The Board Differences, Resource Capacity and the Ambidextrous Innovation of the Enterprise-Part of the Moderating Role of Network Centrality

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Abstract: Based on agency theory and resource dependence theory, combined with the survey data of a sample of 2812 Chinese A-share listed companies from 2015 to 2019, use OLS regression to explore the differences of the board of directors and the exploitative innovation, exploratory innovation and ambidextrous innovation of enterprises. And on this basis, it analyzes the mediation role of resource redundancy and resource flexibility, as well as the moderating role of network centrality. The research found that: board of directors' differences inhibit exploitative innovation, exploratory innovation and ambidextrous innovation; resource redundancy plays a part of the mediation role in the influence of board of directors' differences on exploitative innovation, exploratory innovation and ambidextrous innovation; resources flexibility plays a part of intermediary role in board differentiation and developmental innovation; network centrality eases the negative relationship between board diversity and resource redundancy, but also intensifies its negative relationship with resource flexibility. The research expands the scope of the relationship between board diversification and ambidextrous innovation theory, and provides an empirical reference for the scientific board governance of enterprises.

1. Introduction

At present, human society is gradually completing the process of turning from an industrial economy to a digital economy[1]. With the development of the digital economy and the advancement of the digital transformation process, the uncertainties and risks faced by development have increased simultaneously, and enterprises need to survive through innovation [2]. At the same time, under the background that my country is still in a inferior position in the international division of labor and affected by the increasingly complex international situation, improving its own innovation level is an inevitable choice for enterprises and countries to break through the “stuck neck” dilemma in key technical fields [3]. In the innovation process, companies usually face the dilemma of exploitative innovation and exploratory innovation. The former emphasizes improving short-term performance by deepening and improving existing products and technologies, while the latter focuses on creating long-term competitive advantages through fundamental technological changes[4]. How to balance the two innovation modes for ambidextrous innovation and what factors will affect the choice of innovation strategy have become a hot topic in academic research.

Based on agency theory and resource dependence theory, the board of directors is the core of corporate governance and an important source of innovative thinking and innovative resources. The governance factors of the board of directors directly or indirectly determine the innovative resources, strategy and behavior of the enterprise[5]. The improvement of the board of directors' diversity will provide new ideas for the formulation of corporate innovation strategies, but it may also cause group conflicts[6]. As a result, in recent years, many scholars have used board governance as the antecedent variable to conduct research on ambidextrous innovation, and theoretical discussions on board differences have gradually increased: Li Shengnan et al. (2018) believe that the stronger the board of directors’ professional capabilities and synergy, the more likely it is to choose dual innovation[7]; Li Jinglin et al. (2019) believe that the gender difference of the board of directors has significantly improved corporate social responsibility, but it also inhibited

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innovation to a certain extent[8]; Li Xiaoqing et al. (2012) believe that the difference in the functional background of the board of directors is positively related to R&D expenditure, while the difference in education level is negatively related to R&D expenditure [9]; Lin Yan et al. (2019) further improved related theories from a cultural perspective, and it is believed that the cultural diversity of the board of directors will lead to a decrease in innovation input based on dialects as a measurement standard[6]. However, the above-mentioned literature analyzes its impact on corporate innovation from the perspective of a single difference. In reality, multiple board differences co-exist and affect the choice and formulation of innovation strategies. There is a distance between theory and reality.

At the same time, considering the social background of China's characteristic socialist market economy system and financial market development is not perfect, government intervention has an important impact on corporate innovation[10], this paper takes into account the differences in the political relevance of the board of directors. The age structure of the board of directors affects the risk appetite, knowledge accumulation and thinking direction of the board of directors, and plays an important role in the choice of innovative strategies[11]. Therefore, this article comprehensively considers the five factors of board gender, functional background, education, political relevance, and age to measure the overall difference of the board of directors, and it also analyzes its impact on the choice and formulation of corporate innovation strategies, bridges the gap between current research and practical applications, and provides companies with practical board structure methodology.

