occupying the second position of the world. The University of Cambridge, University of Oxford, and Imperial College London were from the United Kingdom. In addition to the United States, none of the scientific research colleges and universities is comparable to them (Luo, 2008). The three big scientific and technological powers lead the external exchange and cooperation of Wuhan University of Technology.

Germany, a scientific and technological power known for its rigorousness, is not working closely with Wuhan University of Technology, is ranking eighth.

Table 3   Distribution of Article Cooperation Countries and Region

NO.	Country/Region	Records	Percentage	NO.	Country/Region	Records	Percentage
1	USA	953	8.54%	11	FRANCE	100	0.90%
2	JAPAN	272	2.44%	12	RUSSIA	96	0.86%
3	ENGLAND	268	2.40%	13	SINGAPORE	90	0.81%
4	AUSTRALIA	229	2.05%	14	TAIWAN	76	0.68%
5	SOUTH KOREA	205	1.84%	15	MEXICO	60	0.54%
6	CANADA	197	1.76%	16	DENMARK	57	0.51%
7	BELGIUM	192	1.72%	17	EGYPT	34	0.31%
8	GERMANY	115	1.03%	18	PAKISTAN	31	0.28%
9	NETHERLANDS	110	0.99%	19	SCOTLAND	30	0.27%
10	SAUDI ARABIA	109	0.98%	20	ITALY	28	0.25%

As shown in Table 4, among the institutions with the closest cooperation in scientific research with WUT, the top three institutions are all domestic universities, successively Huazhong University of Science and Technology, Chinese Academy of Sciences and Wuhan University. Huazhong University of Science and Technology, Wuhan University and Wuhan University of Technology are from Wuhan,

Hubei Province. It can be seen that the cooperation between WUT and the other universities in the same city is very close. Other domestic institutions with closer cooperation include Hong Kong Polytechnic University (the 5th), Wuhan University of Science and Technology (the 7th), Hubei University (the 10th), Wuhan Institute of Technology (12th), and etc. Apart from the universities of Wuhan city, Hong Kong is the region with the closest scientific research cooperation with WUT. The top institutions in the field of material science in China, such as Tsinghua University, University of Science and Technology Beijing, Harbin University of Technology, Shanghai Jiao Tong University and South China University of Technology, do not have much cooperation with WUT. In this respect, there are still a lot of opportunities for WUT to further the scientific research cooperation with domestic institutions.

Table 4　Distribution of Cooperation Organizations

NO.	Organization	Records	Percentage
1	HUAZHONG UNIV SCI TECHNOL	568	5.09%
2	CHINESE ACAD SCI	497	4.45%
3	WUHAN UNIV	450	4.03%
4	TOHOKU UNIV	112	1.00%
5	HONG KONG POLYTECH UNIV	102	0.91%
6	KING ABDULAZIZ UNIV	94	0.84%
7	WUHAN UNIV SCI TECHNOL	92	0.82%
8	UNIV MICHIGAN	87	0.78%
9	DELFT UNIV TECHNOL	81	0.73%
10	HUBEI UNIV	80	0.72%
11	UNIV NAMUR	78	0.70%
12	WUHAN INST TECHNOL	74	0.66%
13	UNIV SCI TECHNOL CHINA	72	0.65%
14	CHINESE UNIV HONG KONG	71	0.64%
15	TONGJI UNIV	71	0.64%
16	CITY UNIV HONG KONG	68	0.61%
17	UNIV GHENT	66	0.59%
18	WUHAN TEXT UNIV	66	0.59%
19	HUBEI UNIV TECHNOL	65	0.58%
20	E CHINA NORMAL UNIV	63	0.56%

Among the foreign organizations which have cooperation with WUT in publishing scientific articles, The University of Tokyo ranked the first place for working closely with the State Key Laboratory of Advanced Technology for Materials Synthesis and Processing (the 4th place in overall ranking), following by King Saud University (the 6th), University of Michigan (the 8th in the United States, Delft University of Technology in the Netherlands (the 9th), and etc. As shown in Table 4, there are not only very few top domestic institutions, but also very few top international ones. From this, it can be seen that Wuhan University of Technology needs to vigorously strengthen the cooperation and exchange activities with first-class scientific research institutions at home and abroad for future development. Only by this way, the university can keep pace with the development of international scientific research, and keep abreast of the latest developments in academic research. Then it will have the opportunity to participate in and even to lead the scientific research activities.

3.4 Funding Agencies

Table 5 shows the statistics of the funding agencies that support the scientific achievements publication. The proportion of the achievements funded by the National Natural Science Foundation of China is very high, which exceeds 42%. But the details of the paper need to be strengthened, because National Natural Science Foundation of China has five different annotations. They are National Natural Science Foundation of China (1), Natural Science Foundation of China (4), NSFC (6), National Science Foundation of China (10) and National Nature Science Foundation of China (11). But obviously, the National Natural Science Foundation of China is the only official annotation (Zhang, 2015). The Fundamental Research Funds for the Central Universities (2) is the second major funding for WUT's

scientific research achievements, accounting for 13.3%. National Basic Research Program of China 973 Program is following after, accounting for 6.7%.

Table 5　Distribution Statistics of Funding Agencies

NO.	Funding Agencies	Records	Percentage
1	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA	3462	31.01%
2	FUNDAMENTAL RESEARCH FUNDS FOR THE CENTRAL UNIVERSITIES	1487	13.32%
3	NATIONAL BASIC RESEARCH PROGRAM OF CHINA	523	4.68%
4	NATURAL SCIENCE FOUNDATION OF CHINA	415	3.72%
5	NATURAL SCIENCE FOUNDATION OF HUBEI PROVINCE	352	3.15%
6	NSFC	284	2.54%
7	CHINA POSTDOCTORAL SCIENCE FOUNDATION	253	2.27%
8	PROGRAM FOR NEW CENTURY EXCELLENT TALENTS IN UNIVERSITY	245	2.19%
9	NATIONAL BASIC RESEARCH PROGRAM OF CHINA 973 PROGRAM	223	2.00%
10	NATIONAL SCIENCE FOUNDATION OF CHINA	222	1.99%
11	NATIONAL NATURE SCIENCE FOUNDATION OF CHINA	202	1.81%
12	973 PROGRAM	196	1.76%
13	WUHAN UNIVERSITY OF TECHNOLOGY	178	1.59%
14	INTERNATIONAL SCIENCE TECHNOLOGY COOPERATION PROGRAM OF CHINA	163	1.46%
15	NATIONAL NATURAL SCIENCE FOUNDATION OF CHINA NSFC	162	1.45%
16	CHINA SCHOLARSHIP COUNCIL	156	1.40%
17	111 PROJECT	133	1.19%
18	INTERNATIONAL SCIENCE AND TECHNOLOGY COOPERATION PROGRAM OF CHINA	131	1.17%
19	MINISTRY OF EDUCATION OF CHINA	128	1.15%
20	NATURAL SCIENCE FOUNDATION OF HUBEI PROVINCE OF CHINA	125	1.12%

Natural Science Foundation of Hubei Province is also an important source of scientific research activities for WUT. The proportion of its achievements is 3.2%, only second to National Natural Science Foundation of China, National Basic Research Program of China and 973 Program. Other foundations such as China Postdoctoral Science Foundation, Program for New Century Excellent Talents in University and etc. are also important sources of scientific research achievements of the university. In addition, International Cooperation Program of China, China Scholarship Council and Disciplinary Innovation recruitment plan in 111 Universities are also reflected in Table 5, which indicates that Wuhan University of Technology has been actively engaged in international scientific research cooperation and has made a series of achievements.

3.5 Source titles

Table 6 presents the distribution of the source titles of the published academic articles. That is the hottest rankings of academic journals that the researchers of WUT are keenest to publish its articles. It can be clearly seen that the most popular academic journal is the Journal of Wuhan University of Technology-Materials, which accounts for an astonishing 8.8% of the papers. It almost equals to 9 in 100 academic papers published by this journal. It is undeniable that Journal of Wuhan University of Technology-Materials, which was founded in 1986, has been continuously included by SCI since 1997 and it was the first university journal included by SCI in mainland China. Currently, it is still one of the seven university journals entering SCI, which shows its strong academic influence. However, the higher education intuitions with the objective of Construction of the World's Leading Universities and First Class Disciplines, should not only focus on the domestic influence, but also aim at the international first-class academic journals.

The second most popular academic journal of the university is Construction and Building Materials (IF3.169), a popular journal in the field of international building materials, especially in the field of concrete building materials, which reflects the advantages of Wuhan University of Technology in the field of traditional building materials and concrete materials. The third is the academic journal of Royal Society of Chemistry (RSC) - RSC Advances (IF=3.108). The fourth is the Q1 journal in metallurgical engineering - Journal of Alloys and Compounds (IF=3.133).

As a traditional advantage subject of WUT, the performance of ceramic in academic papers is mixed. The impact factor of Journal of the American Ceramic Society (IF=2.841) is not high, but it is still considered as the industry's leading journal. This journal ranks 16th place. The journal Ceramics

International (IF2.986) ranks 5th place. The Journal of Inorganic Materials (IF 0.444), sponsored by the Shanghai Institute of Silicate Research of the Chinese Academy of Sciences, ranks the 18th place. There are many academic papers published on these above journals. But the top ceramic journal -Journal of the European Ceramic Society (IF 3. 411), does not appear in the Table 6 ranking list.

On the whole, the paper quality of the university needs to be greatly improved. Because in the statistical ranking of source publications, there are only five journals that are in the Q1 among the top 20 journals in Table 6, according to the Chinese Academy of Sciences SCI journal division (refer to the latest edition of 2016). They are: Journal of Alloys and Compounds, Journal of Materials Chemistry A (IF=8.867, Energy and Fuel), ACS Applied Materials & Interfaces (IF=7.504, Engineering Technology), Journal of Power Sources (IF=6.395 Engineering Technology), and Applied Catalysis B: Environmental (IF=9.446, Environmental Science and Ecology).

It should be noted that key the journal Engineering Materials ranks the eighth place in total, but it only includes papers published between 2000 and 2016, for the journal was kicked out of the SCI list in 2017.

Table 6   Distribution Statistics of Source Titles

NO.	Source Titles	Records	Percentage
1	JOURNAL OF WUHAN UNIVERSITY OF TECHNOLOGY MATERIALS SCIENCE EDITION	978	8.76%
2	CONSTRUCTION AND BUILDING MATERIALS	183	1.64%
3	RSC ADVANCES	178	1.59%
4	JOURNAL OF ALLOYS AND COMPOUNDS	153	1.37%
5	CERAMICS INTERNATIONAL	138	1.24%
6	ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY	123	1.10%
7	JOURNAL OF ELECTRONIC MATERIALS	122	1.09%
8	KEY ENGINEERING MATERIALS	116	1.04%
9	RARE METAL MATERIALS AND ENGINEERING	109	0.98%
10	APPLIED SURFACE SCIENCE	105	0.94%
11	JOURNAL OF MATERIALS CHEMISTRY A	99	0.89%
12	MATERIALS LETTERS	97	0.87%
13	ACTA PHYSICA SINICA	92	0.82%
14	JOURNAL OF APPLIED POLYMER SCIENCE	89	0.80%
15	ACS APPLIED MATERIALS INTERFACES	83	0.74%
16	JOURNAL OF THE AMERICAN CERAMIC SOCIETY	83	0.74%
17	JOURNAL OF POWER SOURCES	82	0.73%
18	JOURNAL OF INORGANIC MATERIALS	79	0.71%
19	JOURNAL OF MATERIALS SCIENCE MATERIALS IN ELECTRONICS	77	0.69%
20	INTERNATIONAL JOURNAL OF HYDROGEN ENERGY	76	0.68%
21	JOURNAL OF NON CRYSTALLINE SOLIDS	74	0.66%
22	JOURNAL OF PHYSICAL CHEMISTRY C	74	0.66%
23	INTERNATIONAL JOURNAL OF ADVANCED MANUFACTURING TECHNOLOGY	71	0.64%
24	APPLIED CATALYSIS B ENVIRONMENTAL	68	0.61%
25	JOURNAL OF COLLOID AND INTERFACE SCIENCE	67	0.60%

3.6 Authors of the papers

Table 7 shows the output distribution of individual researcher's SCI academic papers in WUT. It is based only on the authors and does not distinguish the primary author, the corresponding author and the participating author. Excluding some abbreviations referring to several authors, the top ten authors in the number of publications were Yu Jianguo, Zhang Lianmeng, Zhao Xujian, Fu Zhengyi, Shen Qiang, Zhang Qingjie, Liu Hanxing, Mai Liqiang, Tang Xinfeng and Chen Wen in turn. On the one hand, these prolific researchers all come from material science and engineering disciplines, which also support the

dominant position of Wuhan University of Technology in the field of materials; on the other hand, these researchers have been devoting themselves in scientific research for decades and have accumulated a solid research foundation.

Table 7   Distribution Statistics of Authors

NO.	Authors	Records	Percentage	NO.	Authors	Records	Percentage
1	YU JG	499	4.47%	6	ZHANG QJ	266	2.38%
2	ZHANG LM	423	3.79%	7	LIU HX	250	2.24%
3	ZHAO XJ	400	3.58%	8	MAI LQ	239	2.14%
4	FU ZY	275	2.46%	9	TANG XF	229	2.05%
5	SHEN Q	268	2.40%	10	CHEN W	215	1.93%

4 Conclusion

Based on the retrieval results of SCI data in Web of Knowledge, this paper makes a detailed statistical analysis of the literature, and further analyzes the document types, research areas, hot cooperation organizations and countries, source titles, authors of high yield, and so on. The following conclusions are drawn.

(1)Since 2013, with Wuhan University of Technology vigorously promoting the introduction of high-level overseas talents and young scholars with overseas doctorate degrees, the number of high-level papers published has increased dramatically. The proportion of open access journal papers in this university is only 5.5%. It indicates that the researchers of the university generally seldom choose open access journals to publish their academic achievements.

(2)The research achievements of WUT are mainly originality. Therefore, the proportion of academic achievements published in conventional scientific research papers reaches 96.1%, but the academic review papers with higher academic level and scientific research influence only account for 2%. More attention should be paid to review papers.

(3)According to the distribution of scientific research papers, the top four disciplines of Wuhan University of Technology are materials, chemistry, engineering and science. Among them, nearly half of the academic achievements can be classified into materials, reflecting the strong position of materials in Wuhan University of Technology.

(4)The countries that have closest cooperation and exchange activities with Wuhan University of Technology are the United States, Japan, the United Kingdom, Australia, Korea and Canada. Among them, the United States, Japan and the United Kingdom, as the world's most powerful scientific research countries, lead the foreign scientific research exchanges and cooperation of Wuhan University of Technology. Germany, a scientific and technological power known for its rigorousness, is not working closely with Wuhan University of Technology, is only ranking eighth. Tokyo University, King University of Saudi Arabia, University of Michigan, Delft University of Technology in the Netherlands and etc. are the organizations that have closest cooperation with Wuhan University of Technology.

(5)National Natural Science Foundation of China is the most important type of funding for Wuhan University of Technology, and its contribution accounts for more than 42%. The Fundamental Research Funds for the Central Universities (2) is the second major funding for WUT's scientific research achievements, accounting for 13.3%. National Basic Research Program of China 973 Program is following after, accounting for 6.7%. Natural Science Foundation of Hubei Province and China Postdoctoral Science Foundation also provide strong funding support.

(6)Wuhan University of Technology has obvious advantages in the field of traditional building materials and concrete materials, which is especially presented by the number of academic papers published in the hot concrete building materials journal Construction and Building Materials. But in the whole, in the Statistical ranking of source titles, there are only five journals included in the Q1 journal division.

According to the detailed documental information analysis based on the retrieval results in Web of Knowledge, the university can comprehensively, accurately and concretely analyze the specific SCI journal papers under a certain retrieval conditions, which can further guide the scientific research decision and planning well.

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Comparative Analysis of Innovations in Operation Mode Between Alliance Francaise in Wuhan and Confucius Institute at the University of Lorraine

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Abstract: With the rapid development of the economic globalization, the transmission and promotion of languages and cultures are paid special attention to by many countries throughout the world and are even recognized as the representation of the impact and the overall strength of a nation, especially for some developed countries with long history. Alliance Francaise, established in 1883 in France, serves to spread French language and French culture, a century of healthy development of which has received worldwide attention and praise. Set up in 2004, The Confucius Institute as an emerging institute of language and culture transmissions also impresses the world with its speed of development and its greatness of influence. By means of interviews, the comparative analysis and the case study, this paper takes Alliance Francaise and Confucius Institute at the University of Lorraine as examples, analyzing the practices and effects of innovations in operation modes of Alliance Francaise as well as the insufficiencies of Confucius Institute at the University of Lorraine under the cultural turn of global competition by looking deep into theiroperation mechanisms and teaching management modes. The paper comes to the conclusion that Confucius Institute of the University of Lorraine may take lessons from Alliance Francaise's innovative practices in terms of the fund-raising, the teacher training and the cultural transmission so as to better achieve the cultural integration and mutualism of languages.
Key words: Alliance Francaise in Wuhan; Confucius Institute at the University of Lorraine; Operation mechanism; Teaching management mode; Comparative analysis; Innovation

1 Introduction

With the advance of globalization, an increasing number of countries are expecting their national thoughts in politics, economies, cultures and educations to spread all over the world, facilitate international understandings, and promote world peace. The importance of languages as one of the carriers of human thoughts is self-evident. Since the establishment of Alliance Francaise in 1883, similar organizations have been set up successively, including the British Council in 1934, The Goethe Institute in 1951, Japanese Research Center in 1985 and Instituto Cervantes in 1991. After a century of quiescence, China's first Confucius Institute was also established in South Korea in the year of 2004. The following fourteen years witnessed the prosperity of the Confucius Institutes sprouting up all over the world.

At present, many scholars have carried out researches on Confucius Institutes at abroad, the main results of which are as follows. First, some mainly study the impacts of the cultural soft power of Confucius Institutes. For example, Guan Xiulan (2015) believes that Confucius Institutes have a positive influence on the process of constructing China's overseas image. Second, some focus on the problems existing in the rapid development of Confucius Institutes, such as Zhou Luming's article that (2011) thinks the strategic orientation and job function of Confucius Institutes to be not clear enough. Besides, Xu Lihua (2016) points out that Confucius Institutes are faced with the lack offunds, venues, and management staff, weak teachers and other problems. Third, others notice problems in the development between excellent foreign language promoting institutions and Confucius Institutes, such as Guan Xiaohong who (2015) puts forward that the school-running model of Alliance Francaisehas a certain significance in the sustainable development of Confucius Institutes, and Lv Dong (2016) who discusses the enlightening effect of the teachingdevelopment of Alliance Francaise on the overseas promotion of Chinese international education. However, in accordance with the present research situation, there are many macroscopic studies, lack of microscopic studies, which focus more on generalization, but lack any deeper investigations. In the context of the global competitive culture shift especially, Confucius Institutes have ushered in an important transition period, marking the change-from the promotion of quantity to the overall optimization of quality, connotation and function. So, it is urgent to carry out an innovative study on the operation and management of Confucius Institutes.

Therefore, this paperselects two representative branches of language promotion organizations, namely-Alliance Francaise in Wuhan and Confucius Institute at the University of Lorraine, and compares the transformation and development of their operation mechanism and teaching models under the new situation, so as to put forward some innovative management measures and suggestions conducive to the sustainable development of Confucius Institutes.

2 Overview of Alliance Francaise in Wuhan and Confucius Institute of the University of Lorraine

Established in Paris, France, in 1883, Alliance Francaise is a global organization devoted to the transmission of French language and culture. At present, it has opened 1040 schools in 136 countries. Affiliated with French Foreign Minister and Wuhan University, Alliance Francaise in Wuhan set up in 2002 is the only officially recognized language training institution in the Mid-South China. Tackling constantly emerging problems in the developing process with great innovation, Alliance Francaise in Wuhan has grown into one of the most influential Alliance Francaise in the nation.

Established by the Chinese government to respond to the intense competition of the international promotion of languages and to meet the huge demand for Chinese language learning in the craze for Chinese language worldwide, the Confucius Institute is a non-profit educational institution abroad aiming at the promotion of Chinese language and culture. There have been 511 branches over 140 countries and regions. In 2011, Confucius Institute of the University of Lorraine was jointly established by Alliance Française in Wuhan and University of Lorraine in France and became the 15th Confucius Institute in France. Both as non-profit independent organizations for culture exchanges, Alliance Francaise in Wuhan and Confucius Institute of the University of Lorraine share the similar principle and policy, making them both temporally and spatially comparable.

3 The Comparison of Operation Mechanism

The paper draws the conclusion from large amounts of first-hand information collected from interviews with the Chinese principals of the two institutes that Alliance Francaise in Wuhan has achieved significant effects by innovating constructing modes, safeguard mechanisms in raising funds and management systems under the new situation, and meanwhile, Confucius Institute at the University of Lorraine is still at the exploratory stage and calls for a joint effort of the government and the partner institute to make a change.

3.1 The way of running schools

Alliance Française takes franchised mode. The headquarters authorizes the franchise license according to set standards and local institutions run schools in an independent way and are responsible for their own profits and losses. Alliance Francaise in China tends to cooperate with prestigious universities to elevate its level and impact. In 1999, the proposal made by Wuhan University to appeal to Alliance Francaise to jointly establish Alliance Francaise in Wuhan was submitted to the headquarters of Alliance Francaise in Paris, France. After series of discussions of its feasibility, the proposal was granted, followed by the establishment of Alliance Francaise in Wuhan and the appointment of the first principal nominated by the French side. In addition to the cooperative relations established with universities in Wuhan, Alliance Francaise in Wuhan also reinforces its cooperation with Wuhan municipal government and other local large-scale enterprises to accelerate its development in Wuhan.

The Confucius Institute takes a partnership mode, set up jointly by the headquarters, the foreign host universities and its Chinese partner institute. Confucius Institute at the University of Lorraine is established jointly by the China National Office for Teaching Chinese of Foreign Language, Wu Han University of Technology and University of Lorraine in France, with each side determining their own efforts and depth of participation in the cooperation.

In terms of the way of running schools, it is evident that both choose to cooperate with local prestigious universities. Nevertheless, Confucius Institute at the University of Lorraine can still take lessons from Alliance Francaise in Wuhan's innovative practiceof working closely with the local government, enterprises and cultural institutions.

3.2 The financial resources

Alliance Francaise in Wuhan is financed mainly through the French government, self-raised funds from enterprises and foundations, and their incomes from French language and culture teaching activities. In order to further the transmission of the French language and culture, the foundation of Alliance Francaise innovates the mechanism to guarantee funding, with the government providing only

initial capital at the start of the operation andthe tuition revenue making up for the major expenditure in running the operation.

When it comes to the Confucius Institute, the annual operating cost is raised jointly by organizers both at home and abroad. According to Confucius Institute Charter, each supplies for the half load. As indicated in the following table, however, despite incomes of language and cultural activities and sponsors of Lorrain district, most expenses of Confucius Institute at the University of Lorraine are paid by the Chinese government.

Table 1　Operation in 2017(€)

details	Expenses			Income		
	Expenses	University of Lorraine	Partners of the University of Lorraine	Income	University of Lorraine	Partners of the University of Lorraine
reception	5,630,23					
Promotion activities	8,305.44					
Traditional festival celebrations	7,512.20					
language and cultural activities	877.79			13,289		
service charge	5,036.82	53,935.47				
Site fee	6,035.05	57,187.06	14,372.40	3,300		
International exchange activities	16,509.77					
Culture experience activities	6,859.87					
office supplies	2,827.54					
Competition(Chinese bridge)	2,434.28					
sponsors of Lorrain district				10,000		10,000
Appropriation of the Chinese government.				38,569.96		
Total	62,028.99	111,922.53	14,372.40	65,158.96	0	10,000

Compared with the market-oriented financing pattern of Alliance Francaise in Wuhan, it is apparent that the guarantee mechanism of funds in Confucius Institute at the University of Lorraine is still to be further innovated.

3.3 The organizational management mode

Table 2　The Organizational Management Mode

	Alliance Francaise in Wuhan	Selection Policy	Confucius Institute at the University of Lorraine	Selection Policy
Administrative and teaching faculty	China Principal	Selected by partner institution	China Principal	Selected by the NOCFL
	French Principal	Selected by French Foreign Ministry	French Principal	Selected by partner institution
	Professional teachers(40) Administrative staff(20) Part-time teachers (10)	Professional teachers with FLE	Chinese teachers (3) Administrative staff Part-time teachers(3)	Chinese major or teachers and students with better French selected by the NOCFL
	Working Area	3000 square meters		60 square meters

As indicated in the above Table 2, Alliance Francaise in Wuhan and Confucius Institute at the University of Lorraine also differ in the management team.Alliance Francaise in Wuhan is jointly managed by the Chinese principal and the French principal. As for Confucius Institute at the University of Lorraine, the Chinese principal and French principal are core members of the management team, which not only helps theinstitution fully integrated into the local customs but also maintains a favorable cooperative relationship with the country of the target language.

In terms of the teaching faculty, Confucius Institute at the University of Lorraine is slightly inferior. For one thing, the number of teachers is less than the one-eighth of that ofAlliance Francaise in Wuhan. For another, only teachers with FLE can be admitted byAlliance Francaise, while pre-service training of six month can make one qualified for a Chinese teacher or volunteer to be selected by the NOCFL.

4 The Comparison of Teaching Mode

With respect to the teaching mode, this paper compares the innovative strategies of the two language institutes under the new situation in terms of thecurriculum and the cultural transmission.

