Management Decision and Dual Innovation

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Abstract. China's economic development is strongly constrained by existing resources, and the implementation of low-carbon economy and sustainable development requires enterprises to improve their Innovation and R&D capability. As an important participant in the decision-making and execution of the company, the managerial discretion of top managers is related to the overall direction of the organization. Taking Shanghai and Shenzhen A-share listed companies from 2009 to 2020 as the research objects, this paper empirically studies the choice of managerial discretion on enterprise innovation mode, and constructs the mediation model of corporate governance level. The results show that the promotion of executive decision-making power can increase the investment in exploratory innovation but weaken exploitative innovation, and the level of corporate governance plays a partial mediating role in the influence of managerial discretion on exploratory innovation. This paper elaborates the research on the influence of managerial discretion on enterprise innovation mode, which is helpful for enterprises to adjust the size of managerial discretion according to their actual needs, pay attention to the level of corporate governance, and make enterprises better control the choice of dual innovation.

1 Introduction

China's economic development is strongly constrained by existing resources, and the implementation of low-carbon economy and sustainable development requires enterprises to improve their innovation and R&D capability. Enterprise innovation requires high R&D investment and a long period of time, and senior managers play an important role in the implementation of innovation decisions. Hambrick and Abrahamson have made clear the concept of managerial discretion: senior managers have the free right to decide on corporate strategic decisions([1]). Executives can exert significant influence on the R&D investment of the organization through the use of such power([2]). The degree of managerial discretion is determined by the comprehensive action of the system, industry and other environment, the organization itself and the personal characteristics of the manager. Its essence is the influence that the top managers can exert on the organization under the constraints of internal and external mechanisms.

In the research of the impact of management decision power, scholars mainly focus on the aspects of firm performance, innovation and R&D investment, strategic choice and change, corporate governance, inefficient investment and so on. These papers enrich the research on the influence effect of management decision power research. Among them, in the aspect of management decision right to technological innovation, scholars hold different views. Some scholars believe that there is a negative correlation between managerial discretion and R&D investment, while others believe that there is a

positive correlation between them. Although scholars have been in the managerial discretion on the aspects of corporate governance and R&D spending a lot of research, but also the following deficiencies: (1) The relationship between managerial discretion and the choice of innovation model has yet to explore clearly, we need more in-depth thinking and practice; (2) scholars mostly explore the impact of managerial discretion on innovation mode from the single level of corporate governance, such as ownership structure, board of supervisors, board of directors and institutional investors. However, corporate governance level is a complex result of the comprehensive effects of many aspects, so it is necessary to explore the impact of corporate governance on the dual innovation strategy from the overall level of corporate governance. Therefore, this paper takes China's A-share manufacturing listed companies from 2009 to 2020 as samples to study the relationship between managerial discretion, corporate governance and dual innovation, hope to expand the research on antecedent variables of dual innovation.

1.1 Managerial discretion and dual innovation.

The stewardship theory is that people are social rather than economic, top managers for performance of the intrinsic motivation is not only the pursuit of self-satisfaction, but hope to obtain recognition of the outside world.

Benner and Tushman (2002) divide technological innovation into two modes: exploitative innovation and exploratory innovation([3]). Exploitative innovation is

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based on the existing capital and technology of the enterprise to transform and use, or directly from the external introduction. It has the advantages of quick effect, small investment cost and low risk. Exploratory innovation requires enterprises to spend a lot of capital, manpower and material resources for long-term and continuous investment to seek new technologies, expand new development opportunities and markets, and bring long-term competitive advantages and sustainable development for enterprises. It can be seen that enterprises are more willing to carry out exploitative innovation under the guidance of short-term benefits, while exploratory innovation is more in line with enterprises' behavior in order to obtain more long-term benefits.

The stewardship theory emphasizes that the intrinsic motivation of top managers can transcend personal interests and effectively obey collectivism. Due to the existence of pro-organizational behavior, they will pay more attention to the long-term interests of the enterprise rather than the short-term interests. With the improvement of managerial discretion, executives' enthusiasm, initiative and creativity can be effectively exerted. In fact, managerial discretion is an important weapon for managers to implement the blueprint and vision of the company([4]). Therefore, for sake of collective interests, senior managers with greater managerial discretion pay more attention to the long-term returns of the enterprise, and they have behavioral motivation to maximize shareholder value, thus increasing the investment in exploratory innovation and reducing exploitative innovation. Therefore, we propose:

H1a: There is a negative correlation between managerial discretion and exploitative innovation.

H1b: There is a positive correlation between managerial discretion and exploratory innovation.