2. Theoretical Foundation and Research Hypothesis

2.1 Board Differences and Exploratory Innovation, Exploitative Innovation and Ambidextrous Innovation

The high-end theory believes that compared to other teams, the company's strategic decision-making units have more significant impact on organizational activities and their results [12] . Resource-dependent theory believes that corporate innovation strategic decisions, knowledge transfer process will be bound by corporate resource capabilities [13]. Also, the board of directors as a strategic decision-making unit is also a key channel [14], which determines the depth and breadth of corporate innovation. As the core of the strategic decision-making in the modern corporate governance structure, the personal characteristics of the directors will have an important impact on the development of corporate innovation strategies[8] , such as the gender of the board member, Functional background, degree of education, political correlation, and age. The size of the difference between the board members will lead to a significant difference in the resources of the company and the innovative strategic decision, and ultimately affect the innovation process and results of the enterprise [13].

Exploratory innovation emphasizes to obtain and create new knowledge, the purpose is to increase future income and improve long-term competitiveness[15], need to be more open, radical organization culture and extensive authorized organizational architecture[16]; Exploitative innovation is reproduction and excavation of existing knowledge, the purpose is to improve value chain efficiency and short-term performance[17] , more under system strict, cultural conservative, and relying on traditional plans Favorite with the control mechanism. From the perspective of organizational culture, the larger board differences, the easier communication between the directors' members, the easier to create obstacles, causing contradictions, which is not conducive to forming a consistent strategic decision consensus, and then choosing a more conservative innovation strategy, hindering the development of business exploratory innovation. From the perspective of decision-making efficiency, the larger board differences, the more communication costs and time costs need to be inventive, and the efficiency of improved relevant innovation decisions on existing products will be reduced, which is not conducive to the improvement of short-term innovation performance in the enterprise. Increased performance, hindering the development of exploitative innovation. Ambidextrous innovation is reflected in the

exploratory of innovation and exploitative innovation competition and coupling[44], the board differences is too large, and the membership of each other is insufficient, which is not conducive to enterprise to form a good innovation atmosphere. Develop effective innovation strategic decisions to carry out ambidextrous innovation.

Comprehensive analysis, proposing the following assumptions:

H1a: Board differences inhibition exploratory innovation;

H2b: Board differences inhibition exploitative innovation;

H2c: Board differences inhibition ambidextrous innovation.

2.2 The Mediating Role of Resource Redundancy

Resource redundancy is the resources that exist in the enterprise beyond actual needs[18]. Based on the theory of resource dependence, resource redundancy is an important prerequisite for ambidextrous innovation. However, under different enterprise scales, life cycles, and external resource search and acquisition capabilities, there are significant differences in enterprise resource capabilities, which affect the enterprise innovation model [19].

There are many different elements among board members, such as gender, functional background, education level, political connection, and age. With the increase of group heterogeneity, a group fracture zone will be formed within the board of directors, and the trust and communication and cooperation of group members will be negatively affected[6]. Due to communication obstructions and insufficient trust among members, board members maintain a cautious attitude when investing resources. The increased diversity of board members will inhibit the accumulation of redundant resources in the enterprise.

Due to the existence of resource constraints, companies need to make a trade-off between exploratory innovation and developmental innovation. As a kind of excess resources that can be used by enterprises at will, resource redundancy provides support for enterprises to carry out innovative activities in a resource-constrained environment, enabling enterprises to have the ability to carry out exploratory and exploitative innovation at the same time, and promote the formation of an internal ambidextrous innovation model. In addition, on the one hand, redundant resources have greater flexibility and configurability, and can be configured according to the form of resources required for technological change or R&D, and promote the formation of a corporate culture that is loose within the enterprise and encourages innovation, which provides resource base and environmental support for the exploratory innovation. On the other hand, the increase in redundant resources effectively alleviates the risks brought by innovation activities, provides enterprises with more opportunities for trial and error, is conducive to the deepening of existing technologies by enterprises, and promotes the development of exploitative innovation activities.

Based on the above analysis, this article believes that higher board diversity will lead to the reduction of redundant resources of enterprises. At the same time, resource redundancy will promote exploratory and exploitative innovation activities, and further promote the formation of ambidextrous innovation models.