4.1 Curriculum

More than 4000 students are annually enrolled inAlliance Francaise in Wuhan, accomplishing 600 thousand of school hours and ranking first among all teaching bases ofAlliance Francaise in China, the achievement of which is closely related to its diversified curriculum. As shown in the Table 3, the courses ofAlliance Francaise in Wuhan can be further categorized into application-oriented courses and characteristic courses. The orientation of the course is adjusted according to different needs of French language learners under the precondition of combining features of economy and humanity of the three towns of Wuhan. For example, the region where the Zhuankou campus is located is a gathering place of French enterprises in which many employees are exposed to French language for work reasons, especially the highly professional French language like scientific French. Therefore, the Zhuankou campus increases the number of intensive language classes. As for Wuchang which is a center of education and high-tech industries as well as the headquarters ofAlliance Francaise in Wuhan, there are intermediate and advanced interest classes for lovers of French languages, covering a wide range of cooking, wine-tasting, drama, dancing and practical French for traveling and so on. Since 2016,Alliance Francaise in Wuhan has also begun to work with universities in Wuhan in the establishment of off-campus internship bases, extending the new mode of university-enterprise cooperation.

Table 3   Comparison ofConfucius Institute At the University of Lorraine And Alliance Francaise InWuhan In Curriculum

	Test-orientated Courses	Featured Course	Joint Programs
Alliance Francaise in Wuhan	Basic French, Intensive Oral French, French Writing, Tutoring for Interviews, Sprint Courses on TEF/TCF, Sprint Courses on DELF/DALF, Professional French and so on.	Scientific French Pre-intermediate, Intermediate and Advanced Interest Classes for Lovers of French Languages, Experience-Based Winter/Summer Courses for Teenagers.	off-campus internships jointed established by different universities, such as Wuhan University of Technology and Huazhong University of Science and Technology
Confucius Institute at the University of Lorraine	Pre-intermediate, Intermediate and Advanced Chinese, Intensive Courses for Proficiency Tests	Training Courses for the Faculty and Staff of the University of Lorraine in France; Calligraphy, Tai Ji, Weiqi and Tea Art.	Movie Appreciations jointly established with University of Lorraine in France

Five years since its establishment, Confucius Institute at the University of Lorraine has offered intensive language courses including the pre-intermediate, intermediate, and advanced Chinese courses, intensive courses of Chinese language for proficiency tests, and training courses for the faculty and staff of the University of Lorraine in France as well as courses of traditional Chinese culture including calligraphy, Tai Ji, WeiQi and tea art. Multiple ways of advertising and great efforts have won them more than 1100 students.

In conclusion, curriculums of both institutions have their own characteristics. Both fit the customs of local culture and education, achieve the goals of educates and adjust timely to match the features of students.

4.2 Cultural Activities

Both Alliance Francaise in Wuhan and Confucius Institute at the University of Lorraine have achieved transitions of the output content from a language-and-culture-oriented one to a cultural-promotion-oriented one, of target audience from elite education to mass education and of the output style from classroom teaching to mass communication. And both cultural activities have developed into a distinctive journey of culture that accord with their own characteristics and local traditions and conventions.

One of the founding purposes ofAlliance Francaise in Wuhan is to demonstrate French language and culture, and promote the development of local artists and culture. To meet the goal, not only does it form a network of French language training and cultural transmission coving the largest scale in the Central China, it also sees it as its own responsibility to provide the public with cultural activities ofhigh quality. It builds a long-term stabilized partnership with the cultural office of French Consulates General in Wuhan. In addition to its important roles in the China-France Culture Year and the China-France Cultural Spring,Alliance Francaise also holds regular cultural activities in the form of exhibitions, lectures, concerts and meetings throughout the year incessantly. Besides, the "Madames' Club[1]" held by "Transcultural Appointment" at regular intervals has also become a highlight of innovation in the transmission of French culture in Wuhan region.

Apart from the language teaching,Confucius Institute at the University of Lorraine also carries out a series of featured cultural programs, such as the Chinese Summer Camp, the study-tours to China for undergraduates, the celebrations of traditional Chinese festivals, the lecture series of Chinese studies and so on. Each year, the Confucius Institute gives courses on the martial art and Tai Ji but gains little success with only less than 30 students enrolled, not to mention its little impact on promoting and transmitting the traditional Chinese culture.

5 Inspiration

Americanlinguist Sapir once points out in *Languages* that there are things lying behind the language and it is never possible for language to be alive without culture. The reason whyAlliance Francaise in Wuhan can secure a lasting foothold in the region is that it seizes the cultural property of language and makes itself an important media for cultural transmission by closely combining language learning and cultural promotion. There is no denying thatAlliance Francaise in Wuhan and the Confucius Institute at the University of Lorraine function almost in the similar way when it comes to the language and cultural promotion,Confucius Institute at the University of Lorraine established in 2011 is still an uprising brand that is relatively insufficient in the ways of running schools, the fund-raising, the faculty strength and cultural transmission. From the analysis above, we find that there are certain innovative practicesof Alliance Francaise in Wuhan that can be learned byConfucius Institute at the University of Lorraine.

Firstly,Alliance Francaise in Wuhan is a non-profit institution but takes a market-oriented mode of operation. It operates independently and is responsible for its own profits and losses. In contrast, the Confucius Institute at the University of Lorraine regards Chinese government as its major financial resource to guarantee teaching and cultural activities. And the dependence on government usually continues for a long time. In fact,Confucius Institute at the University of Lorraine can attempt to build a mode of an integration of enterprises and schools. Not only should it develop itself by industrializing itself and contribute to local economic development, but also should strengthen the cooperation with local universities, cultural organizations, overseas education agencies and enterprises to achieve mutual benefits.

Secondly, all French teachers inAlliance Francaise in Wuhan are qualified with FLE and all their Chinese teachers have received professional trainings in universities. Although most teachers inConfucius Institute at the University of Lorraine are able to complete teaching tasks, there are still teachers speaking nonstandard Chinese, lacking basic theories and knowledge, knowing little about the feature of foreigners learning Chinese or applying inappropriate teaching methods. What's more, some teachers start teaching only after a short period of training, and thus lack necessary professional quality. As a matter of fact, merely being able to speak Chinese is far from being a real qualified Chinese teacher. Besides, only some of them can speak French but a larger proportion lack the required knowledge of French language.

Consequently, when faced with students, especially the beginners, most teachers lack the ability to communicate and hence the teaching result is unfavorable. Therefore, the development ofConfucius

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[1] Zhuankou economic and technological development zone in Wuhan has attracted the investment of many French enterprises, bringing large numbers of French employees to work on this fresh foreign land. The Zhuankou campus of Alliance Francaisein Wuhan thus becomes the gathering place for the family of the French employees by setting up Chinese courses to help them better adjust to the new life and understand the local customs. Frenchmadams also voluntarily group together and work with Alliance Francaise, trying to expand and enrich culturalcommunications. At present, they gather once a month to hold activities on the theme of "Transcultural Appointment" to spread French culture, enhance mutual understanding of each other from multiple aspect and promote cultural fusion.

Institute at the University of Lorraine cries out for breaking obstacles of insufficient teachers. It should cultivate a team of Chinese teachers of large number and high quality and of profound understanding of French culture. At the same time, the scale of training programs for local teachers should also be expanded.

Finally, in terms of cultural transmissions,Alliance Francaise in Wuhan aims at presenting French language and culture and promoting the development of local artists and local arts. By comparison,Confucius Institute at the University of Lorraine focuses more on language teaching but is insufficient in cultural activities. Therefore,Confucius Institute at the University of Lorraine should take lessons fromAlliance Francaise in Wuhan to let culture act as the major character on the stage constructed by language. It should also go out of the classroom, make the most of resources both at home and abroad and give full play its own role as the cultural medium in order to promote exchanges and cooperation between domestic and overseas artists and between the home of the Confucius Institute and Chinese cities and regions.

6 Conclusion

The above comparative analysis reveals that both the Confucius Institute at the University of Lorraine andAlliance Francaise in Wuhan cooperate with prestigious universities and enjoy high-class management teams and educational programs that fit their own development. However, in terms of the fund-raising, the faculty team and the cultural transmissions,Confucius Institute at the University of Lorraine is still slightly inferior and thus needs to expand and develop new channels of fund-raising, normalize the structure of teaching faculty and deepen the reform of modes of cultural exchanges so as to solve the problems in its progress and guarantee its sustainable development.

As the first brand of the"going out" of Chinese culture and flagship product of the promotion of Chinese language and culture,Confucius Institute at the University of Lorraine is also the very first attempt of Wuhan University of Technology to cooperate with French universities in running schools. In the current environment of rapid development,Confucius Institute at the University of Lorraine should pay special attention to themaintenance of the rational thinking. Based on reflections on previous experiences and achievements, it should take a reasonable lesson fromAlliance Francaise in Wuhan from all perspectives to secure its benign operation and sustainable development. Only in this way can it play an active and strategic part in China's cultural soft power in a steady and efficient way and promote China-France cultural communications and exchanges.

Acknowledgement

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Research on Influencing Factors of Independent Learning of Undergraduates and Motivation Raising

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Abstract: The independent learning state of undergraduates has a direct influence on the students' academic performance, construction of study style and talents cultivation quality in colleges. Starting from theoretical research and practical experience of college management and combining the existing findings of domestic and foreign research on independent learning, the research made an aggregate analysis and proposed the prediction indices system for influencing factors of undergraduates' independent learning and compiled questionnaires of undergraduates' independent learning. The factor analysis was adopted for analysis and processing of survey data, and 7 variables were extracted as common factors and respectively named as learning attitude, interest in major, application for college entrance, quality of teaching, examination disciplines, learning objectives and learning environment. The conclusions were drawn after analysis, to provide suggestions for rationalization of improvement on the undergraduates' independent learning in colleges.

Key words: Factor analysis; Independent learning; Influence factor; Motivation raising

1 Introduction

Learning is the bounden duty of students and their principal task. The state of independent learning of undergraduates directly influences the academic performance, construction of study style and talents cultivation quality in colleges. However, in face of restless society, the undergraduates are prone to have blundering psychology, and their state of independent learning is not satisfactory: many of them are learning passively, the online game, smart phone and fragmented media information significantly impact their independent learning, the students lack motivation of actively and voluntary learning, leading to prominent problems such as no learning in normal times but cramming before examination, etc.

As the major learning style of undergraduates, the independent learning is influenced by a great many factors, such as students themselves, campus atmosphere, home environment, teaching level, colleges' management mode, etc. To research the influencing factors of undergraduates' independent learning entails analyzing and processing various factors to explore and pinpoint the major factors to constitute a reasonable system structure.

2 Data and Methodology

With 355 undergraduates in a college as objects of study, the research consulted literature to absorb related indices, instituted preliminary indices system framework model, and interviewed colleges leaders, teachers and counselors to verify and optimize the indices system, to finally form an predictive indices system for influencing factors of undergraduates' independent learning, then preliminarily selected 35 observation indices under six categories of variables such as learning interest, motivation, methods, personal planning, learning climate, teaching condition to fabricate questionnaire.

The objects of research herein were very sensitive to education and teaching condition of school and institute, own learning state, and existing learning problems , which can ensure the reliability and validity of data source. The questionnaire survey was anonymous to ensure the principle of "value neutrality". The questions of questionnaire were all designed using Likert five scale method: for the questions of importance level, 1 represents the least important, and 5 represents the most important; for questions of satisfaction, 1 is the least satisfied, and 5 is the most satisfied. Part of questions data was inverted, and corresponding adjustment was made in data preprocessing stage. The questionnaire is feasible to research the undergraduates' state of independent learning and the influencing factors.

The survey altogether dispensed 355 questionnaires, recovered 348, weeded out 5 invalid ones to lastly obtain 343 valid data. The SPSS software was adopted to analyze and process the data. The paper mainly researches the correlation between the independent learning state of undergraduates and related influencing factors. After data preprocessing, correlation analysis and experimental examination, some indices with lower correlation coefficient were deleted and finally 21 indices under 5 categories were selected for factor analysis.

Table 1   Questionnaire questions for the included analysis objects

Variable	Question index
Interest in major (A1)	Driving factors for selection of the major (A1-1)
	Whether you feel optimistic about prospect of major (A1-2)
	Correlation between the most desired major and the currently learned major (A1-3)
	Whether you are satisfied with your current school (A1- 4)
	Whether you like current major (A1-5)
	The parental influence in filling the application form for college entrance examination (A1-6)
	The teacher influence in filling the application form for college entrance examination (A1-7)
Learning motivation (A2)	Current learning momentum (A2-1)
	Current effort level in learning (A2-2)
	Current general condition of learning (A2-3)
	Class attendance (A2-4)
	Own requirements on attending state (A2-5)
	The opinion on "pass is OK, no matter high or low score" (A2-6)
Learning method (A3)	Cognition about learning objective (A3-1)
	Setting of current learning objectives (A3-2)
	Preview before class for important courses (A3-3)
	After school learning (A3-4)
Climate for learning (A4)	Have you cheated in examination (A4-1)
	Influence of learning state of surrounding students on your learning (A4-2)
Teaching condition (A5)	Evaluation on teachers' teaching attitude (A5-1)
	Evaluation on teachers' teaching method (A5-2)

3 Empirical Research

3.1 Analysis on reliability and validity

The data was preprocessed to weed out the invalid questionnaires and redundant indices before using SPSS17.0 software for reliability and validity analysis. The result shows that the effective rate of samples were 98.56%, and the Cronbach's α coefficient based on total scaling of standard items was 0.787, higher than 0.7, indicating high reliability. Thus, the measurement questions and variable concepts in the questionnaire can be regarded as consistent and the survey result as consistent too.

In the meanwhile, the KMO and Bartlett sphericity test showed that Kaiser-Meyer-Olkin metric value was 0.799, so the initial samples were fit for factor analysis. On the other hand, the significance value in Bartlett test was 0.000, smaller than 0.05 of significance level, indicating that there exists correlation among variables and they are fit for factor analysis.

Table 2   Result of KMO and Bartlett Test

KMO and Bartlett's test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.799
Bartlett's Test of Sphericity	Approx. Chi-Square	2371.598
	df	210
	Sig.	.000

3.2 Variable communality and variance devoting rate of factor

The calculation via SPSS software derives the result of variable communality, which is generally greater than 0.7, indicating that the extracted general factor basically reflects more than 70% of information of initial variable, so the result of factor analysis was satisfactory.

According to result of variance devoting rates of factor (table 3) and scree plot (Fig.1), the initial 21 independent variables' dimensions have been reduced to 7 common factors. It is observed from the

column of cumulative percent variance (CPV) in table that sum of eigenvalues of the 7 common factors accounts for 67.748% of total eigenvalues, i.e. the newly produced 7 latent variables contain 67.748% of information quantity of initial 21 independent variables, so the first 7 can be extracted as principal factor, i.e. latent variable.

Table 3   Variance Devoting Rates of Factor

| Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.179	24.664	24.664	3.674	17.495	17.495
2	2.448	11.659	36.323	2.199	10.472	27.967
3	1.550	7.380	43.702	1.981	9.431	37.398
4	1.463	6.969	50.671	1.887	8.987	46.385
5	1.416	6.743	57.415	1.835	8.740	55.125
6	1.159	5.521	62.936	1.514	7.207	62.332
7	1.011	4.812	67.748	1.137	5.416	67.748
8	.788	3.751	71.499			
9	.674	3.210	74.709			
10	.657	3.128	77.837			
11	.625	2.975	80.812			
12	.567	2.700	83.512			
13	.535	2.546	86.058			
14	.485	2.312	88.370			
15	.449	2.138	90.508			
16	.422	2.011	92.519			
17	.393	1.872	94.390			
18	.346	1.649	96.039			
19	.313	1.489	97.528			
20	.278	1.324	98.853			
21	.241	1.147	100.000			
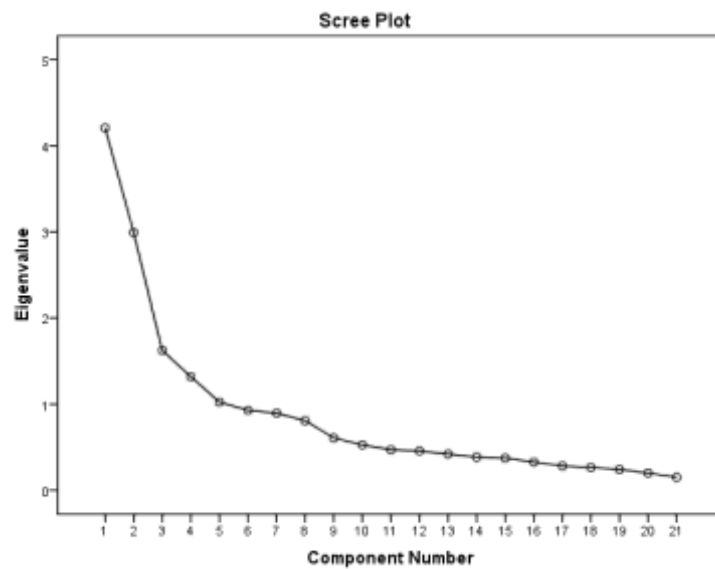
Figure 1   Scree Plot

The maximal variance method was adopted for orthogonal rotation to enhance the interpretability

of each factor variable, then 25 iterations were conducted, with result being as shown in table 4:

Table 4   Factor load matrix

	Component							
	1	2	3	4	5	6	7	
After school learning (A3-4)	0.756	0.185	0.077	0.108	0.109	0.214	0.135	
Current effort level in learning (A2-2)	0.753	0.215	0.103	0.12	-0.084	-0.055	0.057	
Current general condition of learning (A2-3)	0.75	0.256	0.114	0.027	0.014	-0.003	-0.027	
Own requirements on attending state (A2-5)	0.737	0.001	0.069	0.02	0.013	0.354	0.125	Learning attitude
Class attendance (A2-4)	0.688	0.058	-0.153	0.095	-0.155	-0.268	-0.111	
Current learning momentum (A2-1)	0.63	0.173	0.141	0.222	0.026	0.145	-0.25	
Preview before class for important courses (A3-3)	0.476	0.082	0.255	0.164	0.394	0.41	0.132	
Correlation between the most desired major and the currently learned major (A1-3)	0.106	0.784	-0.027	0.043	-0.083	0.215	0.127	
Whether you like current major (A1-5)	0.29	0.748	0.085	0.097	-0.018	0.036	-0.015	Interest in major
Whether you feel optimistic about prospect of major (A1-2)	0.306	0.656	0.149	0.072	0.089	-0.094	-0.074	
The parental influence in filling the application form for college entrance examination (A1-6)	0.062	0.158	0.803	0.091	-0.01	0.005	-0.045	
The teachers' influence in filling the application form for college entrance examination (A1-7)	0.148	0.079	0.788	-0.068	0.094	0.083	0.053	Application for college entrance
Driving factors for selection of the major (A1-1)	0.083	-0.317	0.508	0.049	0.367	-0.236	-0.051	
Evaluation on teachers' teaching attitude (A5-1)	0.111	0.059	0.066	0.872	-0.163	-0.015	0.056	Quality of teaching
Evaluation on teachers' teaching method (A5-2)	0.209	0.1	-0.022	0.847	-0.014	0.096	0.033	
Have you cheated in examination (A4-1)	-0.004	0.064	-0.069	-0.083	0.814	-0.173	0.073	Examination disciplines
The opinion on "pass is OK, no matter high or low score" (A2-6)	-0.08	-0.074	0.26	-0.118	0.803	-0.061	-0.173	
Setting of current learning objectives (A3-2)	-0.082	-0.043	0.343	0.029	0.141	-0.671	0.093	Learning objectives
Cognition about learning objective (A2-3)	0.097	0.123	0.301	0.104	-0.211	0.669	-0.094	
Influence of learning state of surrounding students on your learning (A4-2)	0.113	0.255	-0.003	0.348	0.065	-0.132	0.733	Learning environment
Whether you are satisfied with your current school (A1-4)	0.136	0.413	-0.004	0.335	0.272	0.025	-0.62	

The factor load matrix in table 4 shows that the variables have been reduced to 7 factors. According to composition of factors, each factor was explained as follows after logic analysis:

Factor 1 included seven variables such as after school learning (A3-4), current effort level in learning (A2-2), current general condition of learning (A2-3), own requirements on attending state (A2-5), class attendance (A2-4), current learning momentum (A2-1), preview before class for important courses (A3-3), which were summarized and named as learning attitude, being the most important factor. The factor 2 included three variables such as correlation between the most desired major and the currently learned major (A1-3), whether you like current major (A1-5), and whether you feel optimistic about prospect of major (A1-2), which were summarized and named as interest in major. The factor 3

included three variables such as the parental influence in filling the application form for college entrance examination (A1-6), the teachers' influence in filling the application form for college entrance examination (A1-7), driving factors for selection of the major (A1-1), which were summarized and named as application for college entrance. The factor 4 included two variables of evaluation on teachers' teaching attitude (A5-1) and evaluation on teachers' teaching method (A5-2), which were summarized and named as quality of teaching. The factor 5 included two variables of have you cheated in examination (A4-1) and the opinion on "pass is OK, no matter high or low score" (A2-6), which were summarized and named as learning objectives. The factor 7 included two variables such as influence of learning state of surrounding students on your learning (A4-2) and whether you are satisfied with your current school (A1-4), which were summarized and named as learning environment.

Through naming for the 7 factors, it was derived that among the influencing factors of undergraduates' independent learning, the learning attitude and interest in major ranked high, the application for college entrance and quality of teaching came the second, examination disciplines, learning objectives and learning environment had some influence, which, however, were relatively weaker.

4 The Analysis on Influencing Factors of Independent Learning of Undergraduates

There are 7 common factors influencing the independent learning state of undergraduates, whose influence coefficients were respectively 0.175 for learning attitude, 0.105 for interest in major, 0.094 for application for college entrance, 0.090 for quality of teaching, 0.087 for examination disciplines, 0.072 for learning objective, 0.054 for learning environment. We further jointly called learning attitude and interest in major as subjective internal factor and other factors as objective external factors, and analyzed the logical relation among factors, finding without effort that the internal factors are the primary causes while the external factors are the requirements. The external factor influences the internal factors to work. The research data and logical analysis tally with each other, which further proved the scientificity and reliability of analytic result.

4.1 The most critical factor influencing independent learning attitude of undergraduates is learning attitude

Their relatively lasting positive or negative internal response bias. A great many psychologists regarded the learning attitude as the core nonintellectual factor among heaps of factors influencing students' learning, as it determines the learning behavior and learning state of students in a manner, which is in line with the saying that "Attitude is everything". The forming of learning attitude is joint result of external environment factors and personal demands of learners, being the process of value and learning view internalization. To guide the undergraduates to cultivate correct cognition, emotion and intention for learning is of crucial importance to improvement on undergraduates' independent learning state.

4.2 The interest is the best teacher

The interest in major dominates learning enthusiasm of undergraduates and can make them actively input more into learning, thereby further improving independent learning state. In the meanwhile, "failure to fully understand the major before college entrance examination, ambiguous orientation of interest in major and future professional orientation" are the first causes influencing their interest in major. The colleges should intervene in cultivation of students' interest in major as early as possible and always pay close attention to it: In the beginning of learning, the colleges should help students to cultivate interest in major via entrance education, introduction to major, etc., and adjust the students' interest in major through changing major, cultivate interest in major in teaching of professional courses. The colleges should also continuously maintain students' interest in major with deepening of major teaching, to consolidate their interest in major practice.

4.3 The colleges' education and teaching quality

General learning style and examination disciplines, guidance of learning objectives and learning environment, etc. provide conditions and guarantee for undergraduates' independent learning. The quality of teaching has a bearing upon the survival and development of school, so the proportion of evaluation by students should be increased as appropriate in monitoring and examination and the function of teaching link in guiding of learning objectives and cultivation of interest in major should be enhanced, to attract the undergraduates to learn independently. The examination disciplines should be made strict, and the cost for cheating and speculation should be raised to build a good learning style and

satisfactory learning environment, to constrain and infect students, which can power their independent learning. Improvement on students' independent learning is a system engineering which should start from the root, grasp the stress and make internal and external efforts, to build a powerful support system to provide main power and impellent for undergraduates' independent learning, thereby improving learning state and cultivation quality.

5 The Analysis on Raising of Motivation for Undergraduates' Independent Learning

The impact of these factors and analysis of the study, we further jointly called learning attitude and interest in major as subjective internal factor and other factors as objective external factors, and analyzed the logical relation among factors, finding without effort that the internal factors are the primary causes while the external factors are the requirements. The external factor influences the internal factors to work. So as the main body for raising of power for undergraduates' independent learning, the colleges can institute corresponding excitation policies to raise the motivation of undergraduates' independent learning.

5.1 The current evaluation system of "mark first" should be optimized

The examination and assessment mechanism should be combined in teaching, to more powerfully stimulate undergraduates to learn independently to the largest extent to realize the objectives set in school. Furthermore, the introduction, propaganda and training of school resources and introduction activities of independent learning should be increased to better guide the undergraduates in using and understanding the resources and materials of independent learning.

5.2 The education on independent learning and teaching system should be organically fused

Such as actively researching education and teaching that are combined with education on independent learning, actively using new technologies such as multimedia to innovate class form. "Flipped classroom" has become a rising teaching model, in which, information technology serves as support, the teachers' role is the learning guider via the video-based instructional resources, while the students are the major players of learning who watch and learn the video in class and consolidate and explore the knowledge via various classroom activities. In recent years, the concepts of micro-class and flipped classroom have gradually become known to people, so the college teachers and managers should highly value them.