1.2 Managerial discretion and dual innovation.

According to the stewardship theory, when managers have high managerial discretion, they will feel trust and respect and pay more attention to the cooperative relationship, so the agency problem will be weakened, and corporate governance will be more efficient. The essence of corporate governance is to balance authorization and decentralization to enable enterprises to make scientific decisions and achieve the purpose of effective operation([5]). When an enterprise endows senior managers with greater managerial discretion, it will make efforts to improve the corporate governance level in order to supervise their rights. Therefore, we propose:

H2: There is a positive correlation between Managerial discretion and corporate governance level.

1.3 The mediating role of corporate governance

Tylecote Andrew et al. (1998) pointed out that the allocation of rights, responsibilities and benefits included in the R&D input of an organization needs to be operated within the organizational framework, and corporate

governance has a significant impact on the allocation of innovation input, power and benefits. As the premise of enterprise risk management, corporate governance is generated in order to control various risks that enterprises may face in the future([6]). From this perspective, corporate governance tends to be risk neutral, and it will effectively avoid the risks undertaken by the organization through the selection of diversified input methods. Therefore, we propose the following hypotheses:

H3: Corporate governance plays a mediating role between managerial discretion and dual innovation.

2 Research design

2.1 sample selection and data sources

We take China's A-share manufacturing listed companies from 2009 to 2020 as samples. ST, ST*, financial industry samples were removed, and samples with missing data were removed. At the same time, bilateral tail reduction processing was carried out at the 1% level. The final sample size was 6793. All data are from CSMAR database.

2.2 Model design

To verify hypothesis H1, the following model settings are made:

$$Innovation_{i,t} = \beta_0 + \beta_1 MD_{i,t} + \beta_2 Controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

In order to verify hypothesis H2 and H3, the following model is set:

$$Innovation_{i,t} = \beta_0 + \beta_1 MD_{i,t} + \beta_2 CM_{i,t} + \beta_3 MD_{i,t} \times CM_{i,t} + \beta_4 Controls_{i,t} + \varepsilon_{i,t} \quad (2)$$

$Innovation_{i,t}$ represents exploitative Innovation and exploratory Innovation; MD, CM and Controls represent managerial discretion, corporate governance level and control variables respectively; β is regression coefficient; $\varepsilon_{i,t}$ are standard errors.

2.3 Variable definition

(1) Innovation. It is divided into exploitative innovation (ExploitI) and exploratory innovation (ExplorI). Measured by the ratio of enterprise development capitalization expenditure and research expenditure to the total assets.

(2) Managerial Discretion (MD). The average value of the three indexes of position power, remuneration power and operation power is used to measure the management decision power. Position power is measured by whether the general manager concurrently serves as the chairman of the board. The value is 1 when the general manager concurrently serves as the chairman, and 0 if not. The compensation right is measured by the

natural logarithm of the average compensation of the top three executives.

Operating rights are measured by the ratio of working capital to operating income.

(3) Corporate manage (CM). The variable measure of corporate governance in this paper applies the comprehensive index -- G index, which was proposed by Bai Chong 'en et al., in 2005 to measure the governance level of listed companies.

(4) Control Variables: Including enterprise size, LEV, ROE, enterprise growth and enterprise cash flow.

3 Empirical results and analysis

3.1 Descriptive statistics and correlation analysis

As can be seen from the descriptive statistics in Table 1, the mean value of exploratory innovation is 0.0249 higher than that of exploitative innovation, which indicates that the capital input of exploratory innovation of sample enterprises is generally more than that of exploitative innovation. The mean value of the management decision right is -0.0237 and the standard deviation is 0.49, indicating that the management decision right of the sample enterprises is relatively small on the whole, and there are great differences among enterprises.

Table 1. Descriptive statistic

Variable	N	Mean	Std.Dev.	Min.	Max.
ExploiI	6,793	0.0021	0.0061	0	0.1033
ExplorI	6,793	0.0249	0.0223	0	0.7526
CM	6,793	0.0000	0.7520	-2.0375	3.3050
MD	6,793	-0.0237	0.4900	-5.4781	7.1920
size	6,793	22.0919	1.0964	20.1108	25.4287
lev	6,793	0.3849	0.1858	0.0560	0.8455
roe	6,793	-0.3188	3.4784	-25.7490	8.0893
growth	6,793	0.1783	0.3394	-0.4319	1.9640
cash	6,793	20.1026	1.2138	17.3496	23.6057

As can be seen from the correlation analysis in Table 2, the correlation coefficients between managerial decision power, exploratory innovation and exploitative innovation are 0.053 and 0.165 respectively, and both are significant at the 1% level. The correlation

coefficient between corporate governance level and management decision power is 0.427, which is significant at the 1% level. The correlation coefficient between the level of corporate governance and exploitative innovation is negative, and the correlation coefficient between the level of corporate governance and exploratory innovation is positive, both of which are significant at the 1% level, indicating that the level of corporate governance may have opposite effects on exploitative innovation and exploratory innovation. The correlation coefficients among the variables are all below 0.7, and after testing, the variance inflation factor VIF among the variables is 2.17, indicating that there is no multicollinearity among the variables.