Based on the above analysis, the following hypotheses are put forward:

H2a: Resource redundancy plays a mediation role between board differentiation and exploratory innovation;

H2b: Resource redundancy plays a mediation role between board differentiation and exploitative innovation;

H2c: Resource redundancy plays a mediation role between board differentiation and ambidextrous innovation.

2.3 The Mediation Effects of Resource Flexibility

Resource flexibility is an important way to effectively manage the resource conversion cost and conversion time by expanding the effective use of resources, reducing resources in an uncertainty, reducing resource conversion cost and conversion time[20]. The high-end theory believes that the heterogeneity of decision makers will lead to differences in their values and cognitive foundations, which in turn affect the development and implementation of corporate strategy [21]. During the

innovation decision process, the board members will make different judgment on the environmental changes facing the company, and is willing to meet the changing market demand, and continue to learn flexible adjustments. Renovate the old resources [22], which greatly improves the flexibility of resources.

When the environment is more complicated, exploratory innovation is of great significance to its long-term survival and development [23]. Exploratory innovation requires companies to make more accurate development opportunities for future development opportunities, and also requires more knowledge and technologies. Since the difference between the board member has made the company has a broader social network, it brings together more knowledge of technology, legal and management skills. Enterprises have an increase in creativity, funds, technologies such as external imports The flexibility of resources is improved; and the localization of new products is large, and the resources are required to have higher dedication, and the dedication of resources reduces the flexibility of enterprises in response to risks and environmental changes, greatly weakened resource flexibility. Further, the development of exploratory innovation is suppressed. Exploitative innovation pays more attention to effective mining and development of existing resources and capabilities. In the case where resources are small, companies should adjust and modify existing resources to reduce costs, improve efficiency, and improve existing product quality to meet customer and market needs [24]. A limited resource constraint, the difference between board members help to increase the overall knowledge reserve, solve the ability to improve non-customary puzzle, so that resources are re-combined, their use is flexible, and resource flexibility. At the same time, the governance layer tends to focus the organizational resource in a particular business area, and improved the results, the resulting “core capacity rigidity” phenomenon makes the flexibility of resources, further inhibition exploitative innovation. Due to resource constraints, exploratory innovation and exploitative innovation for scarce resources make it difficult to coexist. The disclosure of the board of directors has brought new views, broadening the scope of resources of resources, improved resource flexibility; but resource scattering makes exploratory innovation and exploitative innovation competitions, inhibition ambidextrous innovation.

H3a: Resource flexibility in part intermediaries between broad differences and exploratory innovations;

H3b: Resource flexibility in part intermediaries between broad differences and exploitative innovations;

H3c:Resource flexibility in part intermediaries between broad differences and ambidextrous innovations.

2.4 The Moderating Role of Network Centrality in Regulating the Board Differences and Resource Capabilities

The director network is a collection of direct and indirect connections established by individual directors of the company's board of directors and the directors through at least one board of directors at the same time [40]. As a group that participates in corporate governance and decision-making, the board of directors has a certain right to speak in the formulation of corporate innovation strategy decisions. Based on social network theory, directors with high network centrality are at the core of the network and play the role of information hub[27]. They have rich information sources and can obtain a large amount of heterogeneous information, thereby enhancing the innovation performance of enterprises.

Based on the resource dependence theory, directors can use their position in the director network to obtain key scarce resources such as complementary technologies, market dynamic information, and funds, and help companies improve their core competitiveness. At the same time, social capital embedded in the director network is an important guarantee for corporate innovation activities [28]. In addition, the closer the directors are to the center of the network, the greater the impact on other members, and the stronger their resource acquisition and control capabilities[36]. Therefore, increasing the centrality of the directors’ network is conducive to the establishment of direct and

frequent contacts between the governance layers, enhancing mutual trust and tacit understanding, and promoting the exchange and dissemination of tacit knowledge [29], thus alleviating the increase in the internal differences of the board of directors. The resulting lack of trust between members and the obstruction of communication lead to the suppression of redundant resource accumulation.