5.3 The independent learning should be combined with career planning

The career planning means an individual combines own practical situation and current opportunities and constraints to set professional objectives for himself/herself, select the path to advance, and define action direction, time and scheme for achieving professional career and ideal life goal.

5.4 Arrange corresponding teacher resources and establish related advisory services

The colleges should arrange corresponding teacher resources and establish related advisory services to timely counsel the undergraduates for the problems and puzzles in independent learning. As the students lack an objective cognition about themselves, leading to overrating or underrating of own capacities, etc., counseling can highlight a direction for their independent learning.

5.5 Lectures and exchange activities of various forms should be held

Such as inviting excellent alumni and professional employees to timely transfer the related information in workplace to the undergraduates, to make them understand the demands for social and enterprises for undergraduates in advance, help them to make planning for independent learning and actively clarify the content scope of independent learning. The colleges should also introduce related resources, opportunities and industry prospect, etc. to make them accumulate more knowledge needed for future professional direction in school.

5.6 The colleges should well educate the freshmen

Taking their entrance as a chance to reasonably indoctrinate them with the concept of learning style in university, to make them take formation of good learning style as a habit, establish a long-term mechanism for construction of learning style. In a dozen of years before entering university, the students are under the traditional educational pattern and aim to be admitted by a good high school and a good university. What is the objective after entrance? Graduate entrance examination? Go abroad? Hunt for a good job? They are at sea. The entrance education can enable them to reflect deeply and realize that they should try to be competent for own work in future, no matter what industry or post, thereby highlighting the university objective.

6 Conclusion

With the undergraduates in a college as objects, the research adopted factor analysis method to study the influencing factors for undergraduates' independent learning, found out the major factors and their influence from a good many predicative indices, and suggested that the 7 common factors of learning attitude, interest in learning, application for college entrance, teaching quality, examination disciplines, learning objectives and learning environment are concentrated manifestations of the undergraduates' state of independent learning, thereby providing a reference frame for compiling the evaluation scale of undergraduates' independent learning state and offering scientific references for colleges to improve students' independent learning. However, the research failed to fully consider the influence of students' family, and the cumulative variance devoting rate of factors needs to be enhanced, which are the direction of future deep research.

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Research on the Class Innovation Management Platform

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Abstract: Class is the basic unitof college class management, mutual study and further contact.The construction of college class is of great significance to the development of students and student work. From the perspective of the students' development, college management, data sharing and the lifetime classes' construction, this paper studies the shortcomings and causes existing in the college class management. In the paper, we systematically propose the construction plan of the class management platform with respect to the class overview, class notification, basic information, class knowledge, class regulations, regular management, innovations and entrepreneurship, personnel style, career guidance and classmates' friendship. The proposed platform offers reference to the college class management based on big data, promotes the information sharing and the inheritance of knowledge, andprovides benefit for the students' development.

Key words: Management platform; Class; Innovation; Big data; Internet

1 Introduction

With the rapid development of the network technology, big data and cloud computing, especially the rapid spreading of mobile intelligent terminals, the behaviors, attitudes and values of the college students are changing inevitably. With the help of the key technologies such as intelligent sensing, wireless communication, data processing, software programming, website design and assistant decision, it can be desired to take the class as the basic management units. Class, as the basic units and front camps of the campus life, is playing important roles in building dynamic, open and shared data information platform to improve the students' comprehensive quality and their daily management efficiency, optimize their emergency plan and share the experience of class management,and build a lifelong friendship.At the National College Ideological and Political Work Conference, President Xi emphasizedthat we mustadhere toestablishinghigh moral valuesand people's cultivationas the fundamental task of education, stick to implement theideological and political work through the entire process of education and teaching, make endeavor to provide comprehensive education and create a new situation of the higher education development in our country. "Yiban" is an advanced platform for ideological education and class management in colleges and universities.It has set up student work stations in the campus, and also provided topics, photo albums, and network disks for class construction. However, the platform mainly relies on the rich and colorful culture activities, while it lacks thesystem construction of the class information platform. Zeng Linghua (Zeng Linghua, 2015) has constructed class information platform based on school basic data and class appraisal management, and carried out the verification. However, the research mainly focused on the functional department of the primary and middle school class, the subjects' behavior was relatively simple, the scope of activity was relatively small, and it did not conform to the requirements of college students' autonomy, diversity and differentiation. Chen Lili (2018) provided class information platform based on the complete information database, registration system, payment system, class public platform and class WeChat group, QQ Group, etc. The content of the study was not comprehensive, lacking basic knowledge, class system, class activities and systematic thoughts on innovation and employment guidance. Dong Lei (Dong Lei, 2014), Yang Xiaohui (Yang Xiaohui, 2013), Wang Yuanyuan (Wang Yuanyuan, 2011), Lin Yan (Lin Yan, 2017), Sun Weiwei (Sun Weiwei, 2016) and Fei WeiWei (Fei WeiWei, 2018)carried out the research on college student' work from the aspects of the WeChat public platform, promotion of instructors' information literacy, virtual class, class management strategy,class management mode,innovative management method of graduates' classunder the "Internet+" background respectively. However, the researches werelack of thesystematic refinement of the university class information platform. Therefore,from the perspective of the students' development, college management, data sharing and the lifetime class' construction, the author studies the shortcomings and causes existing in the college class management. In the paper, the author systematically proposes the construction plan of the class information platform with respect to the class overview, class notification, basic information, class knowledge, class regulations, regular management, innovations, personnel style, career guidance and classmates' friendship. The proposed platform offers reference to the college class management based

on big data.

2 The Main Problems in Class Construction under the Big Data Environment
2.1 Lack of effective regulatory enforcement
Nowadays, the rules and regulations proposed for class management in colleges and universities are relatively macro and impractical.Classes are required to enrich and improve according to each major characteristic. There are two main problems existing in this area. On one hand, the construction of the rules and regulations in the classes are uneven, and they cannot serve as guidelines to regulate the behaviors of college students. For example, among the students employed in the survey, only 29.7% had class songs, class logos, and class mottos; 39.2% did not have a complete class election system, 32.5% did not have a financial disclosure system (Nie Bangjun, 2014). On the other hand, the construction of the system is relatively independent, existing structural redundancyand lacking information sharing. For example, among the students participated in the survey, 7% knew the rules and regulations of the other classes in the same major, 3% referred the rules and regulations of the senior classes in the same major. The class rules and regulations can't be effectively implemented due to the incompleteness of the regulations, and lack of inheritance and share ability.

2.2 Lack of positive influence of class cadres
Generally, class cadres in the colleges mainly include monitor, secretary of the Youth League branch, organizing committee, publicity committee, psychology committee, art and literature committee, sports committee and class life committee. Generally, themonitor, and the secretary of the Youth League branch are generally appointed in the counselor's organization meeting. Subsequently, the monitor and the secretary of the Communist Youth League branch organize meetings to appoint othermembers. During the tenure of class cadres, the work is mainly reported to counselors, but it lacks feedback from class members. At the same time, the lack of supervision, rewards and punishment system leads to the inaction of some class leaders, which may bring down the positiveeffect of the class cadres.

2.3 Lack of formal innovation in class culture
In colleges, the class culture construction mainly includes cultural and sports activities, community activities, and class conferences. However, those activities do not appeal to the college students under the new media environment. The students are interested in the social networks that aim to emphasize individual differences, and capable of quick sharing and feedback, such as WeChat, QQ and Weibo, rather than the collective activities. This conversion reduces the cohesiveness of the class, and leads to the marginalization of some students' thoughts, behaviors and emotions, thus induces the possible problems such as reluctance to studying, indulging in online games and being disturbed by depressive and anxious motions.

2.4 Lack of long-term mechanism for scientific research and academic research
Among college students, scientific research work is mainly encouraged through the construction of study styles and the scientific research competitions. The construction of study styles mainly focuses on strengthening class disciplines, restricting computer using time, organizing group study, conducting stringent exam rules, and urging students to be self-discipline, forming a good learning atmosphere. On the other hand, the research competition cannot effectively promote the ability of academic research among students. Since it is much more difficult, students are lack of enthusiasm in participating. In terms of the construction of academic style, it shows progress periodically but lacks long-term guiding mechanism. The strict discipline conflicts with the diversification of learning resources and research interests of students under the new media environment.Thenit reduces students' interest in learning and makes them less self-confident and have improper learning attitude.

2.5 Lack of effective guidance in career planning
The education of career planning is initiated through the school entrance training, graduation training and some activities during the period. Career planning education is important for college students in recognizing the self-characteristics, clarifying the current market demand for talents and formulating study plans. Under the new media environment, there is a lack of class-level career planning guidance, career planning information sharing, and typical cases of successful careers. Further, the deficiency results in the college students indulging in the network for a long time, experiencing confusion and sluggishness.

3 The Causes of Problems in Class Construction under the Big Data Environment
3.1 Significant individual differences in technological innovation

In modern society, the development of the new media technology is rapid. There are continuous competitions among internet giants such as Baidu, Alibaba, and Tencent, as well as traditional enterprises such as Gome, Wanda, Suning, Gree. To satisfy the needs of people in every aspect of daily lives,such as food, communication and education, Didi, Alipay, WeChat and other internet products are promoted by the new media technology. The college students are keen on advanced technology and they enjoy the convenience of new media technology. At the same time, they also form a unique characteristic in the new media era. On one hand, they pursue individuality. The easier access to information, materials, transportation, and communication allows college students to have more choices to achieve personal characteristics, and this kind of differentiation is often seen as a sign of maturity and charm. On the other hand,they have weak cognitive ability and are easy to be misled. In a word, the internet technology makes it easier for college students to enjoy global information while bringing information such as gambling, pornography, trafficking, deception and brawl. The ability of students to identify the information during their active age is different, and some students are prone to be affected by negative information.

3.2 Insufficient planning of class information construction

Most college classes use QQ and WeChat to exchange daily work information, school homepages, school forums and query systems to deal with daily business. The class is no longer regarded as a unit in the class construction process.The advantage of new media technology and innovation of the college students have not been made full use to carry out information management in the class construction. The existing problems may lead to the repetition of class rules and lack of inheritance. The annual work plans formulated by class, typical achievements of class cadres, the competition and assessment of class cadres are lack of assessment and feedback. The class activities are outdated and lack of participation. As a result, the cohesiveness and team awareness are reduced greatly (Zhang Tingting, 2011). Moreover, the construction of study styles works to a certain extent, and only a small number of students are eligible to participate academic competition, leading to a lack of long-term mechanisms for academic research in the class. The lack of success achievements in career planning and correct guidance are not positive for the early career planning of college students.

From the above description, a class-level information network platform can be constructed by taking class as a unit. With the informatization and digitization of class construction, sports activities, academic researches and student career planning can be announced in the platform. Repetitive construction can be avoided, and management or learning experience of the same schools, similar majors, and classes can be enhanced. Additionally, the sharing, transmission and precipitation of the working experience can also be improved. Those advantages are of great significance for the college students' development under the new media environment.

3.3 Insufficient emotional communication between teachers and students

In general, colleges and universities should arrange the full-time positions for counselors, with the ratio of counselors to students not lower than 1:200. Actually, the full-time counselors should be dominating, and part-time counselors should also be arranged to cooperate with full-time counselors. Moreover, full-time counselors need to be arranged for each grade level in each department. There should also be a part-time head teacher in charge of each class. Due to heavy teacher-related work, arduous research topics, and the gradual promotion of new media technologies, face-to-face communication between teachers and students are declining. As a result, the interaction between teachers and students are weakened, and the problems of the students cannot be reflected to teachers promptly. To some extent, those problems will definitely affect the class construction work.

4 The Model of Class Management Platform

In the Third Session of the Twelfth National People's Congress, Premier Li Keqiang put forward the "Internet+" action plan for the first time in the government work report. The speed-up of the college class information construction as performing the "Internet + Class" work is a response to the country's policy.

The implementation of the basic management unit for college students and the information construction of the front camps is an integrated project. By making full use of the big data and cloud computing technology, the hardware and software platforms built up by the information center in the university will be helpful for management and maintenance purpose. Undergraduate students record the class work in progress, while graduate students make supplements according to their current situation, forming a virtuous circle for sharing experiences, sharing knowledge and passing on friendship.

4.1 Value the overall planning and build the organization foundation.

The value posed by the leaders of the Ministry of Education and universities and colleges is important for the class information construction program. Based on their individual characteristics, universities and colleges are responsible for the overall planning and establishment of the organizational structure for the class information construction platform. Also, universities and colleges should establish the efficient student work platform, strengthen the publicity and motivation to encourage the participation and execution of the student class information construction and management platform.

4.2 Optimize the information construction structure and build the technical foundation

The technical personnel involved in the class information construction should fully consider the creativity of the undergraduates, the software structure, hardware support, and the convenience of subsequent development and maintenance. In the process of building the software, it is necessary to take the opinions of the students into account. Attention should be paid to the differences and links existing between class APP and enterprise APP, class websites and social websites.The technical staff should contribute to the information expansion, such as texts, pictures, audios and videos, as well as the collection between the undergraduate students and graduate students, and also protect the data privacy and the knowledge accumulation.

4.3 Construct independently and enhance the students' involvement

The class information construction should highlight the related class activities, such as knowledge sharing, accumulation and transmission, and ensure the college students to develop freely. According to the author's educational practice, it is suggested that the information construction of class should include the class overview, class notification, basic information, class knowledge, class regulations, regular management, innovations, personnel style, career guidance and classmates' friendship. The construction framework is shown as Figure 1.
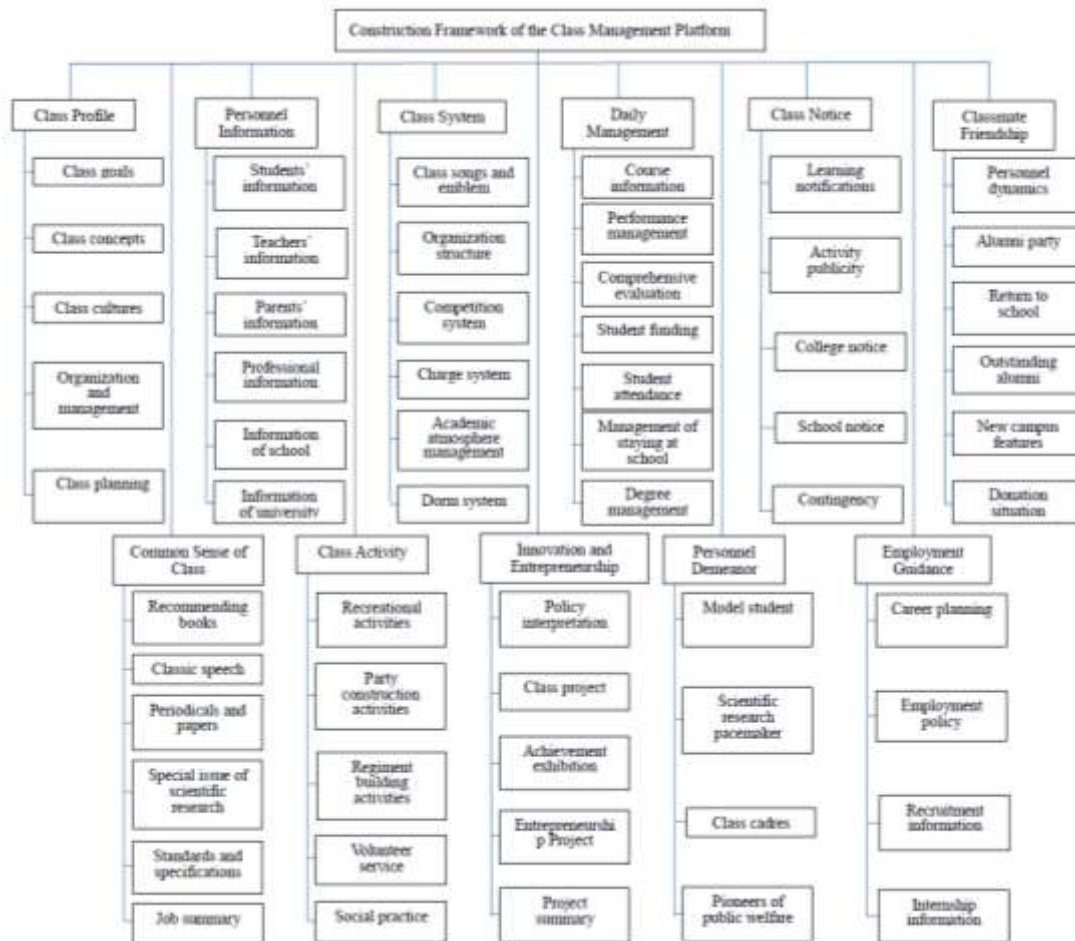

Figure 1   Construction Framework of the Class Management Platform

Four aspects are explained in detail as follows.

(1)Complete the construction of class systems

As the saying goes,nothing can be accomplished without norms or standards. With the class cadres appointed, it is desired to guide each class to complete the design work, i.e., class logos, class songs, mottos and class uniforms and so on, according to the characteristics of their major and format requirements of the Websites or apps. Furthermore, each class should complete the students' information files, and establish the dormitory management system, financial management system, mutual support system,class cadres appointment and deposition system. Moreover, it is also important to select the outstanding classes for rewards and recognitiontaking the schools, colleges and grades as units.

(2) Strengthen the construction of class culture

On behalf of strengthening the class culture cohesiveness, it is necessary to consider the class activities and individual activities as a whole, particularly the personal knowledge sharing demands. Therefore, the class members need to reserve personal videos, photos and dynamic update interfaces when conducting a wonderful video collection and writing record of cultural and sports activities, special group days and other activities. To better integrate the personal life, class cultural construction, and motivate students to enhance the belief of being a part of the class culture construction, it is necessary to create class professional culture and class sharing culture. The cultivated culture will also provide resources for reviewing the campus life.

(3) Build a platform of scientific research

In order to better promote the study style of the students, we can build information sharing and communication platforms among the graduates, school students, teachers and parents in the information construction platform. Under the same platform, the related videos and messages will be shared.The college students get the expectations from family members, teachers, and graduates through videos and messages to help them to establish correct learning attitude and strengthen the ability of independent learning.

On the other hand, it is necessary to share the regulations in the academic competitions to better support the academic abilities of students in the colleges. The unforgettable experiences, the typical moments and reports of the senior students in their academic research can be shared among students, and they should be served as study materials for junior classes. In addition, by contacting with the graduate alumni to share the related technology, knowledge and key difficulties faced in the domestic and foreign industry, students in the university will have a chance to understand the development of the industry in advance.

(4) Build a platform of career planning

To offer better guidance for college students to start their own career planning consciously from the beginning of their studies, the class information platform needs to include the contents of graduates, employers, career planning education, professional disciplines and so on. In the process of implementation, the platform will collect related businesses in our country, career planning and recruitment of the employers, and other related information. At the same time, we have access to get a better knowledge of the graduate alumni's working condition through long-distance interviews or some other ways. Such that students in the university can establish an intuitive understanding of the career planning and development, and it may also promote the students in the university to make the career planning earlier.

5 Conclusion

This paper studies the main problems and causes among the class construction under the big data environment existing in the college class management. Further, the author proposes the construction mode of the class information platform with respect to the class overview, class notification, basic information, class knowledge, class regulations, regular management, innovations, personnel style, career guidance and classmates' friendship. The proposed platform offers guidance to the college class management based on big data. The construction is aimed at promoting the construction of "Internet + class" with the help of big data, cloud computing and other technologies, achieving the connection among schools, classes, students, teachers and families, as well as graduate alumni. Moreover, the proposed measurements will help college students to complete self-positioning, future development plans, and knowledge inheritance in advance, and become a socialist builder and comprehensive successor with continuous self-improvement in knowledge, ability and communication.

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Research on the Public Welfare Development of Chinese Youth Palace

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Abstract：The core of public service is public welfare. The public welfare of the Youth Palace is the focus of education in public off-campus which is widely concerned. At present, there is no clear theoretical and specific explanation for the public welfare of the Youth Palace, either in theoretical research or in practical work. This paper expounds the basic concepts and public welfare connotations of Chinese Youth Palace, and takes Wuhan Youth Palace as an example to introduce the present situation of the public welfare practice of Chinese Youth Palace. At last, this paper puts forward some suggestions to provide guidance and help for the education institutions at home and abroad.
Key words: Youth palace; Off-campus education; Public welfare; Public institutions

1 Introduction

Chinese Youth Palace is an important place to hold youth education events, and also an important carrier to carry out the ideological and moral education of minors, with great educational and political significance (Yuan Xia, 2018). The state attaches the Youth Palace great importance of the off-campus education, and has issued relevant several policy documents to guide the managers to operate the Youth Palace. In 2006, The State Council of the Central Committee of the Communist Party of China jointly issued the Suggestions on Further Strengthening and Improving the Construction and Management of Minors Outside School Activities, which pointed out that the Youth Palace, the juvenile palace, the youth student activities center, the children's activities center, the science and technology museum and other underage public welfare places should be fully exploited, and clearly pointed out the importance of the teenager's palace is a public welfare education institution outside the school. It has been emphasized that the social welfare should always be put in the first place. This article, taking the public welfare of Chinese Youth Palace as the breakthrough point, combines the literature reading and the practice research to define the basic concepts and the public welfare connotation of Chinese Youth Palace, and takes Wuhan Youth Palace as an example to introduce the concrete practice of the development of the public welfare of Chinese Youth Palace, which has a certain reference significance in the development of the public welfare education institutions at home and abroad.

Zhu (2017), Liuzhou Youth Palace, points out that the construction of the modern teenage palace needs to define its nature and content, improve the management system and innovate the service content[1]. Wang (2016), Grammar of Changzhou Open University, studied the operation mechanism of the expansion of out of school education, and mentioned that school, community auditorium, government public facilities and various training bases could be set up as community education activity places outside the campus, and the operation cost was reduced[2].

Cutucache C E, Luhr J L, Nelson K L (2016) found that business employers often complain about students' shortage of critical thinking, problem solving and teamwork[3]. Nebraska developed a STEM out of school education program for poor students, minority students and students who do not perform well in schools. NE STEM 4U introduces college students to participate in public welfare teaching through strict recruitment standards and entry training, STEM model plans courses according to regular school teaching, but pays more attention to improving students' critical thinking and ability to solve problems. This way of teaching helps junior students improve their academic performance and enrich their social experience.

2 A Discussion on the Position of Chinese Youth Palace

In 1987, the State Education Committee and the Central Committee of the Communist Youth League on Strengthening the Work of the Children's Palace clearly pointed out that the Youth Palace (including the young house, and the juvenile palace) is a comprehensive outside school education institution for children. It is an off-campus activity place for young children and an important position for the construction of socialist spiritual civilization. The Youth Palace refers to the teenager's palace, the juvenile palace and the youth activity center, which are established by government and the Youth League Group. Also, Chinese Youth Palace is a practical class to promote the all-round development of young people, and an important position to strengthen the ideological and moral education, and a public

cultural service facility that specializes in providing extra school education for young people, and the platform for the Youth League to serve the youth directly.

The research on the position of Youth Palace is very rich in academia, as shown in Table1. Most scholars believe that the Youth Palace is a place to offer social education and off-campus education to young people, and also a public welfare unit. The concept of the Youth Palace in this article includes the common teenager's palace, juvenile palace, Youth activity center, youth museum of science, which are public service units that offer public education services with non-profit.

Table 1   Position of the Youth Palace

Scholar	Position of the Youth Palace
Shao YueFei (2003)	The Youth Palace is the main venue for young people's off-campus education. It is also a base for young people's activities and a training base for art education.
Chen YingQi (2008)	The Youth Palace is the main position of social education and the extension and supplement of school education.
Zhang LiangXun(2010)	The Youth Palace is an off-campus educational institution providing educational services to young people.
Wei MingLiang (2014)	As the main place for teenager's off campus educational activities, Chinese Youth Palace is an important support and carrier for young people's social education.
Zhang XiaoSheng(2016)	The teenager's palace is a public welfare institution with a certain social security and assistance function, and it is part of the public education system because of its educational and cultural service.
Tan ChuanChuan(2016)	The Youth Palace always has the subject buildings of science and technology, literature and art, training, sports, music and so on, equipped with parking lots and greening facilities and so on. It has offices, personnel departments, teaching and other management departments, literature department, art department, science and technology department, sports department and other business departments.

3 Main Social Functions of the Teenager's Palace

In the aspect of public service research. Tang (2014) believed that we should make full use of volunteer services to improve the service level of the Youth Palace[10]. The public cultural service function of the Youth Palace should be helpful to stimulate interest and spread scientific and technological cultural skills, and explore special talents, and also be a good position to cultivate the consciousness of inheritance. From the perspective of public welfare, combed the discourse changes of the policy of education outside the school. We can found that with the development of society and economy, the host education subject changed from the same quality to the heterogeneity, from the national interests to the individual interests, from the special activities to multiple activities, and from the complex to the convenience. Under the political and cultural background of Chinese characteristics, Chinese Youth Palace is an important place for off-campus education, and an important position to strengthen the ideological and moral education, and a public service institution to provide public education services.

3.1 Important off-campus education place

The Youth Palace is an important place for off-campus education, undertaking the function of social education outside school. Zhang (2011) from the angle of education positioning of the teenager's palace, believed that it has the function of perfecting cognition, developing personality and providing social ability[11]. By organizing kinds of activities, Chinese Youth Palace develops the sociality and personality of teenagers, cultivates social cognition, masters socialized skills and promotes the youth socialized. The Youth Palace education is a purposeful, planned and organized off-campus education with youngsters as the main object. He believes that the education of Youth Palace enriches the off-campus life of young people, makes up for the shortage of school education and promotes the development of quality education. From the angle of social security, the function of the Youth Palace is reflected in social education, social service and social assistance.