3.2 Analysis of regression results

In Table 3, the regression results of Model (1) and Model (2) test the relationship between MD and binary innovation, and the MD coefficient is -0.001 and 0.002, respectively, and it is significant at the 1% level. Hypothesis H1 is verified. Model (3) tests the relationship between MD and CM. The coefficient of MD is 0.617, indicating that there is a positive correlation between management decision power and corporate governance level. Hypothesis H2 is verified. Model (4) and Model (5) tested the mediating effect of CM. In Model (4), the coefficient of CM was not significant and showed no negative correlation, and the mediating effect of CM between MD and exploitative innovation was not significant. The possible reason is that with the improvement of corporate governance, enterprises will have ample cash flow at their disposal. There is no need to cut down the investment in exploitative innovation and the long-term and short-term interests of the organization can be taken into account. In Model (5) tests the mediating effect of corporate governance level on the relationship between managerial decision-making power and exploratory innovation. The coefficients of CM and MD are both positive and significant at 10% and 1%, respectively. The regression results show that the significance of managerial decision-making power on exploratory innovation decreases after the inclusion of corporate governance level as the mediating variable. It shows that corporate governance level plays a partial intermediary role between them. Thus, H3 has been partially verified.

Table 2. Correlation matrix

	ExploiI	ExplorI	MD	CM	size	lev	roe	growth	cash
ExploiI	1								
EI	0.064***	1							
MD	0.053***	0.165***	1						
CM	0.035***	0.110***	0.427***	1					
size	0.075***	-0.078**	0.101***	-0.389**	1				
lev	0.054***	-0.075**	-0.145**	-0.239**	0.548***	1			
roe	-0.005	0.089***	0.067***	0.033***	-0.014	-0.125**	1		
growth	0.068***	0.257***	0.036***	0.053***	0.028**	0.035***	0.221***	1	
cash	0.084***	-0.004	0.170***	-0.304**	0.838***	0.357***	0.023*	0.030**	1

Table 3. Regression results

variables	Exploil	ExplorI	CM	Exploil	ExplorI
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
MD	-0.001***	0.002***	0.617***	-0.001***	0.001*
	(-3.016)	(3.134)	(43.761)	(-3.183)	(1.722)
CM				0.000	0.004***
				(1.151)	(5.210)
size	0.000**	0.004***	-0.323***	0.001**	0.000
	(2.155)	(4.883)	(-19.273)	(2.376)	(1.583)
roe	0.000	0.000	0.000	0.000	0.006**
	(0.463)	(1.591)	(0.342)	(0.458)	(2.346)
lev	0.001	0.007***	0.606***	0.001	0.013***
	(1.019)	(2.698)	(12.353)	(0.816)	(22.330)
growth	0.000***	0.013***	0.036***	0.000***	0.001***
	(3.109)	(22.423)	(3.071)	(3.058)	(3.342)
cash	-0.000	0.001***	0.001	-0.000	0.001*
	(-0.632)	(3.343)	(0.085)	(-0.634)	(1.920)
cons	-0.015***	-0.094***	7.074***	-0.017***	-0.103**
	(-2.760)	(-4.562)	(16.956)	(-2.948)	(-4.876)
N	6793	6793	6793	6793	6793
r ²	0.014	0.129	0.381	0.014	0.130
F	5.420	58.252	241.400	5.148	54.641

* p<0.1 ** p<0.05 *** p<0.01"

4 Conclusion

We use the 2009-2020 A-share manufacturing listed companies as a sample to empirically test the relationship between managerial discretion and dual innovation, and at the same time test whether the level of corporate governance plays a mediating role in the two. The results show that with the improvement of managerial discretion, the innovation of enterprise will reduce the investment in utilization innovation, and increase of exploratory innovation investment. The level of corporate governance plays a partial intermediary role between the managerial discretion and exploratory innovation, and the managerial discretion increases the input of exploratory innovation by influencing the level of corporate governance. We supplement the research on the antecedents of enterprise innovation mode selection, which is helpful for enterprises to adjust the size of managerial discretion according to their actual needs, pay attention to the level of corporate governance, and make enterprises better control the choice of dual innovation.

There are two important implications: one is that enterprises should advocate win-win cooperation, empower managers with appropriate management decision rights, mobilize their enthusiasm, initiative and creativity, and improve their R&D and innovation capabilities. Another is that according to the actual situation of the enterprise, the senior management can be given different degrees of managerial discretion, so as to adopt the appropriate innovation mode.

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