However, from the perspective of agency theory, the power embedded in the network of directors can stimulate short-sighted behavior, that is, directors invest too much resources and energy to seek cooperation with the outside world in order to improve their position in the network relationship. Therefore, the combination of resources is limited, and the improvement of the flexibility of resources promoted by the board of directors has also been suppressed. In addition, when the centrality of the director network exceeds a certain standard, it will trigger the cognitive lock-in effect of the director network [30], that is, the intricate network structure constrains the cognition and thinking of each member, and the continuous accumulation of homogeneous resources and information confines the members' innovative thinking weakens the enterprise's ability to respond to innovation and is not conducive to the flexible use and effective adjustment of resources, which intensifies the restraint of resource flexibility due to differences in the board of directors.

Based on the above analysis, the following hypotheses are put forward:

H4a: High network centrality relieves the negative relationship between board difference and resource redundancy;

H4b: High network centrality inhibits the forward relationship between board difference and resource flexibility.

2.5 The Following Concept Model is Constructed According to the Above Hypothesis

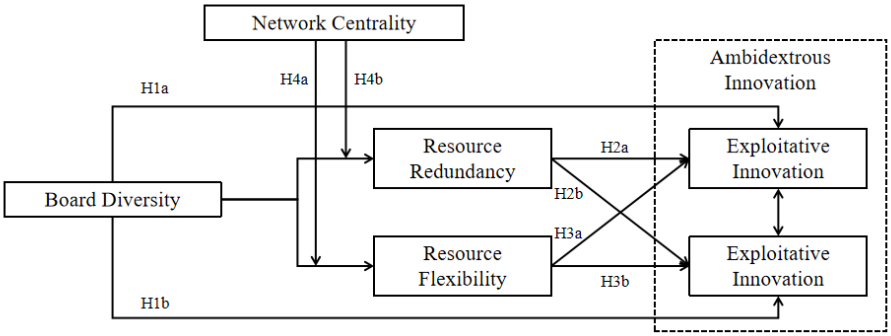

Fig.1 Concept Model

3. Research Design

3.1 Sample Selection and Data Sources

This study selects all listed companies in Shanghai and Shenzhen A shares from 2015 to 2019 as the initial sample. The data comes from the Cathay Pacific Database (CSMAR) and China Research Data Platform (CNRDS). The initial sample is screened in the following order: ① Eliminate sample selection Listed companies that have been processed by ST and ST* during the period; ② Exclude samples of listed companies in the financial industry; ③Exclude samples with incomplete disclosure of financial data, R&D data, and corporate governance data. After data screening, 9686 observations are finally obtained. Taking into account the influence of outliers on the regression results, the continuous variables are processed with 1% Winsorize. The research data is analyzed with the help of StataSE 15 and IBM SPSS Statistics 26.

3.2 Variable Design and Measurement

(1) Interpreted variable:

Exploratory innovation and exploitative innovation. At present, there are many quantitative methods for exploratory innovation and exploitative innovation. This project draws on the practice

of Bi Xiaofang et al. (2017)[33], and divides R&D investment into exploratory innovation (R>0, D>0) ;R>0, D=0) and exploitative innovation (R=0, D>0) two models. Therefore, this study uses the cost of corporate R&D activities to measure exploratory innovation investment (R), capitalized expenditure As a measure of exploitative innovation investment (D), divide the two by the company's total assets to avoid interference from the company's scale effect.

Ambidextrous innovation. March and others believe that achieving and maintaining the balance between exploratory innovation and exploitative innovation is very important for the survival of enterprises. Therefore, dual innovation can take the optimal or intermediate value in a continuum, exploratory innovation and exploitative innovation. They account for the two ends of the continuum respectively, and the two have a trade-off relationship [34]. Therefore, we can use the absolute value of the difference between exploratory innovation and exploitative innovation to measure ambidextrous innovation.