3.2 Important ideological and moral education position

Youth Palace is an important position to strengthen ideological and moral education, an important position to promote quality education and build socialist spiritual civilization. Its purpose is to guide young people to set up ideal beliefs, cultivate the consciousness of the rule of law, develop interests and hobbies, promote physical health, enhance the spirit of innovation, improve the practical ability, hammer the moral quality, and practice social responsibility. In April 12, 1957, the Ministry of Education and the

Central Committee of the Communist Youth League formally promulgated the regulations on the work of the children's house and the juvenile house. The article clearly stated that the basic task of the children's palace is to cooperate with the school for communism education for children; to cultivate them with good moral qualities; to help them consolidate and expand classroom knowledge; to enrich their cultural life; to develop their interests and talents in all aspects; to train their skills.

3.3 Public education services institution

The Youth Palace is a public welfare institution to provide public education services. The government clearly points out that the Youth Palace must adhere to the principle of public welfare, emphasizing that the social benefits should always be put in the first place. The Youth Palace, juvenile palace, youth student activity center, children's activity center, science and technology museum, and other places which provide public service for minors, are all public welfare institutions. The social benefits of Chinese Youth Palace are the top priority at the present stage, and economic benefits are only a supplement to social benefits. The teenager's palace, as the important youth outside activity place of the government, is one of the important ways to provide public education service for young people. It has important social responsibility. The property of public welfare is the root of the construction of the Youth Palace management. Zhang Liangxun (2010)pointed out that the Youth Palace education service belongs to the scope of the government youth affairs, has the very strong public nature[12]. However, because of its exclusiveness and competitiveness, it is not a pure public product. Therefore, the Youth Palace education service is quasi public goods.

4 The Concrete Practice of Chinese Youth Palace's Public Welfare Development -- Taking Wuhan Youth Palace As An Example

As one of the earliest built Youth Palace, Wuhan Youth Palace, which is the first-class palace among the whole country, has typical Chinese characteristics, and with large area and long history. Therefore, this article chooses Wuhan Youth Palace as an example to conduct a case study on the public welfare development of Chinese Youth Palace.

4.1 Development background and brief introduction of Wuhan Youth Palace

Wuhan Youth Palace, founded in 1956, covers an area of 200 thousand square meters, with a total building area of 65 thousand square meters. It is a first-class place for youth social education activities. Wuhan Youth Palace adheres to the principle of commonweal and benefits, and insists on adhering to the concept of quality education, strengthening self-construction, expanding service function, creating cultural brand, extensively carrying out practical experience activities. Up to now, Wuhan Youth Palace has cultivated a large number of excellent people, such as Sa Beining, Dong Ming and so on, and won the Ginkgo Award (excellent team award) of education in Chinese youth society for two consecutive years; and won the National Advanced Youth Palace for four consecutive times. It has been awarded honorary titles such as National Demonstration Base for Off-campus Activities for Young People and Education Base for Patriotism in Hubei Province. During the period from 2010 to 2016, Wuhan Youth Palace had been awarded 85 items such as national, provincial and municipal honors and awards, and formed 25 academic research achievements, such as The Sketch Eenlightenment Book, Wuhan Youth Palace Investigation Collection, Wuhan Youth Information Management System and so on. There are more than 1000 reports from various national, provincial and municipal media such as the Children's Palace Association, the Chang jiang Daily and so on.

4.2 The public practice of Wuhan Youth Palace

Wuhan Youth Palace insists on strengthening the ideological and moral education of young people as the core, focusing on the cultivation of innovative spirit and practical ability, focusing on the cultivation of public welfare activities with distinctive features, significant educational benefits and strong influence, constantly strengthening the mechanism and integrating resources, and trying to promote the normalization and diversification of the activities. Significant social benefits have been achieved.

(1) The Wing of Dream Warmth Studio

Wuhan Youth Palace Art Department, built in July 2011, aimed at cultivating artistic imagination and creative ability of children with autism and mental retardation, offered the opportunities and platforms for learning art, building self-confidence, opening self, and integrating into society. From the first 11 autistic children (7-18 years old) in the initial summer training class, the painting guidance was given to more than 60 special children with autism and brain disabilities in 2014. The program has launched a training course worth more than 100 thousand yuan for more than 200 autistic and Down

syndrome children.

(2) Public Welfare Lecture at the Weekend

The program was founded in 2012. Wuhan Youth Palace cooperating with the Wuhan Morning Newspaper invited the top students of the college entrance examination and the city education experts to open up the weekend public welfare lecture for the middle school students and pupils.

Table 2   Public Lecture at Weekends in 2012-2016

Year	Activity quantity	Benefit range
2012	46	More than 100 teenagers and parents
2013	25	More than 100 teenagers and parents
2014	26	More than 100 teenagers and parents
2015	11	Nearly 2000 young people
2016	28	Nearly 2000 young people

(3) The End of the Month Concert

The End of the Month Concert was sponsored by Wuhan Municipal Party committee of the Communist Youth League, Wuhan Education Bureau and Wuhan Culture Publishing and Broadcasting Bureau, which was held in March 2013 for free to offer ethnic, classical, orchestral and percussion music for the majority of youngsters in Wuhan.

Table 3   Concerts at the End of the Month in 2012-2016

Year	Activity quantity	Time	Benefit range
2012	12	The last week of the month	10000 persons
2013	12	The last week of the month	10000 persons
2014	12	The last week of the month	10000 persons
2015	7	The last week of the month	2000 persons
2016	3	The last week of the month	2000 persons

(4) Love Class

For a long time, Wuhan Youth Palace provided free education service for the poor families, children of migrant workers and children of social welfare homes in Wuhan, and organize teaching staff to go deep into the schools of migrant workers' children and the community of migrant workers, and offered children the quality training courses such as painting, calligraphy, vocal music, martial arts and English for free. More than 80 percent of the public welfare activities aimed at all adolescents and vulnerable youth groups. In 2013, 200 children of sanitation workers were offered free training courses, which are worth more than 100,000 yuan.

(5) The World of Water

The program was established in June 2013 and has been held for five consecutive years. Led by the Communist Youth League of Wuhan municipal Party committee, Wuhan Youth Palace, Wuhan Youth Development Foundation, Wuhan Evening News and other related love enterprises, the program jointly organized "summer water tens of thousands of youth water recreation and water lifesaving knowledge popularization activities". The program offers migrant children, impoverished family children, sanitation workers children, military families and children the free tickets, waterproof and safety knowledge training and knowledge of water safety rescue.

Table 4   The Development of the World of Water in 2012-2016

Year	Opening days	Reception of tourists (person time)	Operating income (ten thousand yuan)	Free quantity
2010	50	120 thousand	532.34	—
2011	53	180 thousand	585.60	—
2012	50	150 thousand	738.63	—
2013	50	120 thousand	689.43	10000(value 640 thousand yuan)
2014	50	150 thousand	400.60	10000(value 800 thousand yuan)
2015	50	120 thousand	390.77	10000(value 800 thousand yuan)
2016	50	120 thousand	487.73	10000(value 800 thousand yuan)

Remarks: two lectures on waterproof safety knowledge per week

4.3 Operation and management of Wuhan Youth Palace

Wuhan Youth Palace takes part in the public recruitment of the public agency organized by the Municipal Bureau of people's society. Employees should be recruited through unified written examination, interview organized

by the competent department and publicity examination. The performance assessment of the staff is responsible for the performance of the Wuhan Youth Palace, results of the assessment are mainly used for the evaluation. Furthermore, internal control system in Wuhan Youth Palace is perfect, it formed the Handbook of the common system of Wuhan Youth Palace such as: more work, more merit and better pay; insist on overall planning, pay attention to comprehensive balance, people and post matching, pay attention to career development planning, to ensure the space for improvement.

Wuhan Youth Palace is aimed at building a good and comprehensive learning team through post training, visiting and learning, listening and evaluation classes, business discussions and exchanges, and carrying out various forms of evaluation and competition activities, thus improving staffs and workers' responsibility awareness. Wuhan Youth Palace encourages employees to learn and improve themselves constantly, pay attention to education and scientific research, it closely combine the actual work, organize the work of the workers to carry out the research, enrich the spiritual and cultural life of the staff and workers, and organize a number of staff cultural and recreational activities such as the staff photography competition.

5 Conclusion

At present, the Youth Palace should base on the actual situation of the local area to carry out the exploration and practice, optimize the external and external environment of the school education, strengthen the exchange and study of the concept, the cooperation and guidance of the business, the publicity and guidance of the public opinion.

Chinese Youth Palace is an important carrier of the socialist spiritual civilization. Carrying out public welfare activities, expanding the coverage of public welfare, and constantly innovating the form and content of public service will help to promote the development of Chinese youth education. Through this study, Chinese Youth Palace is defined as a public service unit that provides public education services with non-profit. The connotations of public welfare are mainly as follows:

(1) It is an important activity place for off-campus education.

(2) It is an important position to strengthen ideological and moral education.

(3) It is a public welfare institution to provide public education services.

This article takes Wuhan Youth Palace as an example to introduce the concrete practice of the public welfare development of Chinese Youth Palace, which mainly has the following public welfare characteristics:

(1) The social impact of the brand activity is becoming more and more significant.

(2) The activity public welfare and the educational connotation have been significantly improved.

(3) The activities of the form are more, and the number of activities increases steadily.

Acknowledgement

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Innovative Development Strategy of Publishing Enterprises

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Abstract: This paper analyzes the general situation of the current publishing industry, and it thinks that the publishing industry is gradually becoming digitalized, networked and multi-media. Based on this, this paper argues that traditional publishing enterprises should not blindly follow the trend, it should think calmly, find their own position, and do the existing work more perfect, more professional to innovate the model through new technology, new media, digital dissemination. Book publishing management system should be innovation and change from inside to outside. Aiming at the development and innovation of the publishing house, the following strategies are proposed in this article: innovation in the selection of book publishing topics; focus on the book publishing brand and indigenous innovation; establish innovative market data and channels; pay attention to talent and team training; and the innovation of transformation to digital publishing.

Key words: Publish; Enterprise; Innovation; Strategy

1 Introduction

With the arrival of the all-media era, outstanding domestic publishing groups have paid more attention to the study of the transformation of the whole media, especially the in-depth study of the all-media business model and successful cases. Because of this, the traditional publishing industry is facing more and more challenges, and the publishing industry is gradually shifting to digital, network and multi-media. The Internet and new media have brought great impact on the traditional publishing industry. People have shifted from browsing paper editions of publications and news reports to news platforms and electronic publishing platforms. The platforms, terminals, and forms of electronic publications are also viewed. Changes are constantly taking place. From PC to tablet, mobile phone, from website to Weibo, WeChat, and multi-screen interactions, multiple forms of communication have gradually become the trend of the publishing industry and even the entire media industry. Facing the new changes in book publishing, many researchers have explored the future innovation and development of traditional publishing industry and the emerging digital publishing status from different perspective. Kui Zhang proposed to build a new content management model for traditional book publishing enterprises based on "Internet +" platform, which represented the attitude of most scholars; Ketao Yin also believed that the innovation of Internet technology has provided a new driving force for the transformation and upgrading of publishing enterprises; However, from the perspective of talent management structure and talent skills, publisher Mingming Yu discussed the innovative strategy of transformation from traditional publishing enterprises to digital publishing; and so on.

The author thinks that the book publishing should have innovation and change from inside to outside. For example, from the perspective of book design, the design of books is more and more personalized, and the selection of materials is more and more exquisite. This not only improves the quality of books, but also substantially increases the added value of books, so that books not only valuable for learning and reading, but also become a new direction for the development of traditional paper books. So paper books aren't going away, it's just that we haven't made them better.

No matter how the new publishing industry evolves and develops at present, it will only change in form. As a traditional publishing industry, it has to find its own positioning to make its existing work more perfect and professional, and upgrade and develop through the new technology and new media digital platform (Wenqi Fu, etc 2018).

2 Innovation in the Selection of Book Publishing Topics

In response to the problems in the selection of book publishing topics, we have conducted many aspects of the topic selection work, mainly including the following:

2.1 Strengthen the management of topic selection

How to manage the topic of book publishing scientifically and effectively is the basis for the development of publishing companies. The management of topics should be comprehensive and all-round, focusing on the management of topics selected, the organization of topics, and policy orientation.

2.2 Pay attention to the programmatic nature of the topic

The topic plan plays an important role in publishing activities. For publishers, their primary and basic work is to make a plan of book publishing topic selection. The topic selection plan, especially the key topic selection plan, plays a guiding role in publishing work, from which one can see the publishing direction and publication level of a publishing press. Publishers should consider the short-term, medium-term, and long-term objectives of the book when considering topics for the publication. They should pay attention to the recent, short-term, book-reading topics that can be put on the market in a timely manner, focus on the layout of the medium-term, and seriously consider the future. The planning of the long-term book publishing topics is not to be neglected. The determination of a publishing plan, that is, the selection of topics for book publishing and the design of a system, is an artificial systematic project that involves many aspects and is an initiative, purposeful, planned, scientific behavior.

2.3 Strengthen the innovation of the topic selection and pay attention to strategy

For the topic plan, new ideas and originality are necessary. The conception and planning of the topic are the reflection of consciousness and creativity of editing work. It is the externalization of innovation consciousness and creative ability of planning editors. At the same time, we should also pay attention to the trajectory of book publishing press topics, get rid of blindness and step into a consciously and orderly manner.

2.4 Strengthen content innovation

Acting as content managers, book publishing press filter, edit and provide high-quality content to the public. And the other way round, the great products and platform can also play a vital role in their long-term development.

3 Pay Attention to the Book Publishing Brand and Indigenous Innovation

Identify the proportion of brands, channels and content in the book marketing process. For example, the price of a book will has a direct impact on the sale of books. It is necessary to maximize the book profits and consider the purchasing power of the readers.

Creating new brands and new channels are the most challenging job. When publishing presses make mid-to-long-term brand planning, they reasonably adjust the structure of their publishing products, vigorously implement the strategy of fine books, and increase the planning and operation of brand books, featured books, double-effect books, and market bestsellers to form their own brand and characteristics. In particular, small and medium-sized publishers should make use of their own professional discipline backgrounds to achieve small and refined, small and special, small and excellent, and gradually form their own leading products, so that their own framework is clear. And some long-term adherence to corporate image, brand logo, and positioning, which is also an important force for readers to purchase long-term and form a brand.

In addition, I believe that we should still adhere to the form of content service, put the contents of the book in the first place, and provide accurate and effective service for readers.

4 Market Data and Market Channels Innovation

According to Paulo Faustino (2013), The purchase and sale of books, using aggressive marketing practices, constitute undoubtedly an integral part of the strategies that contribute to spread more culture and knowledge—that is, we cannot forget that book marketing helps to convey information to everyone and it is accessible to all, after going through the publisher, distributor, retail outlet, finally reaching the end customer—the reader.

4.1 Build a strong reader database

We must establish a reader-service network platform to provide quality after-sales services for readers, and from the outset, we should adhere to the concept of serving the reader. We must grasp and understand the online and offline platforms and resources of the book market, and develop more readers' needs through book clubs, communities, etc., and customize books for readers.

Bezos said: Ford did not know every one of his customers, and I know. So we should also know that each of our readers, we need these databases.

Internally, according to Qiang Huang (Qiang Huang, 2015), we must operate the way the market does. Our selection of book topics are fully justified by market data. Our evaluation of employee performance should also be based on market results.We can implement a set of engineer-like management methods: all speak with data, how much manpower and material resources has been invested in a project and what has been achieved. It is necessary to summarize after each book is

finished.

4.2 Focus on the continuity and periodicity of the promotion content

Firstly, the continuity of extension content should be innovated. Franco Malerba believed that consumer behavior, cognition and ability play a major role in innovation. When books first come into the market, they directly transmit information to the target readers, causing readers to pay attention to this book. After the book enters the smooth period of sales, the promotion content is constantly deepened. Through the discussion and exchange meeting, publishing enterprises should guide the readers to understand the book gradually and constantly seize the readers of different levels.

Then understand the book promotion cycle. From book publishing to the middle of the sale of books, the book-marketing has been running through it. This makes the book-marketing of every stage point can be linked with the last market promotion, and also pave the way for the next market promotion. Sporadic marketing is not only unable to achieve the desired results, but also the cost of marketing is higher every time. On the contrary, the continuous market promotion at all stages has taken advantage of the situation around each stage point and greatly reduced the cost of promotion, and the effectiveness of the market promotion has been kept high level by the superposition of the early promotion effect.

5 Pay Attention to the Training of Talents and Teams

Enterprises should put the personnel structure in the first place, human resource are the root of the enterprises. Different professional talents are necessary in the team, such as talents who are good at the network technology and who are skilled in the text editing and the market planning etc, and there should be a kind of corporate culture that can let them often communicate with each other to combine these talents (Mingming Yu,2016).

At the same time, we should make full use of the innovation of talent structure and talent management. Besides, we need more talents with complex knowledge of business management to realize the seamless integration and deep integration of traditional publishing concepts and digital technology. It is necessary to create a humanistic environment for the growth and development of talent groups that suitable for publication development. A good humanistic environment is conducive to the perfection and development of the whole editing and publishing talents' environment, and it is of great significance to the implementation of talent strategy. We should strive to build an excellent corporate culture, give full play to teamwork spirit, and continuously enhance team cohesion and competitiveness. The personnel structure in publishing enterprises is shown in Figure 1.

Figure 1   Personnel Structure in Publishing Enterprises

6 Innovation of Transformation from Traditional Publishing to Digital Publishing

According to Baoling LI (2016), The current primary task for traditional publishing companies is to develop digital strategy and make it as one part of overall business development strategy. With the social background of digitalization and modernization, the traditional publishing industry must be transformed as soon as possible to seize the current development opportunities and improve the competitiveness of enterprises. Now more and more traditional publications are slowly transforming into digital publishing. Only by realizing publishing digitalization and informatization can we meet the needs of current citizens and promote the Competitiveness.

6.1 Innovating digital publishing development process

With the continuous progress of science and technology, industrial structure and market economy are developing rapidly. The digital publishing industry has gradually updated its industrial structure and

management model, mainly embodied in the following point: finished product, technology, related service, fixed channels and terminal.

6.2 Innovating publishing content

According to Xianrong Huang and Changqing Tian (Xianrong Huang and Changqing Tian, 2014), to improve the international competitiveness of Chinese publishing industry, China should also take the publishing products as the key issue and focus on it, while creating a favorable economic, cultural and policy environment, strengthening the reform and expanding overseas presence, etc.

Publishing industry is a kind of content producing industry, and its main purpose is to provide various types of information products and services for the public. The purpose and value of digital publishing products is to provide readers with detailed content various services. Accordingly, the main innovation content of digital publishing is to combine the specific content of traditional publishing with the market channels and terminal services of different readers' demands in the current science and technology background.

6.3 Innovating value-added service of product

Digital publishing products, to a certain extent, have met the actual needs and value-added services of current users. Compared with traditional publishing products, they have unsurpassable advantages. Therefore, during the transformation, the traditional publishing industry should make the best use of the advantages of digital technology to analyze and manage the product content and the current market demand, to better meet the different needs of different readers and improve the competitiveness of its own enterprises. In order to ensure the sustainable development of China's digital publishing industry, the problems in the transformation process should be clarified and effective solutions should be proposed (Jingmei Jiang, ect 2018).

6.4 Innovating integration service

The public and professional of traditional book publishing enterprises all should firmly grasp the core advantages of content resources in the Internet era. By taking advantage of Internet platform and Internet technology, the "Internet +" content business model based on the extension of content or digital content should be constructed by means of independent cooperation or authorization. Thus, according to Kui Zhang (Kui Zhang, 2017), the transformation from "Internet + " to "content + "can be realized. Content management model of traditional publishing enterprise is shown in Figure 2.
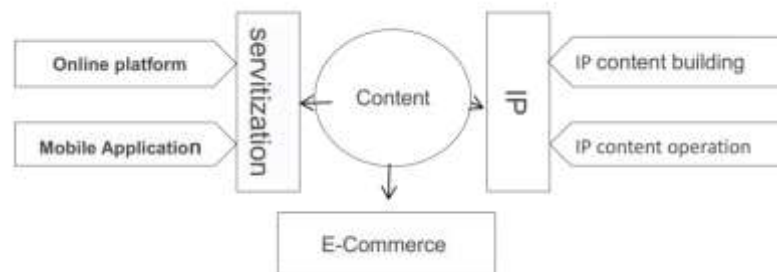

Figure 2   Content Management Model of Traditional Publishing Enterprise

7 Conclusion

In the process of transformation from traditional publishing to modern publishing, we need to make traditional publishing more precise and professional. And at the same time, we also need new technologies and new means to better complement the publishing industry.

It is hoped that the publishing enterprise can find the right direction and strengthen the competitive advantage of the publishing industry by combining the current situation, not closing the door, absorbing advanced management methods and experiences in domestic and overseas, and combining new technology, new means and new media.

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Research on the Construction of Service-oriented Primary Organizations of University Teachers from the Perspective of System Science

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Abstract: The 19th National Congress pointed out that it is necessary to build a learning, service and innovative political organization. Based on the construction of the organization composed of college teachers, this paper adopts the theory of system theory, analyzes the problems existing in the construction of the political organizatio composed of college teachers in China, and combines system theory integrity, relevance, openness and comprehensive optimization. From the four dimensions of overall layout, service content, service brand and long-term mechanism, this paper puts forward the implementation path of building political organization. The research helps to promote the construction of service-oriented political organization of university teachers.

Key words: System theory; College teachers' political organization; Service organization

1 Introduction

As early as the 1930s, American scholar Bertalanffy (American scholar Bertalanffy, 1932) proposed the concept of system science, pointing out that system theory is the fundamental theory of theoretical research on scientific systems such as physics, biology, and social sciences. He Liqin (He Liqin, 2013) pointed out that using system theory to know that primary political organization construction is not only a work innovation, but also a scientific method to solve real problems; Yu Hai (Yu Hai, 2013) used systematic science theory to study the professional training of university counselors, and proposed The training system consists of three subsystems: guarantee, training and quality; Su Chunjing (Su Chunjing, 2015) proposes that pedagogy is a science to be developed with system science characteristics from the perspective of system science; Chen Xueqiang (Chen Xueqiang, 2017) proposes system science to modern Vocational education is very important. It needs to adapt to the needs and design a multi-disciplinary education system. Yang Xiaoli (Yang Xiaoli, 2018) proposes the use of systemic thinking to educate and guide college graduate students to achieve system functions.

In summary, there are many literatures on the construction of system research based on system science theory. The research results all show that system science has good reference and scientific guiding significance for organizational design and organizational construction. However, there is a gap in the related research that targets the primary political organizations of university teachers. Therefore, from the perspective of system science, this paper studies the construction of political rganizations for university teachers.

2 Using System Analysis Primary Political Organizations Composed of University Teachers

2.1 The necessity of creating a teacher's primary organization

As an important part of the social system, the practical significance of the service-based primary party organization construction has exceeded the scope of the campus, affecting social life, creating conditions for the cultivation of talents in the university and deepening reform.

First, the need for universities to adhere to the correct political direction. As a highland of talent, the university is the foundation of university organization. The creation of individual teachers has a positive effect on consolidating the ruling status of political parties in universities and enriching the party building work in the new era. Second, it is the need to promote the scientific, healthy and sustainable development of all aspects of university work. The primary organizations of university teachers are widely distributed, and can convey the policies and policies of political organizationto the teachers and students at the primary level. The scientific, systematic and long-term organizational construction activities can condense the wisdom of the masses, grasp the laws of education, and crack development. The problem is to provide intellectual support for university development. Third, it is the need for socialist market economy reform. The masses' demands for social public services, especially in education and other areas related to people's livelihood, continue to increase. Objectively, universities

are required to transform closed and singular service methods, build multi-level and open platforms, and make innovative demonstrations on service-oriented management. The reform of the whole society has accumulated experience and provided reference. Finally, it is the need for deep dissemination of the core values of socialism. As an advanced stage of national education, universities are an important platform for the dissemination of socialist core values. Through the activities of the organization, teachers and students can resonate and deepen their pursuit of value.

2.2 Problems

As a kind of education, management and service unit, the primary organizations of colleges and universities are an important support for running a good university. In the process of establishment, they need to combine their own characteristics, adapt to the direction of education reform and develop the characteristic highlights of services, but they also face the following dilemmas: The activities are poorly linked and the overall situation is weak. The activities of the formation are basically in the state of their respective administrations; the services provided are not combined with the tasks of personnel training, social services and cultural heritage, and the service connotation of the university characteristics needs to be deepened; The evaluation mechanism is lacking, the orientation of mass satisfaction is not obvious; the degree of service sharing with local governments is low, and the comprehensive social benefits are not high. In response to these problems, the introduction of systematic research methods can provide a comprehensive research perspective for university primary party organizations, and enhance the organization's activities, effects and sustainability.

2.3 The innovation of systematic approach to the construction of primary organizations for university teachers

System theory believes that things are composed of many elements that are organically related to each other, and an orderly and dynamically balanced nonlinear whole that can achieve a certain function. System theory is a brand new methodology. Application system theory, research is no longer limited to the development of a point, a part, but through the synergy, flow, exchange and interaction, to achieve overall optimization, reflecting a dynamic, development, the concept of two-way and related, the application of system theory to the development of service-based primary organizations is of great significance to the organization of university organizations.

