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Abstract: This paper selects 632 manufacturing listed companies in 2015 and divides them into four categories according to the Wrigley classification method. By analyzing the conduction path of diversification influence on technological innovation, this paper studies the influence of different diversification types on R&D investment, and explores the relationship between diversification and innovation capability. The empirical results showed that the innovation ability of the diversified enterprise is weaker than that of the specific one; the diversification of non-related diversification inhibits the company's technological innovation activities; the higher the degree of diversification, the lower the innovation ability of the enterprise. Thereby the study provided some suggestions and hope it's beneficial for enterprises to further improve their R&D capability.

Keywords: Diversification; Related diversification; Unrelated diversification; Innovation

1. INTRODUCTION

Quantitative expansion strategy, regional expansion strategy, vertical integration strategy and diversification strategy are four stages of enterprises life cycle. Enterprises in the pursuit of the development process need to choose and their core competencies to match the strategic development model, and diversification strategy is to increase the number of new industries to meet the growth and expansion of a way can effectively improve marketing efficiency, and help enterprises to reduce costs, but may also bring some risks for the enterprise. In general, a single type of enterprise technology synergies weak, diversified business to better play this advantage, decentralized business risk, prevent cash flow, and create a good R&D funding environment. However, the shortcomings of diversification is also obvious, diversification of the organization more complex and agency costs and the risk of asymmetric information to a certain extent, inhibit the ability of enterprises to invest innovation.

Most domestic researches focus on the relationship between diversification and corporate value and corporate performance, while ignoring the inherent mechanism of diversification innovation. Diversification will affect the technological innovation of enterprises? Are different types of diversification same? The degree of diversification will lead to changes in the strength of business innovation? These problems promote our further exploration of the relationship between the two, this article will analyze the diversification of the impact of diversification on enterprise technology innovation from the perspective of internal control and empirical analysis of different types of diversification of the impact of enterprise technology innovation effect, enhancing the competitive ability to provide some references.

2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESIS

2.1 Theoretical Framework

2.1.1 Diversification of the choice of internal control bias

Managers' behavior is often subject to the adjustment of internal control, the types of the diversification will bring different economic effects (Hitt and Hoskisson,1994), making enterprises in the selection of internal control exist bias. The strategic control and financial control are regarded as the cornerstones of enterprise

internal control. In this paper, the tendency of diversification in internal control is analyzed from two aspects: strategic control and financial control.

Diversification makes the management of the organization between the familiarity of communication and coordination of communication ability weaker than the specific type of enterprise. And the specific type of enterprise managers will stand on the height of the whole enterprise for business and investment. Such enterprises not only complete the department's own daily business, but also take into account the overall performance of the development of enterprises, and executives make decisions often take into account the overall interests of enterprises. Their vision will be more long-term and not rely on simple financial indicators. Diversification can be beneficial to create an internal capital market within the firm, and the company can make up for the shortage of funds internally and reduce the cost of financing (Marchant, 2003). Therefore, the diversification of enterprises tend to financial control, while the specific type of enterprises tend to strategic control.

2.1.2 The impact of internal control on innovation

Innovation has the characteristics of long cycle, high risk and so on. It needs a reasonable internal control system to adjust. Enterprises in the implementation of financial control, the competition between the sub-business sector is very strong, business managers and employees are more concerned about the benefits of technological innovation results, they will try to avoid the enormous risk of innovation .So it will weaken the enthusiasm of staff and managers and make companies unwilling to open up new areas of research.

Strategic control emphasizes the long-term development of enterprises. The coordination between the various departments is strong, so employees are willing to share the risk of innovation and research and development. Mobilizing the enthusiasm between the departments, so that employees are willing to take risks at the risk of new products and core technology research and development, better enhance their technological innovation ability. Therefore, strategic control is conducive to the improvement of enterprise innovation, and financial control will inhibit the improvement of enterprise innovation.

2.2. Research assumptions

2.2.1 Comparison of the impact of diversification and non-diversification on innovation

Specific type of management investment and plan are relatively long-term, they tend to consider company's long-term interests; under the diversified business model, due to the high degree of internal information asymmetry, management is difficult to care each department, when the complexity of management increases, the business sector and business decisions are relatively large differences, so the size of the income and profit enterprises to determine a department manager of the contribution of enterprises. Performance evaluation makes the conflict of interest intensifies, competition is particularly prominent. Driven by the interests of the maximum, the department managers are more interested in short-term operation, reduce risk behavior. Enterprise innovation has the characteristics of risk, so managers will reduce their R&D investment in order to curb the innovation capacity of enterprises Therefore, we propose the following hypothesis:

H1: The implementation of diversification suppresses the innovation of enterprises compared with the single business enterprise.