(2)Explanatory variables:

Board differences. Five indicators of gender, functional background, education level, political relevance, and age of all directors of each listed company are selected each year to measure the overall difference of the board of directors. Values are assigned to them, and variance processing is performed respectively. Finally, SPSS software is used Perform factor analysis to obtain a comprehensive score and use this to measure the degree of difference between the board of directors. The results show that the Kaiser-Meyee-Olkin (KMO) value is greater than 0.7, and the corresponding probability P value of the Bartlett sphere test statistic is close to 0, indicating that factor analysis can be used for analysis. The specific measurement methods for the five indicators are as follows:

1)Director gender: 1=male, 2=female;

2)Functional background: 1=independent director, 0=non-independent director;

3)Education level: 1 = technical secondary school or below, 2 = junior college, 3 = undergraduate, 4 = master's degree, 5 = doctoral degree, 6 = other (degrees announced in other forms);

4)Political relevance: 1=political relevance, 0=no political relevance;

5) Age: Assign the value with the age of the board members.

(3) Intermediary variables:

①Resource redundancy: At present, most scholars use the financial indicator measurement method proposed by Bourgeois (1981) [35] to measure the redundant resources of the organization, including absorbed redundancy and unabsorbed redundancy, among which the cost-to-income ratio is used to measure the Absorbing redundancy. The larger the indicator, the more redundant resources are internalized in the operation of the enterprise; the asset-liability ratio and current ratio are used to measure the unabsorbed redundancy. The higher the two indicators, the faster the enterprise can mobilize. The more redundant resources there are. According to the practice of Jiang Chunyan (2004), the average value of the above three indicators is used as the measurement indicator of redundant resources [39].

②Resource flexibility: Bourgeois (1981) believes that current assets are a kind of realistic or potential resource buffer for enterprises, enabling enterprises to adapt to internal adjustments or external changes [35]; current assets represent the company's possible future investment and potential investment Opportunity [38]. Drawing on the relevant research of Hu Yuanlin (2020), the turnover rate of current assets is selected as a measure of resource flexibility.

(4)Adjusting variables:

Network centrality: This article draws on the network centrality indicators introduced by Freeman, Wasserman and Xie Deren to measure the different positions of directors in the director network of listed companies[40]. There are three standard indicators for measuring network centrality: degree centrality, intermediary centrality and proximity centrality. The characteristics of network centrality are considered from different angles.

Since three degree can reflect the characteristics of network centrality from three different levels, this study comprehensively considers three indicators. The maximum value can reflect the network

centrality of the directors who have the greatest influence on the company's director network and is representative. Therefore, this study uses the maximum value to measure the company's director network centrality index.

(5)Control variables:

This article refers to the research of Liu Jianhua et al. (2019) [44], and selects some control variables as follows:

Table 1 Variable Definition Table

Nature	Name	Symbol	Explanation
Interpreted variables	Exploratory innovation	R	Cost expenditure of R&D activities / company total assets
	Exploitative innovation	D	Capital expenditure of R&D activities / company total assets
	Ambidextrous innovation	RD	Absolute value of exploratory innovation minus exploitative innovation
Explanatory variable	Board difference	V	Factor analysis method
Intermediary variables	Resource redundancy	Sr	Average of current ratios, asset and liability rate and cost revenue ratio
	Resource flexibility	Rf	Main business income / average current assets
Adjusting variables	Network centrality	Re	Average of maximum degree centrality,maximum intermediary centrality,maximum proximity centrality
Control variables	Corporate scale	Size	Natural logarithm of total assets
	Separation rate	Dual	The actual controller has the difference between the control of listed companies and ownership
	Board of directors	Board	Natural logarithm of the number of directors in the board
	Property	Soe	State-owned enterprises take 1, non-state-owned enterprises take 0
	Intangible asset ratio	Intang	Intangible asset/total assets
	Revenue Growth rate	Gro	Operating income this year / operating income last year
	The top ten shareholders shareholding ratio	Tth	The top ten shareholders stocks / total stock
	Assets and liabilities ratio	Lev	Total liabilities/total assets
	Year	Year	Annual virtual variable

3.3 Model Establishmen

This paper constructs the following model:

①The difference of the board of directors and exploratory innovation, development innovation and ambidextrous innovation:

$$R_{i,t} = \alpha_0 + \beta_0 \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots (1)$$

$$D_{i,t} = \alpha_0 + \beta_0 \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots (2)$$

$$RD_{i,t} = \alpha_0 + \beta_0 \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots (3)$$