The risk of Western political thoughts occupying universities still exists. The primary organizations of some university teachers are relatively scattered and the service functions are weakened. These are the direct threats they face. The holistic and hierarchical theory of application system theory, through comprehensive, systematic and innovative activities, overall planning and overall promotion, awakening its sense of purpose, transforming service into its own pursuit, strengthening the role of primary organizations; applying relevance and hierarchy Theory, through service activities, examine the effectiveness and rationality of the strategic design and organizational structure of university primary organizations, strengthen the function of teachers' primary organizations, and apply the environmental optimization theory of system theory to promote the active reform of the party and government organizations at the university. Change the national conditions and create a good organizational ecosystem.

3 How to Use System Theory to Optimize the Political Organizationsand Government Primary Organizations Composed of University Teachers

In view of the fact that the primary organizations composed of service-oriented teachers have a strong significance for the development of university systems in the creation activities, the introduction of systematic research methods, the application system's integrity, relevance, openness and comprehensive optimization characteristics, Four optimization proposals for overall layout, rich service content, service brand creation, and long-term mechanism. The implementation path of college teachers' primary organization construction based on system theory is shown in Figure 1 below.
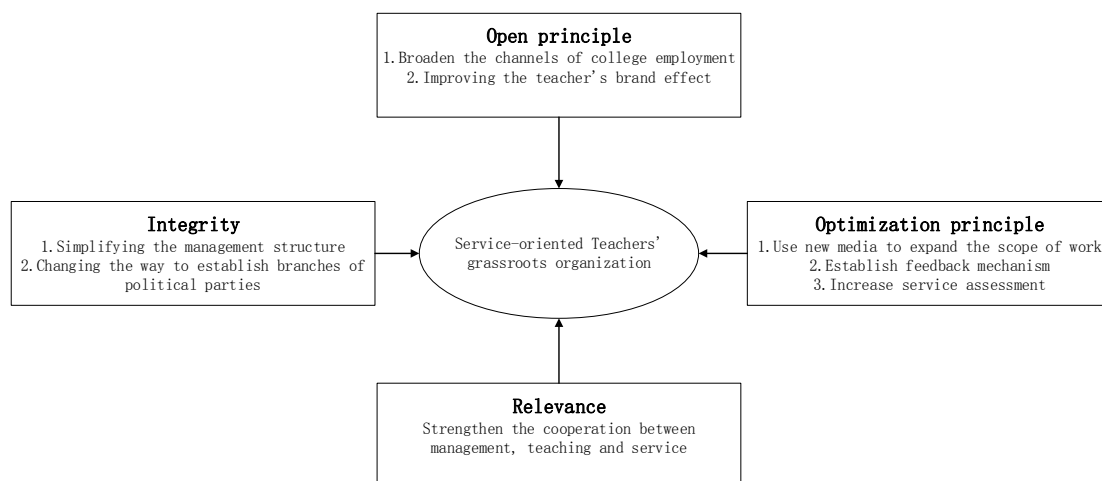
Figure 1   Primary Organization Construction Implementation Path

3.1 Unified layout, inter-related common development, active implementation of organizational activities at all levels

The core of the holistic principle is part of the system, and because of the "connections" that exist between them, "A new property of the sum of the components and components, i.e., the system or the whole," simply put, "the overall effect is greater than the effect of a single element." When the university is studied as a system, it is found that the flow of its elements is not enough and the overall system advantage is not fully utilized. The administrative authority takes precedence over the academic power, the administrative function department has the priority of resources and the service function is weakened. The lack of effective sharing of resources and information between different professions is impeded. The organizations and the government jointly take charge of the implementation of the system is only a formality, the open government affairs is not enough, the teachers' appeal channels are not clear, the responsibility system is not clear, these are the part that should be paid attention to in the creation activities. To adopt the principle of holistic ness, the grass-roots organizations composed of teachers should divide the work clearly and move up and down, and promote the wholeness of the creation activities around the core goal of the long - term development of the school.

Follow the order of the things themselves, adapt to the transition from the level to the flat organization, reduce the middle management interference, and improve the overall management effect. Optimize the construction of primary organizations of politics and government, expand the breadth of service content, expand the scope of service radiation, eliminate blind spots between teachers and students and society, and truly integrate into the masses. In recent years, there has been a group of professional teachers composed of primary organizations, showing strong service-oriented characteristics, with discipline teams as the unit. The Disciplinary Team is a major feature of university human resource management, "operating on the basis of scientific research." Political organization personnel grow up in primary academic organizations such as teaching and research rooms and scientific research teams, transforming service activities into job pursuits, and inspiring organization members' initiative, creativity, and service work in real need of roots in combination with business characteristics. Organizational activities include political science, academic exchanges, and educational talent management. Teachers have special knowledge in different fields and are easy to support each other in interdisciplinary and related disciplines.

3.2 Explore the internal relevance of the system, enrich the connotation of service and enhance the effect of service

Relevance refers to the interdependence and interaction between systems and subsystems, the elements within the system, and the environment between systems and systems. The core of the relevance principle is to find the interrelationship between internal factors, systems and environment in complex systems to achieve their benign interaction. According to the relevant principles, the creation activities of university-based service-oriented teachers' organizations should seek management, cooperation and cooperation between teaching and services in order to achieve a seamless connection, and it is necessary to construct a three-dimensional service network. And expand the service space. We will play an important role in the integration of internal resources such as discipline layout, talent

training, scientific research team building, industry-university research and development, local economic services, and participation. In the process of seeking and absorbing external resources, we will build social culture and other external resources, continuously enrich the service connotation and improve service efficiency.

3.3 Adhering to the concept of openness, the construction of the organizations branch should integrate local conditions and create a service brand

The principle of openness is the law of the dynamic development of the system. In the constant communication with the environment, systems and factors, the system experiences a dynamic development process from low-level to high-level, from simple to complex, from disorder to order. The openness of the primary organizations of political parties in universities and the openness of the university itself complement each other. The spirit of "compatibility" is the embodiment of its own openness. The creation activities carried out in line with the concept of "openness and development" are time, dynamic and persistent. In the process of creation, new ideas, new methods and new information will be continuously integrated into the system, and the creation activities will be summarized and developed in time to form a virtuous circle of effective feedback, improvement, innovation and perfection.

Based on the principle of openness, through the creation of activities to create talent brand, service economic transformation and the development of people's livelihood. In recent years, the channels for selecting and employing personnel have been continuously widened, and the flow of talents between colleges and local governments has been accelerated. The brand effect of college teachers is obvious: the age structure is more reasonable, and the proportion of young and middle-aged talents is higher; Strong professional background, most of them have working experience in studying abroad. The type is rich, have familiar teaching, scientific research academic talented person, also has the coordination ability strong, the rich experience management talented person. The channels of exchange of talents between local governments and universities should be unblocked, and effective long-term mechanisms should be formed to provide intellectual support and organizational guarantee for the creation of service-oriented government.

3.4 Constructing the service system, optimizing the service environment and perfecting the evaluation mechanism

The system optimization principle refers to continuous research and improvement of the system according to the system objectives, and finally the optimal function of the system. This principle requires attention to the construction of the system environment, the creation of an institutionalized, long-term service mechanism to achieve system goals. The organization branch of college teachers should innovate the service carrier, extend the service tentacles, optimize the system environment, and build a networked service system. The focus of work during the social transformation is the grounding gas project. In the era of big data, new media has penetrated into all aspects of social life, and is good at using new media tools, expanding work areas, creatively carrying out party building activities, using the Internet, mobile phones, etc., through WeChat, Weibo, etc. to effectively interact with party members and the masses. Master the hotspots and difficulties of the masses, establish a gridded three-dimensional service system, form a system of synergy, and establish a service mechanism for public opinion listening and public sentiment feedback. It is necessary to establish a sound service-oriented evaluation mechanism, highlight the satisfaction of the masses, establish service assessment projects, weights, and participation in the scope of assessment personnel, increase the use of assessment results, and establish a correct employment orientation.

4 Conclusion

This paper starts from the necessity of establishing the primary organization of teachers in colleges and universities, and analyzes the problems and bottlenecks in the construction. Drawing on the ideas and characteristics of system science, this paper proposes the implementation of optimization path, and elaborates on each dimension in the path, which has certain reference significance for perfecting the development of organization government primary organizations in China. However, in view of the different actual situation of colleges and universities in China and the different lengths of the establishment of teachers' party branches, the relevant viewpoints in this paper need to be adjusted and improved to be more adaptable and scientific.

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"Five Thoughts" Promotes the Innovative Development of the University's Ideology and Education

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Abstract: the ideology education must be closely around the basic task of enhancing morality and fostering talents. In order to strengthen ideology education innovation, we should attach great importance to the explicit education as well as pay attention to the latent education. The whole process for education centers on 'five thoughts'-student education, teacher education, course education, subject education and environmental education.
Key words: Five thoughts; Ideology education

1 Introduction

In the new period, our country has given prominence to ideology work in universities and made a series of major decisions and arrangements. Colleges and universities have adopted effective measures and actively carried out their work, which has created many successful practices and accumulated many valuable experiences. At present, problems existing in ideology education such as the lack of theoretical innovation and learning initiative of the subject, outdated teaching content, single teaching means, and imperfect evaluation mechanism have caused certain obstacles to carry out ideology educations in colleges and universities. We need to combine teaching in accordance with students' aptitude with dialectical treatment, identify the common point of thinking of college students and the intersection of interests, guide students to analyze, study and solve practical problems with the theory, and improve the work of ideology education (Han Xiping, Zhang Mengfei,2018). The innovation of ideology education follows the general law of development that all aspects should be considered to promote this progress (Xufei, Dairui, 2018).

There are many studies about the work of ideology education. Some people think that with the improvement of china's economic level, higher education has also achieved rapid development, which brings a huge stage for the development of ideology education in universities. However, development and challenges always coexist.In the development of ideology education, it also faces the impact of various trends of thought around the world. Under such circumstances, traditional ideology education is difficult to play its role in promoting social harmony (Su Jing,2014). In 2014 the British government called on schools to promote ideology education to help establish British values. These values include democracy, individual liberty, the rule of law and respect for people of different backgrounds and religions (Janmaat, JG,2018.04). A research at Universidad Autónoma de Chile (Autonomous University of Chile) find that a good university teacher has mainly ethical, moral and affective features that structure the interaction with the students' community, which will promote the innovative development of education work. (Almonacid-Fierro, Alejandro，2018.08). Recent years, some scholars propose that the innovation of cognitive neuroscience can be applied to college students' ideology education through the ideas and methods of nature science and social science research field. According to this study, we designed more effective education and teaching activities and enhanced the effectiveness of ideology education (Li,Fanfan,2018.05).The diversified integration of teaching resources in ideological education in universities is helpful to extend the ideological teaching activities, to update and supplement ideological knowledge, to build a harmonious environment for students（Xu, Jin, Chu Biao, 2018）.

Based on all the research above, we come up with the construction of five thoughts (Tao Hongtan,2018), give full play to the leading role of teachers and the main role of students, promote the reform of ideological courses and the construction of disciplines, optimize the campus fully, and fundamentally solve the problem of 'what kind of people to foster, how to train' in universities.

2 Focus on Promoting 'students' Thinking, Practicing Social Core Values, Stimulating Education in Practice, and Cultivating Students' Spirit of Innovation and Ability to Serve the Society

2.1 The education of ideals and beliefs is the key link of the work of thought education in universities

First, we should highlight the core position of this kind of education in students' ideology work, which also is the core education of students' outlook on world, life and values and can help to solve the fundamental problem of "what kind of people to foster". To conduct the education of ideals and believes for college students, it is crucial to combine the explicit course education, which is mainly conducted through ideology theory courses, with the implicit course education, which is supplemented by campus cultural activities. Secondly, the aim of education should be stressed. We can associate the ideals and beliefs education with career planning to achieve the goal. Finally, we should give full play to the exemplary role of the university party and youth league organization and combine the ideal and belief education with the team building and the party organization construction activities.

2.2 The ideology education should be guided by core values and adhere to moral education

Under the new situation, it is the inevitable requirement for the ideology education in order to support the value guidance, which can be realized through the following five ways: (1) adhere to the concept of people-centered teaching (2) build a new pattern of 'cooperative education' (3) into the Chinese excellent culture, enriching the connotation of the value guidance (4) strengthen the construction of ideological education team (5) the innovation of ideological education and the expansion of the influence the value guidance.

Table 1   Essential Qualities of Students

number	content	percent	number	content	percent
1	Performance in school	12.3%	6	Experience of student cadre	2%
2	college iploma	18%	7	Teamwork spirit	2%
3	Skills certificate	9.8%	8	Presentation skills	2%
4	Practical ability	36.1%	9	Writing ability	0.4%
5	Computer and foreign languageskills	17.2%	10	Development potential	0.3%

3 Actively Carry Out the Formation of Teachers' Ideology Education, Strengthen the Construction of Teachers' Morality, and Foster a Contingent of Teachers with Excellent Ideological Qualities

Ideology education is a systematic job involving all levels of school management and all links of teaching and scientific research. Most teacher staff must establish the philosophy of "whole person education" and closely combine classroom education with scientific research education, practice education, management education, service education, culture education and organizational education.

3.1 Perfect the system for double assessment of teachers' ideological qualities and professional abilities

We will enhance the rules of teachers' theory learning and classified evaluation, and effectively advance their ideological qualities. We will facilitate the institution of tutorial system for young teachers and accelerate the all-round development of themselves.

3.2 Strengthen the construction of teachers' ethics and improve the mechanism of appraisal

The construction of teachers' morality and ethics should be carried out throughout the whole process of moral education and implement the "one vote veto system" in the work of the introduction of teachers, performance appraisal, commendation and reward, professional title evaluation and job appointment and promotion, and perfect the mechanism of teaching evaluation, academic ethics evaluation, incentive and punishment.

3.3 Build a high-level ideological workforce

As the main body of ideology education, university counselors and ideological class teachers must be integrated in the progress to form a great result. At the same time, we will implement the system that young teachers can also be student counselors. Eventually, the full-time and part-time ideological team will bring huge advantages.

4 Promote the Construction of 'Course Ideology' and Boost the Educational Function of Each Course with the Classroom Teaching as the Main Mode

4.1 The essence of 'course ideology'

The essence of this task is to integrate the university's ideology education into all links and aspects of course teaching and reform, focus on the course goal of "the combination of imparting knowledge

and value guidance", reinforce explicit thinking, refine implicit thinking, and build the pattern of whole course education. To complete the transformation of "ideological courses" to "curricular ideology" and maximize the function of ideology education in education teaching of all courses, we need integrate explicit and implicit education which should not only concentrate knowledge in the dissemination of value, but also emphasize value guidance in the dissemination of knowledge.

4.2 The role of course ideology

Play the role of explicit education and infiltration in ideological theory curriculum. The elements of the curricular ideology are fully explored and embedded into the teaching plan to consolidate the ideological foundation of the course.

Integrate the thinking education into the study of professional courses, give full play to the implicit education and value guidance of academic course, and comprehensively promote the ideology of curriculum.

5 Adhere to the Guiding Position of this Association and Implement the "Subject Ideology"Practically. The Ideology Education is Based on the Organization, and the Precondition and Aim for the Construction and Development of This Education Discipline is to Realize the Localization of the Principle in China

5.1 Promote the integration of this group's discipline with the daily ideology education.

The organization's theory of ideology should be a common discipline platform that can connect the main channel of ideological curriculum with the daily ideological education front, which requires that teachers majoring in ideological lesson improve service consciousness.

5.2 Increase the supporting role of the theory discipline on daily ideology education.

Many youth counselors often show a lack of ability when dealing with the problems in ideology education work, so more relevant academic platforms about the organization's theory should be built for the counselor so that they can communicate with others and enhance the ability to solve the major theoretical and practical problem; the counselors themselves also needs to raise the theoretical awareness and actively participate in the theory discipline construction.

6 Perform the Function of 'Environmental Education', Boost Formative Education and Guidance, and Promote the Composition of 'Environmental Ideology'

'Environmental ideology' is an important part of 'five thoughts' and a crucial way to foster people. Achieving the function of education of campus culture atmosphere needs to be promoted from the creation of civilized campus and the production of school spirit. The composition of school spirit is the core of the construction of civilization.

6.1 Establish civilized campus.

The activity of civilized campus establishment has certain guiding impact to the university student's value orientation, has the critical significance of the formation of civilized behavior and the enhancement of students' training quality. It includes the optimization of campus culture, campus civilization, campus network, campus front and the construction of advanced typical education environment.

6.2 Establish school spirit and academic style.

Like sunshine and air, the ethos of college and university determines the improvement of all things. Good school spirit and study style play an imperceptible impact in the growth of students.

The ideology education in university is a strategic project in the new era, facing great opportunities and challenges. This has certain instructiveness to strengthen and improve ideology education by the way of giving full play to the five education of latent and imperceptible function through focusing on five ideas so that organizations can develop the definite effect of college virtue education and further improve the level of job of implementing thought education.

7 Conclusion

Course education, subject education is the first class, students'education is the second class, environmental education is the third class, the teacher education is the key that only through teaching, morality nurturing, personnel training, development and innovation, learn to grow in five aspects, the construction of a three-dimensional, integrated and efficient ideological and political work system,

implement the idea of the whole process of all-round education of the whole, to lay good foundation for the ideological and political education work, create a new situation of ideological and political education work in colleges and universities.

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The Design and Implementation of Multi-media Classroom Reservation System Based on Browser /Server Mode

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Abstract: The management ofMulti-media classroom is an important task forMulti-media teaching at University. This paper analyzes the current situation of the multimedia classroom management in Wuhan University of Technology (WUT), which designs and implements multi-media classroom reservation systemusing ASP.NET technology, as well as adopting B/S three-layer design model and .NET platform. The system realizes the informatization of the classrooms management, and greatly improvesthe level of the Multi-media information management and work efficiencyinWUT.
Key words: Multi-media classroom; ASP.NET technology; B/S mode; Design model

1 Introduction

With the rapid development of information technology, teachers' appointment information registration is a relatively heavy and important task in college management. Through the comparison and analysis of the published literature in foreign countries, there are a lot of different types and sizes Multimedia classroom management systems obtained in foreign countries (Zhang N.P.,2014). Foreign universities also pay attention to the management of multimedia classrooms before the multimedia classroom video monitoring management and the network centralization management has realized. The rapid development of technology, information technology has been used in many fields of society, due to the inefficiency and manual management of teaching management, the modernization needs of the school have made it necessary to use information technology to complete the teacher's appointment of the classroom. With the development of computer technology and modern advanced education technology, the Multi-media classroom has become an indispensable part of colleges teaching and universitiesteaching.The Multi-media classroom of Wuhan University of Technology has developed rapidly in recent years. Now it has formed a total of 328 classrooms, including six teaching points and ten teaching buildings.Classroom types contain general multimedia classrooms, voice classrooms and video classrooms for high-quality courses.

More and more teachers use Multi-media and multi-function classrooms to teach.They submit the applications to teaching management officeofcorresponding college, then staff members of the academic affairs office deal withthe applications in a unified and coordinated arrangement way (Hues, 2013). Advancearrangementsin the Multi-media of academic affairs office are used in a fixed time every week, except some sections such as club activities, student employment guidancewhich are not in the courses arranging plan,and unable to be temporary arranged in the original system.Theteachers are required to fill out applications, those will be for approval andpermitted by teaching management office administrator. Next, the staff of the Multi-media classroom management checkand approve the applications and inform the relevant building Multi-media classrooms manager to open the door (Stephen Walther, 2012).If a teacher applies for a freeMulti-media classroom, it can be solved at once.But if there is no suitableroom for allocation, the classroom administratorneeds to notify the teachers.This process is not only lengthy, butalso very tedious.Therefore, some teachers have given up the Multi-media teaching method.For this reason, it is necessary to design anonline Multi-media classrooms reservation system to simplify the application process and raise the utilization and management level of Multi-media classrooms.In addition, in order to avoid conflict with the curriculum scheduleinthe courses scheduling systemof theacademic affairs office, the system should be integrated with the it.The designed system integrates with the original one, importing the arranged schedule curriculumfrom the scheduling system into the online reservation system. Then the occupied classroom will no longer be reserved (TuoM.E., 2017), it not only simplifies the process, but also realizes the cross-campus office, making the multimedia management work convenient and fast, and it truly serves the teaching work and the whole school.

2 The Ideas for the System
2.1 The analysis of system requirements.

The main users of the Multi-media classroom reservation system are system administrators, classroom administrators, ordinary teachers and students. The functions of system administrator mainly include data maintenance, audit and registration of user information, setting of user rights, and various relational tables of management system error log and maintenance of the system (Liu P,2015). The classroom administrator operates on Multi-media teaching points in each campus, according to the user input requirements, then the data resources can be searched and counted, and the report output can be generated and the class printing function can be completed. In order to maintain the relevant information of the management classroom, to review the reservation application of the management classroom and to adjust the curriculum schedule of the management classroom, ordinary teachers may submit, modify or cancel an application for an appointment (Wu P.G.,2016). It is convenient to query and print multimedia classroom buildings, seats, classes and so on. Information such as classroom equipment's can be used for feedback processing.Moreover, students can check the classroom schedule or class schedule anonymously.

The multimedia classroom appointment and inquiry function module enable the teacher to quickly understand the current situation of the multimedia classroom in the university and make a convenient and convenient appointment of the multimedia classroom required by the course (Ying A.H.,2016). According to the appointment of teachers, the classroom administrator will review and make the relevant work log. The user role function permissions are shown in figure 1 below.
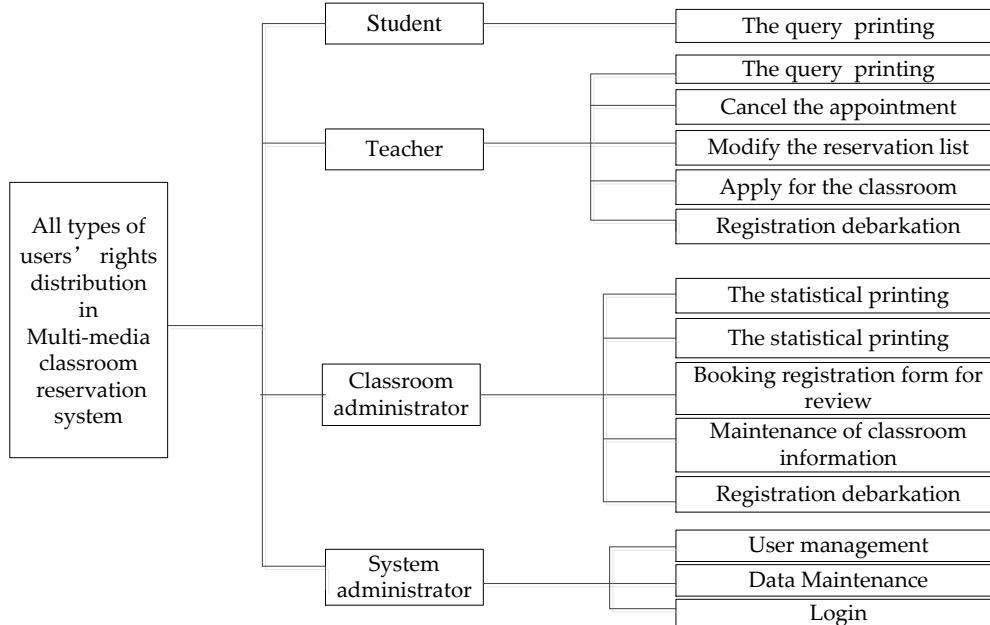

Figure 1   All Types of Users' Rights Distribution

2.2 The design of function

The mission of the Multi-media classroom reservation system in each school is for uniform allocation, making the classroom booking process simple and optimized resource utilization, satisfied the teaching requirement (Yang C.,2013). The primary function of the system is to integrate with the teaching and scheduling system and export the class schedule of each classroom in the teaching and scheduling system into the agreed format, which is imported to the reservation system and displayed.Other main functions are as follows:

(1) According to the requirements of the user, the number of class hours and class members can be inquired into the input parameters, and all available multimedia classroom records can be listed for user selection.

(2) To review the application of teacher's appointment and record the relevant information of the appointee after the approval (teacher's name, course name, class time, class place, etc.) for class use.

(3) Print the class table and statistics class function according to the booking situation and the weekly number, the classroom number and other information.

(4) It has the function of the number of courses and the total number of courses according to the information of different colleges, curriculum types, and building blocks in the campus of multimedia classrooms.

(5) At the end of the semester, we can finally calculate the total amount of class hours that each multimedia classroom teaching point will take in this semester.

(6) The user shall have the ability to modify and cancel the reservation and make a global search according to different input conditions to acquire the satisfied conditions.

(7) The system can log in remotely to maximize classroom resource utilization.

(8) It can edit classroom properties of different teaching points and add new classrooms to complete the update.