2.2.2 Comparison of the influence of low degree and high degree of diversification on innovation

When the enterprise' diversification is high, managers are difficult to care for all enterprises involved in the industry. Industry differences are large, it will relatively scatter resources. So managers cannot stand in the overall perspective of the enterprise to make the best judgments.

Enterprises turn to the financial control mode. In this case, the department manager is more inclined to "short-sighted behavior". It is likely to meet the financial control of the evaluation criteria to avoid the selection

of high-risk innovation. The low degree of diversification of enterprises is still in the early stages of enterprise development, the use of resources to share a high degree of enterprise coordination is better, managers will stand in the interests of the overall business perspective for decision-making. Therefore, managers often choose a strategic control model, enhancing research and development capabilities. Therefore, we propose the following hypothesis:

H2: In diversified enterprises, the higher the degree of diversification, the enterprise's innovation will be reduced.

2.2.3 Comparison of the impact of relevant and unrelated diversification on innovation

In the relevant diversified business model, the synergy effect of assets is obvious, the utilization rate of assets is high. To ensure greater synergies in business decision-making, it is necessary to have higher requirements for the sharing of product unit strategies, which requires centralized control, and diversified enterprises tend to favor strategic control models. So long-term performance has always been the focus of strategic control, it is more likely to stimulate management's willingness to innovation.

Due to relevant diversification, each department operates relatively independent. The synergies between the various departments and the sharing mechanism is very weak, the competitive relationship is prominent. So enterprises are more inclined to set objective financial control indicators to evaluate the performance of department managers, department managers will pursue short-term interests while reducing investment. Therefore, we propose the following hypothesis:

H3: Unrelated diversification compared with related diversified companies, the former inhibits the innovation.

3.RESEARCH DESIGN

3.1 Variable Measurement

The dependent variable of the paper is R&D intensity, calculated by R&D input divided by total revenue.

In this paper, we classify the sample companies by Wrigley's diversified strategy classification method. Specialization Ratio (SR) and Relevance Ratio (RR), which are calculated as Table 1:

SR = Maximum Business Unit Revenue / Total Revenue

RR = Maximum Revenue from Relevant Service Groups / Total Revenue

Table 1 Wrigley's Diversification Strategy Classification

Strategy	Type Specialization Rate (SR)	Correlation Ratio (RR)
Single	95% <SR <1	-
Dominant	70% <SR <95%	-
Correlation	SR <70%	RR ≥ 70%
Unrelated		RR <70%

The other control variables are SIZE, LEV, ROA calculated as Table 2.

Table 2 Variable definitions

Variable	Symbol	Definition
R&D Intensity	R & D	input / revenue at the end of the year
Diversified dummy variable	DIVER	When company is a single type, DIVER value of "0", when the company belongs to the other three categories, the value of is "1"
Highly diversified dummy variable	HDIVER	When company is dominant, HDIVER value is "0", when the company is related or non-related type, the value of "1"

Variable	Symbol	Definition
Unrelated dummy variable	UNRELATED	When company belongs to the relevant type, the value is "0", when the company belongs to the non-correlation type, the value is "1"
Company Size	SIZE	The natural logarithm of total assets at the end of the year
Asset-liability ratio	LEV	The ratio of total liabilities at the end of the year to total assets
Total Return on Assets	ROA	(Total Profit + Financial Charges) / Average Total Assets

3.2 Model Specification

$$RD = \alpha + \beta_1 DIVER + \beta_2 SIZE + \beta_3 LEV + \beta_4 ROA + \varepsilon \tag{1}$$

$$RD = \alpha + \beta_1 HDIVER + \beta_2 SIZE + \beta_3 LEV + \beta_4 ROA + \varepsilon \tag{2}$$

$$RD = \alpha + \beta_1 UNRELATED + \beta_2 SIZE + \beta_3 LEV + \beta_4 ROA + \varepsilon \tag{3}$$

In these three models, β_1 denote the effect of DIVER, HDIVER, and UNRELATED on the intensity of the development, and α is the constant term.