② The mediating role of resource redundancy:

$$SR_{i,t} = \alpha_0 + \beta_0 \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots\cdots (4)$$

$$R_{i,t} = \alpha_0 + \beta_0 \times V + \beta_1 \times SR + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots (5)$$

$$D_{i,t} = \alpha_0 + \beta_0 \times V + \beta_1 \times SR + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots (6)$$

$$RD_{i,t} = \alpha_0 + \beta_0 \times V + \beta_1 \times SR + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots\cdots (7)$$

③ The mediating role of resource flexibility:

$$RF_{i,t} = \alpha_0 + \beta_0 \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots\cdots (8)$$

$$R_{i,t} = \alpha_0 + \beta_0 \times V + \beta_2 \times RF + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots (9)$$

$$D_{i,t} = \alpha_0 + \beta_0 \times V + \beta_2 \times RF + \sum_j C_{j,i,t} + \xi_{i,t} \cdots (10)$$

$$RD_{i,t} = \alpha_0 + \beta_0 \times V + \beta_2 \times RF + \sum_j C_{j,i,t} + \xi_{i,t} \cdots (11)$$

④ The role of network centrality in regulating the differences of the board of directors, resource redundancy, and resource flexibility

$$SR_{i,t} = \alpha_0 + \beta_0 \times V + \beta_3 \times RE \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots (12)$$

$$RF_{i,t} = \alpha_0 + \beta_0 \times V + \beta_3 \times RE \times V + \sum_j C_{j,i,t} + \xi_{i,t} \cdots\cdots\cdots (13)$$

The formula, i and trepresent the company and year respectively; j represent the number of control variables; α_0 represent a constant term; β_0 represent the coefficient of board diversity; β_1 represent the coefficient of resource redundancy; β_2 represent the coefficient of resource flexibility; β_3 represent the interaction between network centrality and board diversity Term coefficient; rrepresents the coefficient of the control variable; C_j represents all the control variables; ξ represents the random disturbance term, and controls the dummy variable for the year in the regression.

4. Empirical Test and Results Analysis

4.1 Descriptive Statistical Analysis

From Table 2 Descriptive statistics, it is known that the mean of enterprise R & D activities' cost-effective expenditure accounts for 0.66% of the company's total assets, the standard deviation is 1.289, the minimum is 0, the maximum value is 6.8%, indicating the cost of listed companies to invest in R & D activities have differences. The number of capitalization expenditures of enterprises account for 0.17% of the company's total assets, and the capital expenditure is much lower than the cost-effective expenditure of the company, and the expenditures required to exploratory innovation are greater than the exploitative innovation, at the same time, the standard deviation of capital expenditure is 0.453, minimum is 0, and the maximum value is 2.6%, indicating that the differences of exploratory innovation investment between listed companies is greater, and the exploitative innovation is more common. The standard deviation of the ambidextrous innovation is 1.916, which is larger than the exploratory innovation and exploitative innovation, indicating that the difference in ambidextrous balance between the listed companies is greater. The mean, standard deviation, minimum and maximum value of the remaining variables are shown in Table 2.

Table 2 Descriptive Statistics

Variables	Mean	Std	Min	Max	Observations
R	0.0066	1.289	0.000	0.068	9686
D	0.0017	0.453	0.000	0.026	9686
Rd	0.0081	1.916	0.000	103.951	9686
V	0.001	0.958	-3.257	2.301	9686
SR	0.924	0.348	0.422	1.922	9686
RF	0.799	0.471	0.013	1.922	9686
RE	1.095	1.072	0.167	2.373	9686
Size	22.122	1.200	20.074	25.971	9686
Dual	0.041	0.071	0.000	0.283	9686
Board	2.109	0.192	1.609	2.639	9686
Soe	0.271	0.445	0.000	1.000	9686
Intang	0.046	0.044	0.001	0.287	9686

Gro	0.157	0.315	-0.453	1.662	9686
Lev	0.411	0.175	0.120	0.849	9686
Tth	0.599	0.148	0.255	0.943	9686

4.2 Pearson Correlation Analysis

Table 3 shows the correlation between variables. From the correlation factor, the board difference and exploratory innovation, exploitative innovation and ambidextrous innovation are negatively related, with H1a, H1b and H1c match, but specific correlations need to pass regression analysis verification. It is noted that there is also a significant correlation between the argument and the control variables, indicating that there may be multiple common linear problems in the model, but the absolute value of the correlation coefficient of each variable is less than 0.5 and the mean VIF of each model is from 1 to 2, it is much lower than the critical value 10, excluding the possibility of multiple copiers of the model.