3 Development Technique

3.1 Development model

The system is based on B/S (Browser/server) mode architecture, at the front desk to present using HTML and VBScript client language with ASP.NET 2.0, the background and the C# language development, the data layer is stored using the Access Database. This reservation system is designed with a three-layer architecture, which is divided into presentation layer, business logic layer and data access layer .Client presentation layer interacts with the user's browser, which provides user with access to the system of the entrance, the server-side presentation layer is responsible for interactions with components of the business logic layer, in response to the client's request, to generate the results back to the client;The Web server in the business logic layer uses the application to process the user's various operation requests to the database, and returns the results to the user to realize the business logic of the Web service .The data access layer submits the logical view of physical data to the business logic layer, separating the changes from the underlying data store from the business logic layer and ensuring the integrity and reliability of the data. The development pattern structure of the system is shown in figure 2.
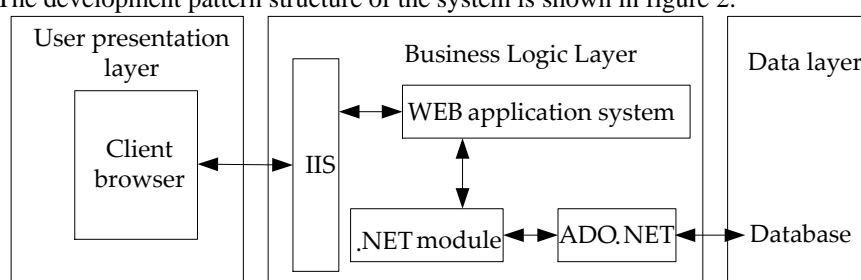

Figure 2   The Development Pattern Structure of the Reservation System

3.2 Key technologies

3.2.1 Realization of user rights.

In order to guarantee the security and stability of this system, the role-based access control model is used to design the authority management module. When a user logs in, its name and authority role are obtained, and the current user has the scope of authorization based on role and authority. Besides, the user has set a functional module to determine the current user from which it can access the collection, and then determine the liston the basis of functional division. The user can login to the default home page of itself.

3.2.2 Data access layer.

The basic role of the data access layer is to hide the data access details, enhancing the portability of the system and accessing the back-end data repository mainly using ADO.NET. The data access layer is implemented mainly by an encapsulated data access class, which provides access data sources for standard interfaces to complete related operations.

3.2.3 User interface.

User interface uses the upper-left-right structure of three parts.The upper part is divided into common operations on the system, the navigation columnon the left is tree structure, where reservation system main function modules, and the right is the operating result of the display area.

4 Design of Main Modules

In the platform of B/S mode, the system uses the advantages of ASP.NET technology and Web database, which is simple and practical, and greatly improves the efficiency of multimedia classroom use and information management.Due to the convenient and practicalinterface of the system, users can

achieve remote, real-time management without the limitation of space and time through access from the server-side browser or real-time information management in multimedia classrooms.

4.1 Classroom and course management module.

The main task of the classroom management module is to manage the Multi-media classrooms of each teaching point. The specific operation includes adding, deleting and modifying the basic information of the classrooms, such as the number of seats and area. This module is also the premise of another module operation (Liu H.,2016). Only after setting the classroom property, we can make reservation inquiry and do other operations. In addition, the course management module is to modify and delete the approved courses.

4.2 Course reservation and enquiry module.

This module mainly provides the distribution and arrangement of Multi-media classrooms for teachers,based on which, teachers can make an appointment and choose the appropriate classroom according to certain input parameters, including the location, time and special requirements of the multimedia classroom (Shao D.h.,2016).The system administrator reviews the appointment status, and the approved classrooms can be used at the appointed time.Otherwise, teachers will be notified to reschedule.Users can easily find out the use information of a classroom in this semester (including classes, time and course names, etc.). According to the class name, the course name and the keywords, such as teachers' name and the conditions of a classroom, it can also print out a list of Multi-media classrooms to teach students during weeks' time.The classrooms in the whole university buildings are used to print arrangement information.

4.3 Statistical function

The classrooms statistics can be used to calculate the utilization rate of the classrooms every semester. This function mainly realizes the statistical inquiry function of the use of multi-media classrooms, which includesthe classrooms usage statistics, departments and curriculum types, for example, a graphic visual representation one. The final statistics summarizes the total classification of schools in the semester at the end of each semester. For the specific algorithm of the above module, ASP.NET and C# language are used to code according to design ideas. This article will not describe them in detail.

4.4 Development environment

(1) The Web server, installed the Windows Server2003 operating system, and IIS6.0 is configured for the system.

(2) Installment of visualstudio2008,and the systemmake use ofASP.NET files to realize various functions of the application and place them in the virtual directory of the Web server which can be accessed by the client browser.

5 Conclusion

The operation of WUT Multi-media classrooms reservation system has been being in good condition since it was officially put into use which brought convenience to the teachers and students of the school.Through this system users can conveniently query to each the details of the Multi-media classroom.The teachers can choose suitable classroomaccording to the teaching timetable, while students can query to the free classroom for self-study. At the same time,this system raises the level of the Multi-media classrooms management, making the Multi-media classrooms resource management become more intelligent and enhance, and reducing the amount of labor as well as bringing the convenience to teachers and students.It also has some extensive applications and promotion value.With the diversification of Multi-media classrooms management and the development of higher education management technology, the Multi-media classrooms reservation system also need to beimproved constantly in order to meet the needs of practical teaching work in WUT.

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Application of Analytic Hierarchy Process in Selection of Basketball Players

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Abstract: In the selection of basketball players, the important premise of scientific selection is to determine the selection index and the weight of the corresponding index. For this reason, this paper introduced the Analytic Hierarchy Process (AHP). The index system consists of physical fitness, body shape, psychological quality and physiological function of the four criteria level indicators and 17 evaluation indicators. The results showed that the body shape had the highest weight, accounting for 53%, and the weight of physiological function was the lowest, which was only 6.8%. This study provides a reference for the objective evaluation of athletes' ability and scientific selection.

Key words: Basketball players; Scientific selection; Analytic hierarchy process; Index system

1 Introduction

Generally speaking, modern training mainly includes the scientific choice, the long-term systematic scientific training, the best performance in the competition, and scientific management of athletes. Athlete selection is the first step in this process. If a selected athlete is a seed without cultivation prospects, no matter how much human, material and financial input is futile. Therefore, the selection of talent has become increasingly important. The starting training age of modern sports has been advanced, and some sports even begin to select athletes before the age of 7. Selection in the early stage increases the difficulty of accurately predicting athletes' future sports ability significantly, so that people pay more attention to the scientific research of athletes' choice. According to the scientific practice, the choice of scientific materials, scientific management and scientific training have become the three main factors restricting the level of competitive sports from the beginning to the present. As the differences in training methods and training levels gradually narrow, the importance of individual talent for improving athletic performance is more prominent.

Basketball is a comprehensive sport which strives for perfection in athlete's physical fitness, technical ability, coordination ability and on-the-spot play ability（Te Wierike S C et al, 2015）. Physical qualities such as strength, endurance, speed, flexibility, reaction and so on，play an important role in selecting basketball players, the level of which directly affects the basketball player's technical and tactical improvement and development ability（Scanlan A T et al, 2015）. Athletes' psychological ability is the key factor that affects the performance of athletes' competitive ability. Referee's judgment and punishment may affect athletes' performance. Good psychological state and personality characteristics are the guarantee of their victory over their opponents. Genetic research shows that once human psychological processes and personality characteristics are formed, it is difficult to change. Therefore, we should not neglect the diagnosis and evaluation of athletes' psychological ability in selecting talents （Shaffer C T et al, 2015）. The level of basketball competition is constantly improving, technical movements and tactical forms become various, game situation changes randomly, a series of emergence problems require basketball players acquiring higher quality in all aspects, especially the basketball consciousness（Bullock G S et al, 2016）.

In the past, the selection of basketball players was usually based on their daily performance, coach's experience, preferences and simple tests. However, these methods will be limited by coaches' experience, cultural level and subjective consciousness, thus affecting the selection of athletes and the accuracy of the evaluation results（Liu Rui, 2013）. For example, in recent years, some grass-roots sports schools over the country when selecting young basketball guards, mostly simply implement the "clapping bone age", a method used to predict whether reserve talents can grow to 1.95 meters and worth cultivating as a seedling depending on clap bone age. Conceptual bias led to the selection of one-sided emphasis on height, ignoring the importance of technical and tactical awareness and training. Therefore, it is an important issue for coaches and researchers to solve that how to avoid this embarrassment and decide weight distribution of various factors in basketball.

2 Introduction of Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP) was formally established by Thomas L. Saaty, an American operational research scientist（Luo Yingjie, 2017）, in the 1970s. It has the characteristics of combination of qualitative and quantitative, systematic and hierarchical. It mainly deals with complex and fuzzy problems, making decision makers have certain methods to follow when making decisions, especially for those complex problems with multiple objectives and attribute characteristics. Analytic hierarchy process (AHP) embodies the idea of system analysis and system integration in the decision-making process. Because complex problems usually have complex influencing factors and chaotic internal relations, it is necessary to conduct in-depth analysis, and then use quantitative research methods to deduce the information obtained comprehensively, so that qualitative problems can be digitized.

Analytical Hierarchy Process (AHP) needs to make a qualitative analysis of the experts' scores （Zhou Ming et al, 2016）. make a quantitative analysis through the establishment of mathematical model, and then determine the ratio of each index and each level index in the core competitiveness of basketball players, so as to estimate the basketball competitiveness of each basketball player. It makes up for our previous empiricism's evaluation of players' competitiveness. This is a very important reference value for selecting excellent basketball players. The method is simple and easy to use. The application of mathematical theory is relatively simple, but it is still perfect, recognized by many scholars, and widely used in many fields.

The steps of AHP are as follows:

(1) Facing the comprehensive evaluation of the problem to be evaluated, the problem is divided into several single criterion evaluation problems by layer decomposition.

(2) Make a thorough and systematic analysis of the selected problems, select the index factors that affect the system problems accurately and refining, and then establish the hierarchical structure model of the system.

(3) The comparison of each stratification factor 22 shows the importance of the above level factors at this level. The judgment matrices of different levels are constructed.

(4) Consistency check for all levels of matrix.

(5) Calculate the weight of each factor by calculating the level of single sorting.

(6) The consistency test of the judgment matrix established by the whole system is carried out, and the consistency test passes, that is, the weight of the scheme layer relative to the overall objective problem can be obtained.

3 Establishing a Hierarchical Structure Model

The establishment of hierarchy is the systematic expression of decision-making problems, which objectively and accurately reflects the objective of abstract problems by selecting indicators. The more complex the problem, the more indicators need to be chosen to reflect the nature of the target. Various indicators require us to divide more levels, and it will be more difficult to construct hierarchical structures. On the basis of reflecting the objective of the problem, these indicators should be as simple, feasible and representative as possible. This is the key to establishing an independent hierarchy in the analytic hierarchy process. A hierarchical structure is established and a parallel relationship between layers is established. The relationship between these two levels is subordinate. Among them, the upper factor dominates the lower level factors while the lower level is the refinement of the upper level. When we use analytic hierarchy process, we usually divide a problem into three levels.

(1) Target level: the target level is the highest level in the hierarchical model. The goal layer is the goal of our problem, that is to say, this layer is the ultimate goal and result that we want to achieve, and only this factor.

(2) Rule level: this layer is located in the middle of the hierarchical model, so it is called the middle layer. The criterion level is the most critical layer to solve the problem by AHP. The factor of the criterion layer is the decomposition of the target layer, each of which is the specific reflection of the target layer. Analysis and research of standards level can help us achieve the corresponding goals. It can have one or more levels. If necessary, the standard layer can be divided into several sub elements.

(3) Index level: this level is the various solutions we can take to achieve our goals. This scheme can be objective and needs our direct choice. It can also be our subjective design, from which we can choose the best. The scheme layer is generally only one layer, which is in the lowest level of the hierarchy.

We should follow the following principles in building decision models.

(1) In the process of solving and simplifying the problem, we must seize the main factors without omitting too much. When we make decisions, some of the problems we see are very complicated. Many

factors will be found when constructing a hierarchical model. If all these factors are built into a hierarchical model, it makes our decision-making more difficult. According to psychological research, we have a rule that one factor should not exceed nine factors. In order to make a clear judgment, methods of reducing the number of factors and increasing the level can be used according to this principle.

(2) It is better to match the attributes of factors among different levels. Do not put them on the same floor. When constructing the hierarchical decision model, the first layer is the target layer, which is usually only a factor and is easy to choose. But there are many factors in the standard level. According to the preceding principles, each factor should not exceed nine. Therefore, these complex factors need to be redefined. Factors of the same rank or nature are placed at the same level. The factors of affiliation can be stratified and downward. This requires us to analyze the problem in depth and establish an accurate hierarchical module.

The overall goal of selecting high-level basketball players is to improve the technical level of basketball and promote the development of basketball（Meng Pengjun et al, 2015）. After in-depth investigation and preliminary feasibility analysis, we believe that there are many factors affecting the level of basketball, which is not easy to determine. Especially, qualitative problems are often encountered in the selection process, and it is not easy to quantify or completely quantify the indicators, such as differences in physical conditions, physical quality, psychological quality and so on（Liao Luzhen et al, 2016）. These detailed indicators used to be the best choice, only through achievements and experience, the lack of a certain degree of scientific（[10], 2015）. Therefore, according to the principle of Analytic Hierarchy Process (AHP), the decision-making problem should be defined firstly, and then the problem should be hierarchized according to the nature of the problem, the relationship between various factors and the corresponding subordinate relationship, so as to form a multi-level structural model, the same level of each element as a criterion layer to the next element (Zhong Jianping et al,2012). Dominance, which itself is a hierarchy dominated by elements, forms a hierarchical structure under the control of top-down relationships.

According to the above-mentioned principles, in view of the target of selecting high-level basketball players, according to the analysis of data and the visits to experts and through consultation, induction, analysis and collation, four indicators are determined at the criterion level, namely: B1 - Physical quality; B2 - body shape; B3 - psychological quality; B4 - physiological function（Xie Dongming，2016）. At the index level, 17 evaluation indexes are determined. Finally, the hierarchical analysis structure model of selecting high-level basketball players are obtained (see Table 1).

Table 1 The Hierarchical Structure of Selecting High Level Basketball Players

Target level（A）	Criterion level（B）	Index level（C）
Selection of high level basketball players	Physical fitness（B1）	Springing force（C1-1）
		Sensitivity（C1-2）
		Speed endurance（C1-3）
		Strength（C1-4）
		Flexibility（C1-5）
	Body shape（B2）	Height（C2-1）
		Finger distance（C2-2）
		Hand width（C2-3）
		Weight（C2-4）
		Length of lower limb（C2-5）
	Psychological quality（B3）	Judgment ability（C3-1）
		Adaptability（C3-2）
		Self coordination ability（C3-3）
		Willpower（C3-4）
	Physiological function（B4）	heart rate（C4-1）
		Vital capacity（C4-2）
		Comprehensive response（C4-3）

4 Constructing Judgement Matrix and Calculating

Building judgement matrix is the most important step of AHP, and also the starting point of AHP.

The formation of judgement matrix is the quantitative process of subjective thinking and the basic information of problem analysis（Peng Lixia，2015）. Therefore, on the basis of listening to the opinions of the investigation group and the masses, the decision-making level makes two or two comparisons on the various factors in Table l, constructs the judgment matrix from top to bottom, and then makes calculation and analysis. In order to test whether the judgment matrix has satisfactory consistency, it is necessary to compare the consistency CI of the judgment matrix with the average random consistency index RI. For the 1-10 order matrix. The RI value is shown in Table 2.

Table 2　The Average Random Consistency Index RI Value

Judgement matrix order （n）	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

The consistency index CI of the judgment matrix is calculated as follows: $CI = \lambda_{max}/n - 1$

the ratio of the consistency index of the judgment matrix to the average random consistency index RI of the same order constitutes the random consistency ratio CR of the judgment matrix, which can be expressed as CRR = CI / RI.

Generally speaking, the smaller the value of CR, the better the consistency of the judgment matrix. It is generally believed that when CR < 0.10, the judgment matrix has satisfactory consistency. When CR>0.10 is not consistent, the judgement matrix must be adjusted. RI is the average random consistency index, which is only the order of the judgment matrix. The related indexes are shown in Table 2. In fact, when the matrix order n is less than 2, there is no inconsistency in the matrix, so there is no need to test it. The judgment matrix A-B for the relative importance comparison between the criteria layers is shown in Table 3, relative to the overall objective.

Table 3　Target Level Judgement Matrix A-B

A	B1	B2	B3	B4
B1	1	1/3	5	5
B2	3	1	5	5
B3	1/5	1/5	1	2
B4	1/5	1/5	1/2	1

$\lambda_{max} = 4.216$, CI=0.042, From table 2 to RI=0.52, CR=CI /RI=0.08l<0.10 satisfies the consistency. The judgment matrix B1-C comparing the relative superiority of the alternatives is shown in Table 4 when considering the physical fitness of the alternatives.

Table 4　Criterion Level Judgement Matrix B1-C

B1	C1-1	C1-2	C1-3	C1-4	C1-5
C1-1	1	1/3	4	4	5
C1-2	3	1	5	5	6
C1-3	1/4	1/5	1	1/3	3
C1-4	1/4	1/5	3	1	4
C1-5	1/5	1/6	1/3	1/4	1

$\lambda_{max} = 5.403$, CI=0.080, From table 2 to RI=0.89, CRIs / RI=0.090<0.10 satisfies the conformance. The judgment matrix B2-C, which compares the relative superiority of the alternatives, is shown in Table 5 when considering the alternatives in terms of body shape.

Table 5　Indicator Level Judgement Matrix B2-C

B2	C2-1	C2-2	C2-3	C2-4	C2-5
C2-1	1	3	5	5	4
C2-2	1/3	1	4	3	2
C2-3	1/5	1/5	1	1/3	1/3
C2-4	1/5	1/3	3	1	1/2
C2-5	1/4	1/2	3	2	1

$\lambda_{max} = 5.198$, CI=0.0495, From table 2 to RI=0.89, CR=CI / RI=0.056<0.10. satisfies the

conformance. The judgment matrix B3-C, which compares the relative superiority of the alternatives, is shown in Table 6 when considering the choice of alternatives in terms of psychological quality.

Table 6　Indicator Level Judgement Matrix B3-C

B3	C3-1	C3-2	C3-3	C3-4
C3-1	1	7	6	5
C3-2	1/7	1	1/3	1/5
C3-3	1/6	3	11/3	
C3-4	1/5	5	3	1

$\lambda_{max} = 4.237$, CI=0.079, From table 2 to RI=0.89, CR= CI / RI=0.089<0.10 satisfies the consistency. The judgment matrix B4-C of the relative superiority of the alternatives is shown in Table 7 when the alternatives are considered in terms of physiological functions.

Table 7　Indicator Level Judgement Matrix B4-C

B4	C4-1	C4-2	C4-3
C4-1	1	2	1/5
C4-2	1/2	1	1/6
C4-3	5	6	1

$\lambda_{max} = 3.029$, CI=0.0145, From table 2, we know m=0.89, then CR= CI / RI=0.016<0.10, satisfying sex. The above-consistency test proves that the judgment matrices in Table 3-Table 7 have good-consistency, and the total ranking of the alternatives can be obtained, as shown in Table 8.

Table 8　The Local Weight and Global Weight of the Index System

local weight	B	B1	B2	B3	B4	global weight	ranking
	C	0.306	0.530	0.096	0.068		
C1-1		0.272				0.083232	4
C1-2		0.479				0.146574	2
C1-3		0.078				0.023868	11
C1-4		0.128				0.039168	9
C1-5		0.043				0.013158	13
C2-1			0.475			0.25175	1
C2-2			0.231			0.12243	3
C2-3			0.054			0.02862	10
C2-4			0.096			0.05088	7
C2-5			0.144			0.07632	5
C3-1				0.0627		0.060192	6
C3-2				0.051		0.004896	17
C3-3				0.105		0.01008	15
C3-4				0.217		0.020832	12
C4-1					0.172	0.011696	14
C4-2					0.102	0.006936	16
C4-3					0.726	0.049368	8

According to the calculation, it can be concluded that CI = 0.059124, RI = 0.89, CR = 0.066 < 0.10, the results show that the consistency requirements are satisfied. Therefore, the above judgment matrix and the total ranking result are satisfactory. Specifically, in the four indicators determined at the criterion level, the weights are: physiological function (0.068), psychological quality (0.096), physical quality (0.306), body shape (0.530), the results are consistent with the results obtained by qualitative analysis. However, in the selection of high-level basketball players, only the four indicators of the criteria level is not specific, so it is necessary to determine the indicators of the lower level. According to the results of the overall ranking, basketball players'synthetic weight of height is the largest, followed by sensitivity, finger distance, bounce, lower limb length, judgment ability and so on. From this we can see that the advantages of body shape can also reflect the level of other qualities, and other qualities have a certain role in promoting; on the contrary, the level of other qualities have a certain restrictive effect on the

shape of athletes.

5 Conclusion

This paper introduced and analyzed the basic principle of analytic hierarchy process and its application in solving practical problems. Through a simple analysis of the selection index, we carried out the weight distribution of each index in the selection process of basketball players and showed the importance of the composition of the selection goal of players is clear at a glance. Analytical Hierarchy Process (AHP) is used to calculate index weights of various factors influencing selection of high-level basketball players. By ranking, we obtained the best solution and provided an ideal theoretical basis for decision-making. At the same time, a corresponding file library can be established according to the model to record the hierarchical structure, judgment adopted and corresponding ranking result. It is convenient for future applications through changing or adding some new decision results.

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Status, Development and Limitation of Research on the Error Analysis

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Abstract: Human language learning is fundamentally a process that involves the making of errors. Error analysis, which focuses on the systematic study on errors in second language acquisition, is a major area in second language acquisition. This paper employs abundant examples to make a thorough research on the theory of error analysis by analyzing the source, classification of errors and the development of research. It ultimately comes to the conclusion that error analysis is an effective way to learn second language, but it needs further research on various aspects of the theory. It is of great significance for teachers employ error analysis in the second language teaching to help language learners acquire second language in an effective way.

Key Words: Error analysis, Second language acquisition; Development of research on error analysis; Limitation

1 Introduction

In the process of learning, learners tend to make mistakes, which will in turn bring benefits to learners from diverse ways of feedback. As to second language learners, errors are inevitable factors in the process of learning second language. Contrary to some traditional views on errors which claim that the appearance of errors is the symbol of failure and should be eliminated completely, error analysis holds a different perspective to treat errors. (Yu Xiaona, 2014) Researchers and teachers came to realize the importance of errors in second language acquisition. When learners produce correct sentences, they may simply repeat something that they have heard before; when they produce sentences which are different from target language, it may be considered that these sentences reflect the learner's current understanding of the rules and patterns of that language. Errors are not always bad, rather they are crucial parts and aspects in the process of learning a language. They may provide insights into the complicated processes of language development as well as a systematic way for identifying, describing and explaining students' errors. Errors may also help to better understand the process of second and foreign language acquisition. (Agsa et al, 2015)As Corder noted: "A learner's errors are significant in that they provide for the researcher evidence of how language is learned or acquired, what strategies or procedures the learner is employing in the discovery of the language." (Brown, 2014) This view not only change people's attitude towards errors, but also improve the position of "errors" as a way to understand learning process. In this way, after the decline of contrastive analysis, researchers turn to the analysis of errors during 1970s. (Zhong Qiuyuan, 2016)

Error analysis in SLA was established in the 1960s by Stephen Pit Corder and his colleagues. It involves a detailed description and analysis of the kinds of errors second language learners make. Influenced by Behaviorism, Error Analysis can replace contrastive analysis, and it is widely used by linguists to find the difference between the learners' first and second languages to predict errors. (She Ali, 2017) It is proved that contrastive analysis fails to predict a majority of errors in spite of its value in the study of language transfer.

2 Theory of Error Analysis

2.1 Difference between error and mistake

Before we understand the theory of error analysis, it is of great significance to make a distinction between "mistake." and "error". Mistake means speakers make error that is either a random guess or a slip of tongue, because it is a failure to use a known system correctly caused by carelessness and inattention. Everyone can make mistakes in both first and second language. However, an error is a noticeable deviation from the grammar of a native speaker caused by incompetence, reflecting the interlanguage competence of the learner. (Liu Zhenwei, 2016) For example, the question "Dose Mike can sing a song?" posed by a language learner is an error, in that the sentence reflects the learner's interlanguage competence. Learners make errors in the process of learning a second language and these

errors can be observed, analyzed in order to learn and acquire language better. To distinguish an error and a mistake, one useful way is associated with checking the consistency of the second language learner's performance. Besides, another significant method is associated with asking a second language learner to correct his or deviant utterance. (Mohammad, 2016)

2.2 Source of errors

Chomsky's Language Acquisition Device and Universal Grammar can partly explain the source of error. Based on these researches, Corder explains the source of errors in a systematical way. It can be seen in the Table 1. He classified the source of errors into four categories: interlingual transfer, intralingual transfer, context of learning and communication strategies. At the beginning of learning a second language, learners inclined to be affected by interlingual transfer, putting the old rules in first language in new language system. A Chinese may say "I have an apple yesterday" instead of "I had an apple yesterday.", because he does not use past tense of a verb in Chinese. When language learners begin to acquire parts of new systems, they tend to be influenced by intralingual transfer-generalization within the target language. Errors are made when learners overgeneralize the second language system like "He goed to school yesterday" instead of "He went to school yesterday." Here, learners thought that all past tense of a verb is to add "-ed" after a verb, which is a manifestation of negative intralingual transfer—overgeneralization. (Teresa, 2015) The third major source of error, though it overlaps both types of transfer, is context of learning. Under different context, learners may produce errors. In the classroom, teachers or textbooks can lead students to form faulty hypotheses about the language. Because of a misunderstanding of teachers' explanations or inability to contextualize the learning, students may have difficulty in distinguishing two similar words like "point at" and "point out". Finally, the last category of source of error originates from communication strategies. In the sentence 'Let us work for the well done of our country", "well done" is an incorrect substitute for "welfare". These categories are presented by Bindal to identify and describe some of the errors made by a group of 76 first year students of Haryana in selected areas of English grammar, i. e., verb forms and patterns, use of auxiliaries and tense usage. (Bindal, 2015)

Table 1   Corder's Classification of the Source of Errors and Examples

Source of Errors	Examples
interlingual transfer	I have an apple yesterday.
intralingual transfer	He goed to school yesterday.
context of learning	difficulty in distinguishing "point at" and "point out"
communication strategies	Let us work for the well done of our country.