3.3 Sample Selection and Data Collection

In this paper, a sample of A-share listed manufacturing companies in Shanghai and Shenzhen in 2015, excluding ST and PT companies, the main missing income of the company and the financial indicators of the missing companies, and ultimately get 32 listed companies. The R&D data comes from the Wind database. The main income composition information and financial data of the listed companies are from the Choice financial database.

4. REGRESSION ANALYSIS

4.1 Descriptive Statistics

Table 3 Descriptive statistics on R & D investment

Type	Median	Mean	Minimum	maximum	Standard
Total sample	0.0292	0.0285	1.2×10^{-4}	0.1621	0.0201
Single type	0.0318	0.0350	3.2×10^{-4}	0.1621	0.0240
Dominant	0.0313	0.0305	3.5×10^{-4}	0.1155	0.0212
Related	0.0302	0.0282	1.2×10^{-4}	0.0731	0.0176
Non-correlation	0.0212	0.0244	2.6×10^{-4}	0.0944	0.0193

From Table 3, we can see there is still a significant difference in the R&D intensity of the sample companies, and the average R & D intensity of the sample firms is small. The maximum value of R&D intensity is from a single enterprise, the smallest from the relevant business-related business-type R&D intensity of the mean is the four types of diversified types of enterprises and the average of the sample the most close. The average intensity of R&D intensity from a single type of business to unrelated business is gradually weakened, indicating that the four types of R&D intensity of the mean from the overall point of view there is a big difference.

4.2 Univariate analysis

Table 4 R & D intensity group test

Non-multiple Of the mean	Multiple mean	Low diversity Of the mean	Highly diversified mean	Related Mean	Non - correlation means	Diff	t	Sig.
3.504%	2.777%					67.669	2.169	0.034
		3.054%	2.658%			287.925	2.129	0.025
				2.822%	2.438%	346.967	2.038	0.042

From Table 4, the Sig values of the three groups, the comparison of the intensity of the three groups of data has passed the significant test: the significance level of the first group is 0.034 <0.05, consistent with the descriptive statistics, which reflects the diversification and non- In the second group, the significance level of the second group was 0.025 <0.05, the second hypothesis was the first validation; Finally, the third group significant level 0.042 <0.05, the correlation multiple And the intensity of research and development of diversified enterprises is significantly different, and the intensity of research and development of related diversified enterprises than non-related diversified enterprises, so hypothesis 3 has also been initially verified.**4.3 Regression Analysis**

Table 5 regression analysis

	Model		
Variable	(1)	(2)	(3)
CONSTANT	0.040*** (4.331)	0.041*** (4.651)	0.043*** (3.838)
DIVER	-0.006** (-2.322)	--	--
HDIVER	--	-0.003* (0.067)	--
UNRELATED	--	--	-0.004* (-1.994)
SIZE	-0.007 (-0.254)	-0.029 (0.536)	-0.049 (-0.335)
LEV	-0.012** (-2.441)	-0.009* (-1.774)	-0.013** (-2.569)
ROA	0.024 (0.067)	0.007 (0.535)	0.017 (0.207)
Adj.R^2	0.033	0.033	0.039
F	6.430***	5.855***	4.997***

Note: ***, **, * represent at 1%, 5% and 10% levels of significant value in parentheses represent t statistic p-value corresponding coefficients.

The three major variables all passed the significance test, and the coefficients were all negative. (B = -0.006, p <0.05), indicating that diversification of innovation capacity and non-diversified enterprises, R & D investment is relatively weaker than that of the diversification of R & D intensity. (B = -0.003, p <0.1), indicating that the higher the degree of diversification, the weaker the technological innovation capability of enterprises. There was a negative correlation between unrelated diversification and R & D intensity (β = -0.004, p <0.1), which indicated that the innovation ability of related business enterprises was stronger than that of non-related business enterprises.

5. CONCLUSIONS AND IMPLICATIONS

The empirical results show that the innovation ability of the diversified enterprise is weaker than that of the specific enterprise, and the non-related diversification restrains the company's technological innovation activity. The higher the degree of diversification, the enterprise's innovation ability will reduce.

The policy implications of this paper are two aspects. First, from the enterprise perspective, we should properly choose diversification. Enterprises as the main body of technological innovation activities, should attach importance to innovation. Enterprises should combine their own, develop a reasonable diversified development strategy. Second, we must increase the government's role in promoting the innovation capability of enterprises. Encourage enterprises to continuously upgrade their ability to innovate and strengthen their own

competitiveness.

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