2.3 Classifications of errors

Since we have discussed the source of errors, based on the observations of what the learners do in terms of errors, error analysis is classified into four stages as is shown in Figure 1.The first stage is a stage of random errors, a stage is called "presystematic", in which the learner is only vaguely aware that there is some systematic order to a particular class of items. (Brown, 2014) Sentences like "Tracy cans draw a picture." and "I want eating apple." can emerge in this stage. In the second stage-emergent stage, learners have a growing consistency in linguistic production, but still unable to correct errors when it is pointed out. Dialogues between a language learner and a native speaker may have some misunderstanding. The third stage is a systematic stage in which learner have more consistency in the production of a second language. The last stage is stabilization stage, called by Corder as "postsystematic" stage, when learners make relatively few errors and produce language fluently.
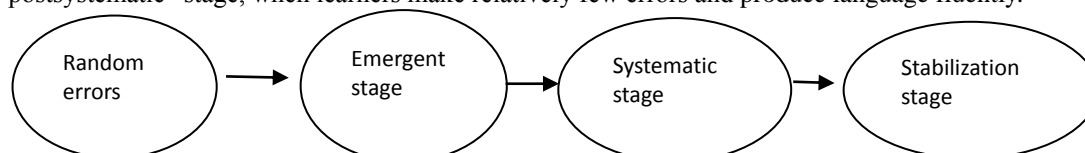

Figure 1   Four Stages of Errors

2.4 Procedures of error analysis

After analyzing the four classifications of errors, we then come to the procedures of error analysis. To acquire the rules of new language from the perspective of language learners, we have to have an effective error analysis. The most prominent task of error analysis is the identification and description of errors.(Rod, 2013) In identifying and describing error, researchers provide overt and covert errors, which are in terms of grammatical errors and context of communication respectively. When learners

realize overt and covert errors, they can try to reconstruct the sentence in a well-organized way with the help of native language. Then, they can compare the original one with the revised one and describe the difference. In this way, learners can make progress with the help of error analysis.

In conclusion, the theory error analysis include the difference between error and mistake, the source of error, the classifications of errors and the procedures of error analysis. After learning the general knowledge of error analysis, we should realized the importance of error analysis in second language acquisition.

2.5 Application of error analysis

Since the publication of the theory of error analysis, it has been applied to diverse aspects and fields, particularly the fields of language teaching and learning. With the development of linguistic theory, the importance and practice of error analysis stands out. Teachers adopt error analysis in various aspects to help language learners to avoid errors and learn from errors. (Ali, 2012) Based on the summary studies on error analysis in recent decades in China, lexical errors are the main topic, followed by errors of grammar, pronunciation, pragmatics, text and others. The research trend has changed from the basic theory to practical application. (Tong Qin, 2018) The application of error analysis in second language teaching and learning has been increasing and diverse in recent years, which is beneficial for language teachers, learners and researchers. (Pooneh, 2012)

3 The Development of Research on Error Analysis

3.1 Early researches on error analysis

The early research on error analysis began in 1960s, when people paid attention to errors in contrastive analysis. Contrastive analysis hypothesis claimed that the leading obstacles to second language acquisition is interference of the first language system, thus a contrast between first and second language system is indispensable to the learning of a second language, such as the discourse analysis and pragmatics. (Malcolm, 2015) Rule-formation of Chomsky thought that second language acquisition, similar to first language acquisition, had a language acquisition device which could build up a language system of the target language. On the basis of these theories, Strevens pointed out that we should not take intralingual errors as obstacles, which need us to overcome, instead errors reflect the process of second language acquisition, which can be used to study the strategies and stages of learners. At this time, the researches on errors were conducted within the framework of contrastive analysis, concentrating on the interference between languages instead of errors themselves. Researches on interlingual errors and intralingual errors are major subjects in second language acquisition. There appeared many essays like input errors caused by first language interference and how to correct errors.(Li Hongmei, 2017)

3.2 Comprehensive researches on error analysis

The conception of interlanguage was put forward by Selinker put forward in 1972, which is a transitional process between native language and the target language. Since then, error analysis became important materials for second language learners. (Larry, 2013) The interlanguage theory holds that a systematic study of errors occur in the learning process together with the reason behind, that is, the error analysis, can reveal the progress and rules in second language acquisition.(Yuan Meng, 2017) The researches on error analysis concentrate on the collection, identification, description, explanation and evaluation of errors, in order to promote teaching methods. The data collection of errors focuses on the definition of errors, while the identification of errors involves the distinction between mistake and error, and the latter is the object of research in error analysis. Language errors are described from two perspectives of linguistics and forms of errors. These descriptions of errors help learners have a better understanding of errors, which in turn improve their study in second language.(Lightbown et al, 2014) The explanation of errors is the principal phase in second language acquisition, involving all possible process in second language acquisition. Richard pointed out three errors, namely interference error, intralingual error and development error, while Shachter and Celce-Murcia classified Richard's categories into transfer error and intralingual error.(Richards, 2015) In addition, Lott divided transfer error into overextension of analogy, transfer of structure and interlingual/intralingual errors. Richard further classified interlingual errors into overgeneralization error, ignorance of rule restrictions, in complete application of rules and false concepts hypothesized. Therefore, the explanation of error is complicated and underwent several changes in classification. At this time, researchers made great progress in error analysis from different perspectives.

3.3 Current research on error analysis

In 1990s, because of the limitation of error analysis, research on error analysis became lesser than that in its peak. The researches on it change from comprehensive descriptions to concrete descriptions of specific subject. Concentrating on the feedback of language errors, researchers endeavor to solve the problems like whether to correct errors, how to correct errors and what errors to correct. (Younghee, 2011)The intent was to determine what instructional implications could be derived from in-depth error analysis. (Mather et al, 2017) Though no consistent conclusions are reached, these researches break the limitation of researches on error analysis. As for the necessity of error correction, most scholars develop the research from the perspective of accuracy, fluency and number of errors after error correction. In terms of how to correct errors, there are direct correction and indirect correction. Research data shows that indirect correction is more effective and appropriate than direct correction in long term and direct correction is suitable for beginners and those who are unable to make correction themselves. Furthermore, researches on what errors should be corrected are relatively less and restrained to the correctness and appropriateness of language use.

All in all, researches on error analysis, to some extent, experienced several waves in second language acquisition. These abundant researches on error analysis help language learners acquire a second language in systematic and scientific way. In this way, researchers should devote more time and energy to the study in error analysis in the future. Though error analysis is effective and useful in second language acquisition, there are also limitations of error analysis, which will be discussed in the next paragraphs.

4 The Limitations of Error Analysis
4.1 Excessive emphasis on error and production
Error analysis, focusing on the analysis of errors in a systematic way, pays too much attention to learner's errors, resulting in ignorance of other aspects in second language acquisition. Though error analysis is effective and useful, second language acquisition is a complicated process including many aspects. Hence, teachers and learners should not stress the importance of errors in second language learning to excess. For example, in the classroom, if the teacher pays to much stress on the correctness and errors in oral class, students may feel nervous and frustrated when they are interrupted by teachers again and again in order to correct error. In this way, fluent, clear and free communications are impeded, which are more important than error correction in oral class. In addition, error analysis is an overstressing of production data and the reliability of error analysis sometimes is not fully supported in special cases.(Fernando, 2016) Language learning is a process of listening, writing, speaking and reading, which includes production as well as comprehension. Error analysis attracts too much attention on language production, oblivious of language comprehension in second language acquisition. Thus, error analysis cannot be applied to the learning of reading and listening, where language comprehension is more significant.

4.2 Failure of comprehensive study on language
Jacquline Schachter and others have shown in research that error analysis fails to account for the strategy of avoidance. (Brown, 2014) In communication strategy, avoidance is an important way to keep the conversation going on. Learners who avoid some certain errors do not manifest a higher level in second language learning. For example, certain English learners are easily to make relative-clause errors in the process of language learning, but native Japanese speaker were largely avoiding that structure, resulting in not as many errors as some native Persian speaker. From this example, we can see that error analysis is not a reliable factor to judge one's level of language acquisition. Beside, error analysis keeps too close research on specific language errors instead of viewing universal aspects of language, which is a complicated language system. Based on papers in CNKI, we can find that most essays center on employing the theory of error analysis to research on language errors in a specific field, such as "The Discussion on Teaching of Writing Based on the Error Analysis of Vocabulary in College Students' English Writing"(Jiasimo, 2016) "The Chinese Tonal Error Analysis and Teaching Method of English-Speaking Students" (YX Gui, 2016) "On the Strengthening of College English Translation Teaching by Using the Theory of Error Analysis "(S Zhang, 2017) and "The Application of Error Analysis in Translation Teaching"(Tang Fang, 2017)etc. These papers reflect the limitation of error analysis, which centers on linguistic elements that are common to all language. The universal properties of language are ignored in this respect.

In a word, though language analysis is effective and useful, there are still some limitations in this research. Aware of these limitations, researchers should spare no effort to overcome the limitation and

make further achievements in this field.

5 Conclusion

Error analysis involves a detailed description and analysis of kinds of errors second language learners make. It is necessary for language learners and teachers to have a good knowledge of error analysis in second language acquisition. This paper firstly analyzes the theory of error analysis from the difference between error and mistake, source of errors, classification of errors and procedures of error analysis. Then, we discussed three stages of research on error analysis. Finally, we come to the limitations of error analysis in second language learning. According to all these analyses, we can draw the conclusion that error analysis is an effective and helpful way of analyzing and learning a second language. Beside, connected with other methods of analysis in second language acquisition, error analysis can be spread to more fields of language learning.

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Research on the Path Selection of Enterprise Transformation in Traditional Industrial Cities from the Perspective of Cultural Genes

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Abstract: Since the reform and opening up, a number of cities have developed rapidly with various advantages. Local enterprises have gradually become industry leaders, while other urban industries have played a major role in the first half of the twentieth century and have played an important role in industrialization. The industrial status of these cities is being replaced, and companies are faced with major corporate transformation path choices. This paper uses a combination of questionnaires and text analysis to study the innovative genes and innovations of some enterprises in Baoji City, Shaanxi Province. The author hopes to provide assistance for the deep research of traditional industrial enterprises in the new era to stimulate innovation potential and break through the bottleneck of innovation, and help the production and management level of China's industrial enterprises to reach a new level.

Key words: Traditional industrial city; Enterprise transformation; Innovative gene; Path selection

1 Introduction

New China has been going through both wind and rain for nearly 80 years. The new journey of reform and opening up has lasted more than 40 years. The development path of Chinese enterprises has undergone several changes. With the advent of the post industrialization era and the pre information era, the industrial status of the city which has played an indelible role in the construction of socialist industrialization in the early 20th century is being replaced. How to transform the local enterprises and how to incubate and innovate new enterprises has become a hot topic for scholars and entrepreneurs. The question of the study.

From the perspective of previous studies, most of the previous studies on enterprise transformation and enterprise innovation behavior were mostly observed in the developed eastern cities (Kong Xiangdou, 2018;Zhao Mengyi, Qu Sunping, Yu Bo, 2018). 2018; Zhao painting, 2014; Zhang Xingan, 2012).Few scholars have studied the path choice of enterprise transformation in traditional industrial cities from the perspective of cultural gene. This research will be based on more than 200 survey results of the key industrial city of Baoji, Shaanxi, which is located in the early days of new China. Based on the survey of enterprises in Baoji Robot and Intelligent Manufacturing Industrial Park, the innovative genes and innovative performance of traditional industrial city enterprises will be explored. This research will be based on Baoji, a key industrial city in the early years of New China. Based on the results of more than 200 questionnaires of Baoji Robot and Intelligent Manufacturing Industrial Park, we will explore the innovative genes and innovative performance of enterprises in traditional industrial cities.

2 Theoretical Basis

2.1 PEST macro environment analysis

Enterprises need to use various production factors to achieve their profit objectives. In the face of different macro environment, enterprises will naturally adopt different development strategies and transformation paths. On the contrary, it is precisely because of the difference of macro-environment that one side of the soil and water makes one side of the enterprise.

Enterprises can follow and study laws, policies and local regulations to standardize operation and innovation in order to seize historical opportunities and avoid future risks. Economic environment, geographical location, population environment and technological factors have a significant impact on the production and marketing of enterprises. On the basis of systematic cognition of the environment of enterprises, we can better grasp the key factors affecting the transformation of enterprises and the long-term driving force of enterprise innovation through the PEST environmental analysis. The study of the relationship between individual behavior and its macro environment is to explore the starting point and foothold of local enterprises in the transformation path selection more historically and prospectively.

2.2 SCP analysis model

Changes in the characteristics of the times and the specific structure of the industry will enable enterprises to choose the path of differentiation in the transformation, and receive different business results. Sort out the internal and external factors and the trend or impact of the industry, analyze the transformation or innovation behavior that enterprises can take, and achieve the adaptation and guidance of enterprises to the new environment of the industry through further innovation in production, operation and management mode.

2.3 Genotypes and phenotype

The enterprise culture and competitiveness formed in the past development process of enterprises are the result of enterprise resource arrangement, coordination and matching. These results are the genetic information that has been formed in the history of enterprises, so as to realize the inter generation inheritance of enterprises. Enterprises retain a lot of cultural genes, but ultimately in the production and operation of enterprises will only be one or several genes. Only dominant genes play an important role in influencing the current development of the enterprise, making the enterprise appear a dominant trait and become a major contradiction that has an important impact on the enterprise.

3 Material Selection and Research Methods

Baoji, Shannxi, is known as the "northwest industrial town" and "China Titanium Valley". The five listed companies such as Beacon electronics, Baotai shares are rooted in Baoji. The high new district in the area has been granted the "state-level high-tech Industrial Development Zone" in 1992, and Baoji is the ancient warehouse with more than 170 kilometers west of Xi'an. In the golden age of "One Belt and One Road" construction, Baoji's enterprises are typical in studying the transformation of traditional industrial cities.

This research adopts the data collection method of questionnaire survey, historical and cultural background data and data analysis. The questionnaire adopted Lester scale to design four variables, namely, innovation performance, innovation culture, innovation strategy and employee participation (Areti Gkypali, etc.; 2018; CesarPino and so on; 2016; Miha kerlavaj, etc.; 2010; Ricarda B.Bouncken, etc.; 2014; Richard Yu Yuan Huang, 2006).From the aspects of innovative sales, innovative products, process innovation and so on, we observe the innovation performance, observe the innovation culture from the management level of the welcome degree of innovative ideas, the risk of innovation, observe the innovation strategy from the relationship between innovation activities and strategies, and observe employee participation from decision making, quality commitment and supervision participation. A total of 227 questionnaires were sent out, 200 valid questionnaires were collected, at the same time, we collect extensive data on the history of Shaanxi Fengdu and Baoji modern industrial enterprises, so this study is feasible.

4 Investigation and Analysis of Questionnaires

4.1 Transplantation and gradualness of enterprise innovation path choice in traditional industrial cities

The Baoji robotics and intelligent manufacturing industry park, which is mainly supported by this research, has begun to take shape. The four research and research enterprises are small and medium-sized enterprises in the intelligent equipment R & D industry, with registered capital ranging from 10 million to 100 million, and the annual output value of the project is expected to be in the range of 10 million to 100 million. By consulting the data and in-situ dialogues, the author finds that the four enterprises are inclined to portability and gradualness in the choice of innovation path. For traditional industrial city enterprises, the choice of innovation path is inseparable from analyzing the environment and solving the problem of survival. Many genes affect the traditional industrial city enterprises to choose a transplant and incremental innovation path.

Table 1   The Attribution of Innovation Path Choice of Enterprise Transplantation and Gradual Transformation in Baoji City

	Economics	technology	Sociology
Opportunity	Located in the Midwest of China, it is an important transportation hub on Bao cheng and Long hai railway lines. The construction of socialist industrialization started early with a complete range of industries; the deputy central city of Guanzhong-Tianshui Economic Belt; and Xi'an was listed as the ninth largest central city in China.	Several specialist technical schools, known as the "Baoji craftsman" brand, have attracted many large enterprises to enter the country, and Baoji titanium industry cluster in China is known all over the country. Cooperation with Northwestern Polytechnical University, Xi'an Jiao Tong University and other famous universities	Introducing relatively mature manufacturing enterprises in the central and eastern regions to take root and provide policy support; attaching increasing importance to innovation
weakness	The inertia of the traditional industrial model of "the ship is hard to turn off"	The core competitiveness of science and technology and the ability of independent innovation generated by elite innovative talents are mostly lacking. The majority of state-owned enterprises are still "iron rice bowl consciousness", and the monopoly advantage of industry makes the past lack of innovation power.	In Guan zhong area, there are only two undergraduate colleges and universities in terms of pragmatism, conservative cultural genes, and innovative atmosphere.
Result	With the increase of attraction, the goal of internationalization and modernization of enterprises becomes clearer, and there is a lack of independent innovation and subversive innovation.	It undertakes the industrial transfer in the eastern and central regions, and maintains a high value of industrial output, but it is congenitally insufficient to carry low added value at the end of the industrial chain	Breakthrough innovation of enterprises is slow, and it is difficult for innovative enterprises to establish traditional industrial cities on the fourth line, with low degree of perfection.

4.2 The motive of the transformation and innovation of the traditional industrial city enterprises

When collecting the results of the same topic, there are obvious differences in the understanding of innovation among different horizontal ownership enterprises. The following chart compares the results of the questionnaire with weighted average method.

When asked about the speed at which new products are launched, the ratio at which new products are produced, the degree of emphasis on innovation in workflow and methods, The answer of private intelligent manufacturing industry in the industrial park shows obvious tendency. No matter senior managers, professional technicians or other administrators, they all have a high degree of recognition for the pursuit of innovation and the innovation behavior of their enterprises. However, the two state-owned design and electronic communication enterprises have scattered recognition results on these issues, and the perceived level of general employees' innovation performance is significantly lower. Similar differences in innovation motivation were also revealed in field visits. In terms of innovation performance, the private intelligent equipment enterprises in the industrial park have a strong sense of urgency for innovation, a great degree of awareness of innovation performance and a strong sense of anxiety.The concept of "iron rice bowl" of employees in state-owned manufacturing enterprises still exists, and the original motive force of enterprise innovation is insufficient.
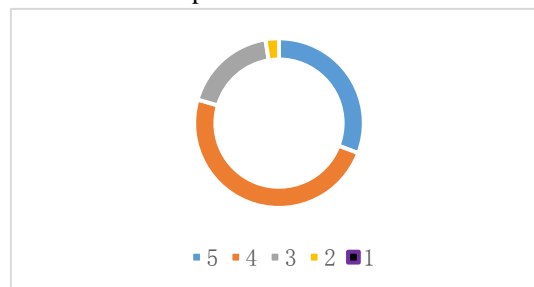

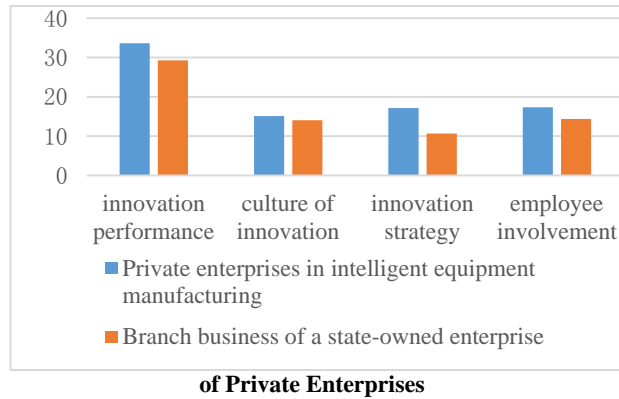**Figure 1   The Respondents Were Highly Sensitive to The Potential Risks of Innovation and Transformation**

of Private Enterprises

Figure 2   Comparison of Different Enterprises' recognition of Innovation Variables

Especially the questions about innovation risk in the questionnaire are the most intuitive. The premise of the innovation and transformation of new private enterprises is to ensure the existence and sustainable operation of enterprises. Therefore, the recognition of "many innovative schemes and ideas are too risky because they are not implemented finally" is very high. The identification of the questions is more scattered.

Emerging private enterprises have few monopoly and native advantages. Their survival instinct makes them need to maximize their potential in technology, technology and management performance.It is also due to the fact that private enterprises in traditional industrial cities do not have obvious advantages in the original market competitiveness and occupancy, and private enterprises have strong innovation motivation to develop new markets. Therefore, the environmental genes of traditional industrial cities and the genetic genes of enterprises themselves make the private equipment manufacturing industry have stronger innovation motivation and ability to cultivate and play a stronger role.

4.3 Complexity of enterprise transformation and innovation genes in traditional industrial cities

The results of longitudinal survey show that enterprises with a good cultural atmosphere, a high degree of employee involvement, and systematic planning of innovative strategies are also prominent in terms of innovation performance, some of which directly affect the transformation of innovation achievements.

There are also some subtle influences on enterprise decision making and enterprise performance, which can not be ignored. For example, the majority of enterprise members have undergraduate education, the low proportion of undergraduate education and the large number of young backbone reserves are the relative advantages and disadvantages formed by the interweaving of dominant and recessive genes.
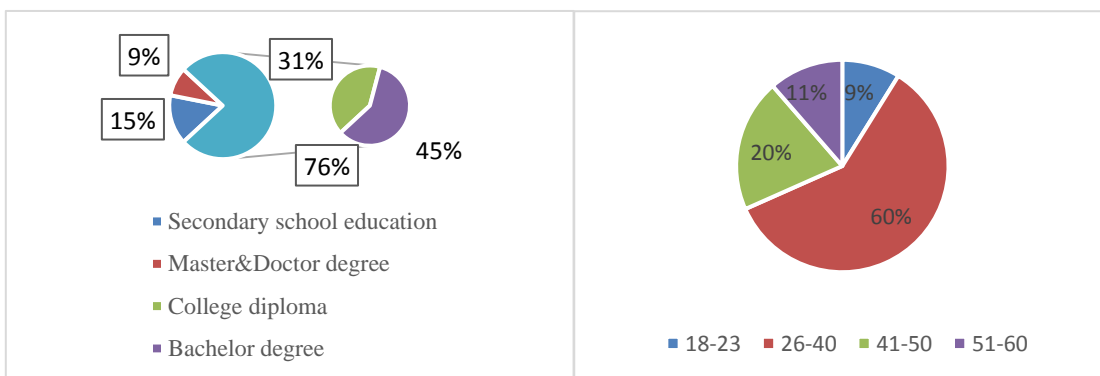

igure 3   Distribution Structure of Dominant Gene (Education, Age) in Enterprises Visited by Industrial Parks

The reason why research enterprises survive and develop is that dominant and recessive genes play a coordinating role. Give full play to the dominant genes to undertake industrial transfer and then homeopathic development of technological innovation potential, using the advantages of recessive genes

to achieve partial compensation. Different enterprises have different degrees of recessive gene expression. The dominant, recessive genes and resources arrangement, coordination and matching intergenerational inheritance of enterprises affect the transformation and innovation of enterprises in varying degrees.

5 Conclusion

The transformation path of traditional industrial cities is accompanied by pains. There are complementary regional, social and cultural genes and complementary bases of corporate culture. In particular, in the face of historical advantages and disadvantages, dominant opportunities and recessive short boards, it is necessary to make use of post exploration and upgrading without delay and impetuous. It is a choice to grasp the main contradiction of the dominant character of enterprises, take the hidden genes, strengthen benign motivation and simplify the steps to take the road of innovation.

Acknowledgement

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Research on Interaction Between Knowledge Management and Independent Innovation in Manufacturing Enterprises

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Abstract: This study defines the connotation of knowledge management and independent innovation, analyzes the interactive relationship between knowledge management and independent innovation of enterprises, and puts forward that the independent innovation of enterprises is the result of the mutual promotion and function of knowledge elements. The concept of independent innovation knowledge field of enterprise is put forward from field angle of electromagnetics. It is concluded that the independent innovation knowledge field of enterprise has the properties of force and energy in general field, but also has extensive action and subjective initiative. From the perspective of knowledge field, the process of independent innovation of manufacturing enterprises and manufacturing enterprises are analyzed. The size and influencing factors of the field force are divided into the dominant elements, the neutral elements and the recessive elements of the independent innovation knowledge field of the manufacturing enterprises combined with knowledge field and knowledge management. These factors play the role of the force and energy of the field, and make the manufacturing enterprise independent through the diffusion, transfer, sharing and integration of the knowledge elements. Innovation provides impetus to improve the capability of independent innovation of manufacturing enterprises.

Key words: Interaction; Knowledge management; Independent innovation; Manufacturing enterprises

1 Introduction

Most scholars divide the knowledge management into two kinds of narrow and broad sense. The narrow sense of knowledge management is the management of knowledge itself, including the management of knowledge creation, acquisition, processing, storage, dissemination and application, while the broad knowledge management also includes the management of all kinds of knowledge related resources and intangible assets, involving the knowledge group. Management of weaving, knowledge facilities, knowledge assets, knowledge activities and knowledge personnel.

The impact of knowledge management at the macro level is mainly reflected in the regional economic aspects. The economic growth of the OECD developed regions is more obviously dependent on the generation, dissemination and utilization of knowledge than in the past. The knowledge-based economy has accounted for more than 50% of its GDP. Therefore, knowledge management is of great importance to the political and economic development of a country at the national level.

Knowledge management can maximize the acquisition and sharing of useful experience and reusable knowledge assets, shorten operation time and reduce duplication of labor, while reducing production costs, it can also effectively improve the efficiency of output.

In the process of knowledge management, the employees can learn new knowledge in the process of work, so that employees can improve their personal skills and professionalism in the process of work. In the process of employee learning, they can also effectively promote the development of the enterprise to the learning organization. The characteristics of knowledge management are mainly shown in the following six aspects: one is to attach importance to the role of people and the development of people; the two is to attach importance to innovation; the three is to pay attention to the contribution of knowledge assets; four is to pay attention to the overall development goal of the society, for example, to attach importance to ecological balance and sustainable development, and the five is to attach importance to knowledge integration management; and the six is to value the model of benefit.

2 Concept Definition

This paper divided the key influence factors of the innovative industry clusters knowledge transfer into three dimensions that is enterprise knowledge absorptive capacity dimensions, dimensions of relationship quality and cluster knowledge network dimensions.

2.1 The definition of knowledge management

The function of knowledge management can be summed up in the following four aspects: (1) the externalization function-the management function of knowledge acquisition: (2) internalization function

to the management function of knowledge processing; (3) intermediary function - the management function of knowledge transfer; (4) cognitive function - the management function of knowledge transport, that is, explicit knowledge The ordering function of knowledge can also be called the function of knowledge organization.

2.2 The definition of independent innovation

With the concept of independent innovation put forward, manufacturing enterprises apply it to related research, which greatly improves the competitiveness of manufacturing enterprises. Manufacturing enterprises use their own resources to make technological breakthroughs and constantly improve the production technology of products.

Independent innovation is a kind of innovation activity relative to imitation innovation, that is, the core technology needed by the innovation comes from the internal technological breakthrough. It is to get rid of the dependence on the external technology in the way of technology introduction and technology imitation, relying on its own strength and through independent research and development activities.

The capability of independent innovation of manufacturing enterprises can reflect the market competitiveness and future development potential of the enterprise in the field of industry. Vigorously carrying out independent innovation can not only enhance the corporate image, but also increase customer confidence. The independent innovation of the manufacturing enterprises means that the manufacturing enterprises use their own resources to carry out the related research and obtain the technological breakthrough, which is the leading innovation of their own, including the selection of the project, the raising of funds, the control of the organization, the determination of the progress and the economic indicators, especially the ownership of the intellectual property.

Based on the analysis of enterprise practice and domestic and foreign research, this research is based on the analysis of independent innovation. It holds that independent innovation has unique characteristics, such as creativity, risk, flexibility, benefit and so on. These characteristics are the basis for the identification and management of independent innovation.

3 The Interactive Relationship and Effect Analysis of Knowledge Management and Independent Innovation in Manufacturing Enterprises

3.1 The effect of knowledge management on independent innovation

Innovation often starts from personal cognition. After conscious development and research, it finally transforms conceptual creativity into products, processes and technologies. To some extent, the independent innovation of manufacturing enterprises can be regarded as the innovation of knowledge within an enterprise. In the current innovative research, the process school has great influence. According to the process of innovation, independent innovation can be divided into three stages, namely, the exploratory stage, the development evaluation stage and the execution stage of independent innovation. Knowledge management runs through the three stages of independent innovation of manufacturing enterprises, and plays a supporting role in different stages.

3.2 The effect of knowledge management on independent innovation

(1)The exploration stage of independent innovation in manufacturing enterprises

The main tasks of the exploration stage of independent innovation of manufacturing enterprises are: creation, evaluation, and making innovation decisions. It mainly involves the generation, recognition, acquisition and storage of various new knowledge. Whether it is the original innovation or the two innovation, the independent innovation of the manufacturing enterprises is first appeared in the form of "creative", and creativity can be considered as a new knowledge. Enterprises need efficient, systematic innovative information acquisition methods to promote technological innovation.

The flow of knowledge is not directed. Therefore, in the start-up phase of independent innovation, manufacturing enterprises need to carry out knowledge management to promote the creation of all kinds of creative ideas, and use knowledge to excavate conscious knowledge. In this process, the process of discovery, analysis and selection of creativity is the acquisition of knowledge. Creativity can come from customers, suppliers, cooperation manufacturers, competitors, college research institutes, enterprise technicians and other employees. Creativity can also cover all aspects, can be the design of new products, new technology and technology, etc. Inspiration inspired by design, production, management, sales and training.

(2) Evaluation stage of independent innovation and development of manufacturing enterprises

Creativity needs to be developed by technology, and it can be embodied in the entity after groping and

experimentation. This stage is the development stage of independent innovation. The development stage of the independent innovation of manufacturing enterprises is mainly the development and design of the products or process ideas determined at the start stage, which involves the diffusion and transfer of knowledge. In the process of independent innovation and development of manufacturing enterprises, knowledge management can improve the whole process of technology and product development. It can lay a solid foundation for the original innovation ability, integrated innovation ability and the ability to introduce and absorb and absorb innovation, in order to coordinate the matching degree of various information and technology development, and assist the innovation system to reach the local level. The optimization is also necessary to achieve the overall optimal.

After the completion of the detailed process and product design, the knowledge system of the enterprise will make the technical data information and summary, and determine the purchase or modification of the manufacturing tools and equipment according to the production needs. Then, the trial production of innovative products or the trial operation of innovative technology is carried out. The detailed data in this process will be recorded and collated. After the knowledge base is arranged, the knowledge system will be fed back to the relevant personnel to help the innovators improve their innovation and prepare for large-scale commercial production.

(3) The implementation stage of independent innovation in manufacturing enterprises

The implementation stage of the independent innovation of the manufacturing enterprises is mainly embodied in the independent innovation, which is embodied in the "tangible" achievements, such as products, technology and technology, and is more perfect and can be put into the market relative to the development stage. This stage is mainly concerned with the application and protection of knowledge. Knowledge sharing, dissemination and diffusion always exist in the whole process of the development stage of the independent innovation of manufacturing enterprises. Through knowledge management activities, such as knowledge acquisition and sharing, effective knowledge can activate the knowledge collected and stored in the start-up phase of independent innovation, and create new creation after the integration of the knowledge.

3.3 The influence of independent innovation on knowledge management

To some extent, the independent innovation of manufacturing enterprises can be regarded as the innovation of enterprises' independent knowledge. Knowledge innovation is the foundation of technological innovation and the source of new technologies and new inventions. Because of the close relationship between innovation and knowledge, the process of independent innovation of manufacturing enterprises will inevitably affect knowledge management. Knowledge management is the whole process management of knowledge acquisition, integration, refining, transfer, sharing and application. It not only runs through the whole process of independent innovation of manufacturing enterprises, but also affects other business aspects, such as financial problems, human resources and so on. The independent innovation process of manufacturing enterprises plays an important role in knowledge management, which is mainly related to the system construction and business performance of knowledge management. Knowledge management is a comprehensive process. In this study, knowledge management is divided into four stages: knowledge acquisition and creation stage, knowledge transfer and diffusion stage, knowledge sharing and management stage, and knowledge integration and evaluation stage.

3.4 The analysis of the interaction effect of knowledge management and independent innovation

The interaction process between knowledge management and independent innovation in manufacturing enterprises is shown in Figure 1. In the environment of enterprise independent innovation, the interaction between independent innovation and knowledge management exists in all stages of enterprise innovation. On the one hand, the knowledge management of manufacturing enterprises can promote and serve the independent innovation of the enterprise, play a role in the process of innovation. Independent innovation can also produce positive interaction effect on the process of knowledge management. On the other hand, once the enterprise's knowledge management is not properly matched with the independent innovation system, both of them are not properly matched. There is a negative interaction effect.
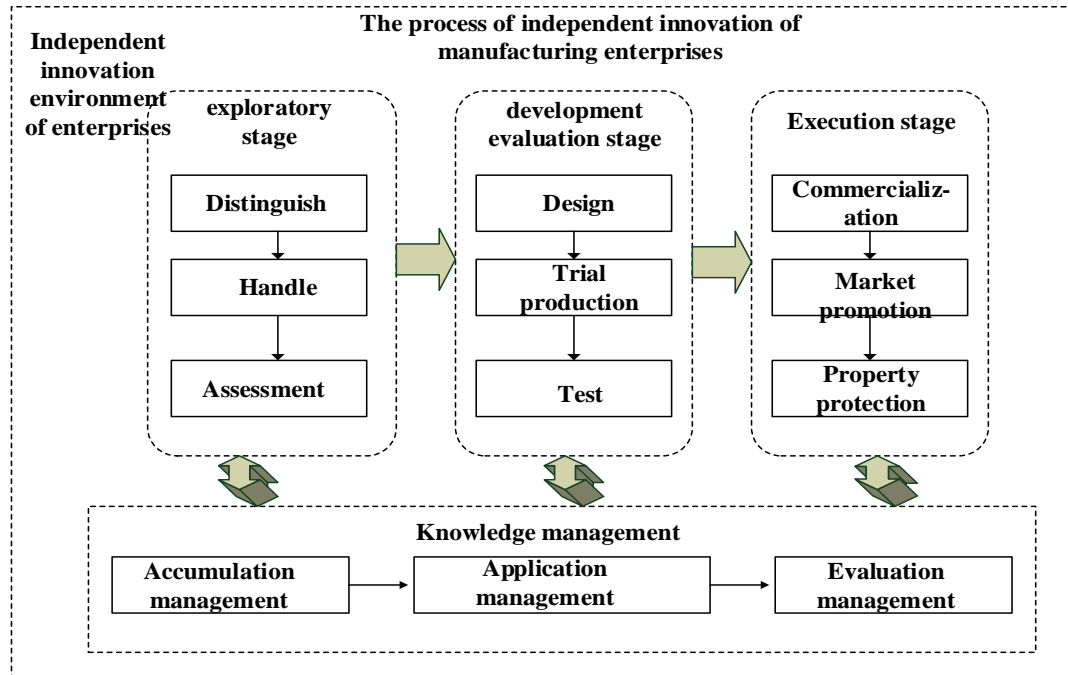
Figure 1   The Interactive Process between the Knowledge Management and Manufacturing Enterprises

The positive interaction effect between knowledge management and independent innovation is that the enterprise produces "1+l>2" effect through reasonable matching of the two. Enterprise knowledge management and independent innovation are interactive and interactive, and correctly guide the two to cooperate with each other to achieve positive interaction effect. How to coordinate knowledge management and independent innovation, realize its positive interaction and avoid the waste of human, financial and material resources is also the purpose of this research.

In order to realize the positive interaction effect, the manufacturing enterprises can use the virtual knowledge network established by the knowledge management to get the technical help in the innovation alliance of "official one, one, one study and research", improve the independent research and development ability of the enterprise, and upgrade the information system of the enterprise continuously in the process of innovation, and achieve a win-win situation.

3.5 The role and field analysis of knowledge innovation in manufacturing enterprises' Independent Innovation

(1)Knowledge field of independent innovation in manufacturing enterprises

In the manufacturing enterprises' independent innovation knowledge field, manufacturing enterprises are affected by the field of knowledge field. The size of the field force determines the size of the independent innovation power of the manufacturing enterprises. Then we study the size and influence factors of the independent innovation knowledge field force of the manufacturing enterprises. According to Coulomb's law, we know that the force between two stationary point charges in a vacuum is proportional to the product of the charge of the two charges, and is inversely proportional to the square of their distance. The direction of the force is along the line of the two point charges, the same name charges repel, and the special charge is absorbed. Referring to Coulomb's law, we define the formula of independent innovation knowledge field strength of manufacturing enterprises such as formula 1.

$$\vec{F} = K \frac{Qq_0}{r^2} \tag{1}$$

In the form:

K - the independent innovation coefficient of manufacturing enterprises refers to the comprehensive weighted values of factors that affect the independent innovation of enterprises, such as the geographical location, economic level and technical level of the enterprises in the enterprises.

Q - the total amount of knowledge resources, directly or indirectly, can provide power for the independent innovation of manufacturing enterprises at specific time points, including the various

dominant knowledge elements, tacit knowledge elements and neutral knowledge elements mentioned in the previous article.

q_0 - the knowledge stock of manufacturing enterprises refers to the total amount of knowledge resources that can be mastered by the manufacturing enterprises at special timing points, including their own knowledge and knowledge field, and the internal knowledge is mainly reflected in the level of enterprise personnel, equipment, funds, organization and management. ;

　　r - knowledge distance refers to the gap between the knowledge stock of the manufacturing enterprise and the knowledge stock in the knowledge field at the special time point. This gap is not only reflected in the quantity, but also is reflected in the knowledge element information in the acquired knowledge field, and the higher the use of knowledge is obtained.

　　(2) Process model of knowledge field of independent innovation in manufacturing enterprises

Knowledge is a special resource, and its creation and production are realized in the process of its dissemination and application. In essence, the process of independent innovation of manufacturing enterprises is the process of creation and generation of new knowledge. In the knowledge field, the elements of knowledge themselves emit energy, and the knowledge elements are transferred, spread, shared and integrated through effective management, and the comprehensive energy is released. These energy are delivered to the manufacturing enterprises at the same time, and the manufacturing enterprises are driven to create new and rationalized knowledge. Therefore, from the perspective of knowledge field, the process of independent innovation of manufacturing enterprises is a spiral and rising knowledge creation process of knowledge creation, transfer, diffusion, sharing and re creation, and the knowledge field provides the motive force for the independent innovation of the manufacturing enterprises.

As shown in Figure 2, the independent innovation of manufacturing enterprises is the process of knowledge acquisition and recognition, knowledge diffusion and transfer, knowledge sharing and knowledge integration under the joint action of the field energy and the transformation of knowledge elements between the knowledge elements and the knowledge elements.
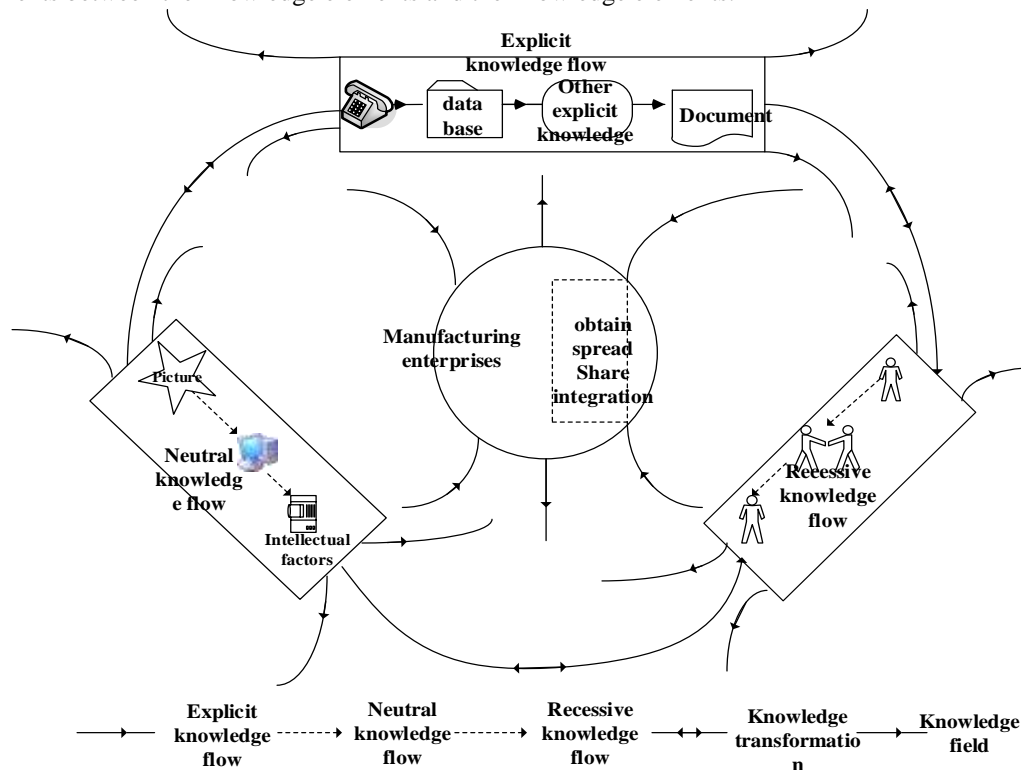

Figure 2　Knowledge Field Model of Independent Innovation in Manufacturing Enterprises

4 Conclusion

　　In the traditional knowledge management, knowledge management includes two kinds of tacit knowledge and explicit knowledge. Based on the characteristics of the independent innovation

knowledge field of manufacturing enterprises, this study divides the elements of independent innovation field into three categories: explicit knowledge elements, neutral knowledge elements and tacit knowledge elements. Explicit knowledge elements refer to the elements that employees can communicate through oral instruction, reference materials, patent documents, software and database access, language, books, text, database and other coding methods to facilitate the formation of new materials, new products, new technologies, new markets and new organizations in manufacturing enterprises. Knowledge matching, policy information, relevant laws and regulations, market demand information, knowledge differentiation, trust, technology, knowledge potential energy, etc. Implicit knowledge elements refer to some unofficial, inexpressible skills, skills, experiences and know-how and insight, intuition, perception, values, mental patterns, tacit understanding and organizational culture of the team to make the enterprise master the unique core technology of its own intellectual property right and to realize the value of the new product on this basis. Such as knowledge motivation, new technology knowledge, product development skills, information processing ability, knowledge structure and so on. The element of neutral knowledge is between the dominant knowledge field and the tacit knowledge field. It refers to the knowledge elements expressed in the way of words, symbols and figures in the process of independent innovation, and the mixture of knowledge elements that can not be expressed in the human brain, such as words, symbols, graphics, etc., such as potential market knowledge and specialization. Family skills, business management knowledge, knowledge recognition ability, knowledge recognition ability, knowledge recognition ability, knowledge application ability and so on.

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Research on the Benefits and Risks of Collusion Behavior in Project Bidding

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Abstract: At present, with the rapid growth of China's development, the government's investment in infrastructure and public projects has been increasing. Although good results have been achieved, there are still many problems in the field of engineering projects. This paper adapts the methods of documentary analysis to focuses on the risks and benefits of collusive behavior in project bidding. Not only benefits but also risks are important factors to effect the decision of speculator.

Key words: Project bidding; Collusion behavior; Benefits; Risks; Governance

1 Introduction

There are many reasons for the collusion behavior in the bidding activities of the project. First of all, from the perspective of the owner, the Bidding Law has left a lot of space to owner's discretion. Because the lack of project resources lead to vicious competition market. They will collusion to make more profit naturally. (Chen, 2016) Secondly, from the perspective of bidders, the current legal system can be used to meet the requirements of bidding qualifications, using the means of surround bidding, forging bid and Accompanying-Bidding to achieve the goal of winning the bid. (Alexeev & Leitzel, 1991) ; thirdly, for cities with high market concentration and openness, the qualification requirements of engineering projects can also be tailor-made for bidders, thus forming a huge market. (Perry et al., 2000) In addition, the government is not strong enough in supervision, even individual official use power to carry out black-box operations for personal gain. At the same time, too much intervention make the supervision is pointless, just created more reasons for the crime. The low costs of collusion and punishment make speculators dare to collusion by taking turns to benefit sharing. (Dotoli et al., 2014) Finally, although the market does not set entry barriers, in fact many bidders do not have a competitive advantage in the market, companies that have entered the market early and have a good foundation and performance will use the prior consultation between the owner and the experts. "Several years of operating performance" is a scoring condition that excludes other companies that want to enter the market or the project, thereby achieving monopoly and controlling the market (Benjamin R., 2016) .

2 Research on the Benefits of Collusion Behavior in Project Bidding

The collusion behavior in project bidding may bring benefits to all parties mainly for high economic benefits. All parties involved in the project bidding activities tend to pursue the maximization of interests. In the absence of additional costs, regardless of whether the cost of collusion between the project bidding stakeholders is symmetrical, collusive behavior may occur, and in the symmetry of collusion costs, collusion behavior is more likely; at additional costs When it exists, it can coexist in the case of conspiracy in the case of conspiracy cost asymmetry (Jeanine Miklós-Thal, 2011; Aske & Cantillon, 2008) .

(1) For the bidder, it hopes to obtain the right to build the project in the fierce market competition while ensuring the profit. Therefore, two or more bidders will often find a collusion for the target, and the price will be low. Obtained the target; or the contractor colluded with the bidding agent to obtain the target at a low price (Porter & Zona, 1992) , and then use its own advantages in industry information, engineering technology, etc., to extract high profits from project cuts (Luo et al., 2013) . Although in the engineering project, a certain quality guarantee is often set to constrain the contractor's behavior, it is often difficult to achieve the expected effect because the amount of the quality guarantee is too small.

(2) For the bidding agent, when the bribe provided by the bidder is higher than the reward provided by the bidder, there may be collusion between the bidding agent and the bidder.

(3) For the supervisory party, it played an important role in strengthening fund management and ensuring the progress and quality of the project (Isaac, 1895) , but driven by economic interests. Under the supervision, the supervisor does not always serve the owner according to the contract, and even seeks rent from the contractor for his own interests, intending to loosely manage the contractor's

construction behavior, and the contractor By making bribes to the supervisory party, you can pursue greater economic benefits, especially when the supervisors subjectively judge the government The low success rate of collusion is more inclined to conspire to defraud the owner and damage the interests of the owner.

(4) For the founder, it has rich information on the construction market and resolutely solves the problem of low level of government engineering management specialization. However, "specialization" is a double-edged sword, and the agent can fully utilize it and the contractor. The information advantage and professional advantage between them, deceiving the government or investors to obtain "information rent", and obtaining "rights rent" from bidding agents, bidders and other stakeholders (Rothkopf & Harstad, 1994) , and the establishment of the possibility of finding a gap in the system, to avoid the management of the government or investors.

(5) As an independent third party, the engineering bid evaluation expert will complete the bid evaluation work for the bidding party according to relevant regulations, which plays a vital role in ensuring the standardization of the bid evaluation procedure and the fairness of the evaluation results. In the process of bidding for the project, the bid evaluation expert may accept the benefits of the bidder, leak the bid evaluation before bidding, tend to bid the bidder during the bid evaluation, and even induce other traditional bid evaluation experts as the bidder. Playing high scores (Zhang Hengquan, Wang Hui, 2014) .

(6) In the bidding of engineering projects, there are often cases where government authorities collude (Besfamille, 2004) . Especially in government investment projects, the competent construction department and its subsidiaries constitute a community of interests. The main body of collusion, the competent department does not hesitate to violate the rules for the subordinate enterprises to undertake projects. In government-invested projects, government rights and social capital combine to form an intrinsic social network, which also provides a breeding ground for collusion behavior (Boone & Mulherin , 2011) .

3 Research on the Risk of Collusion Behavior in Project Bidding

The main risks that the project bidding and collusion may bring to the parties are as follows:

(1) Government departments, construction units, bidding agencies, and regulatory authorities have been eroded, do not act according to regulations, or even abandon professional ethics, and use their rights to seek public interests.

(2) Industry norms have been destroyed. The bidding process is unreasonable, the bid evaluation process is arbitrarily large, and the project bidding and collusion behavior has occurred from time to time, which makes the bid evaluation lack of fairness and objectivity. The lack of credibility undermines the open, fair and just competition atmosphere, resulting in the intensive bidding behavior. (Mattos, 2016) .

(3) The parties to the conspiracy are sanctioned by law. When the project conspiracy is discovered, the relevant government personnel may be subject to dismissal and other disciplinary or criminal penalties; the contractor and the agent will face financial penalties or qualifications, market access restrictions, and even criminal penalties but because the conspiracy may gain far more than the cost of collusion, there are still many people involved in the project bidding.

(4) The project construction benefit was damaged. The existing research shows that the correlation between collusive behavior and engineering quality is very strong, which poses a safety hazard for engineering quality problems (Lorentziadis, 2016) . The project's bidding and collusion behavior led to the government's inability to effectively manage the project, increasing construction costs and market costs, but the project quality and investment efficiency were not guaranteed (ZARKADA-FRASER A, 2000; Harrington et al) ., 2016)   . According to statistics, in China's annual 10 trillion yuan bidding project, the cost of corruption accounts for about 8%, which seriously affects the efficiency of the use of social resources.

(5) The reputation of all parties involved in the conspiracy is damaged. When collusion behavior occurs, the industry reputation system will be damaged. The industry level of the bidders, bidding agents, contractors and other parties in the project will be misjudged, making the government not aware of the status quo of various industries (Krep & Wilson, 1982) , the parties to the conspiracy will also bear the risk of being blacklisted by other projects and no longer able to participate in the project, thus being eliminated by the society. Reputation is more important to bidders than bidders (Houser & Wonders, 2006; Zhou, Dresner & Windle, 2008)   , and it takes a long time to build a reputation, and destroying reputation is often only In an instant, the reputation mechanism is a better constraint for it. An effective and sound reputation-restricting mechanism can regulate and guide the behavior choices of market participants, so that bidders can live up to their own interests while not disappointing. The whole society

expects their morality.

4 Conclusion

In summary, the existing research makes a relatively perfect analysis of the benefits and risks of collusion behavior in project bidding. Most of them use evolutionary game theory to describe the surround-bidding behavior in engineering projects. To clarifying the intrinsic link between benefits and risks can be improve the existing project bidding laws and regulated the functions and responsibilities of different stakeholders. Thereby reducing the possibility of collusion behavior in project bidding.

Acknowledgement

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