Table 3 Pearson Correlation Analysis

Variables	1	2	3	4	5	6	7
1.R	1.000						
2.D	-0.007	1.000					
3.RD	0.730***	0.172***	1.000				
4.V	-0.101***	-0.047***	-0.071***	1.000			
5.SR	0.016	0.038***	0.040***	0.128***	1.000		
6.RF	0.121***	-0.049***	0.077***	0.081***	-0.195***	1.000	
7.RE	0.011	0.019*	0.014	-0.109***	-0.055***	-0.069***	1.000
8.Size	0.032***	0.039***	0.002	-0.369***	-0.340***	-0.121***	0.196***
9.Dual	0.040***	-0.059***	0.001	-0.059***	-0.052***	0.021**	0.058***
10.Board	0.037***	0.004	0.016	-0.284***	-0.099***	0.025**	0.224***
11.Soe	0.038***	0.042***	0.022**	-0.428***	-0.133***	-0.058***	0.125***
12.Intang	-0.061***	0.107***	-0.025**	-0.054***	-0.125***	-0.008	0.014
13.Gro	-0.054***	0.023**	-0.029***	0.025**	-0.052***	0.045***	-0.018*
14.Lev	0.006	-0.016	-0.026***	-0.235***	-0.645***	-0.056***	0.105***
15.Tth	0.098***	-0.165***	0.025**	0.057***	0.054***	0.095***	-0.044***
Variables	8	9	10	11	12	13	14
8.Size	1.000						
9.Dual	0.112***	1.000					
10.Board	0.253***	0.078***	1.000				
11.Soe	0.360***	-0.005	0.231***	1.000			
12.Intang	0.082***	0.003	0.052***	0.092***	1.000		
13.Gro	0.036***	-0.031***	-0.009	-0.089***	-0.008	1.000	
14.Lev	0.510***	0.063***	0.116***	0.229***	0.030***	0.003	1.000
15.Tth	-0.003	0.080***	-0.013	-0.085***	0.025**	0.037***	-0.083***

Note: $^{***}P < 0.01$, $^{**}P < 0.05$,$* P < 0.1$(The remaining form is identical)

4.3 Regression Analysis and Hypothesis Test

(1)Differences of board and Exploration Innovation, Exploitative Innovation and Ambidextrous Innovation

Model (1) - (3) as the regression model of differences of board to exploratory innovation, exploitative innovation and ambidextrous innovation, the regression results are significant. Model (1) - (3), the board difference and exploratory innovation, exploitative innovation and ambidextrous innovation have a significant negative correlation, P<0.01, and negative directions of ambidextrous innovation and exploratory innovation is more remarkable, H1a, H1b, and H1c are supported.

Table 4 Board Differencesand Exploration Innovation, Exploitative Innovation and Ambidextrous Innovation

Variables	1	2	3	Variables	1	2	3
	r	d	rd		r	d	rd
v	-0.144***	-0.015***	-0.163***	gro	-0.210***	0.041***	-0.152**

	(-9.26)	(-2.74)	(-7.38)		(-5.06)	(2.85)	(-2.73)
size	-0.006	0.022***	-0.013	lev	-0.095	-0.174***	-0.453***
	(-0.49)	(-4.72)	(-0.66)		(-1.11)	(-5.80)	(-3.51)
dual	0.464**	-0.308***	-0.087	tth	0.908***	-0.513***	-0.356***
	(-2.52)	(-4.79)	(-0.32)		(-10.29)	(-16.65)	(2.68)
board	0.092	-0.04	0.015	constant	0.039	0.099	1.010**
	(-1.3)	(-1.61)	(0.15)		(0.13)	(0.94)	(2.21)
soe	0.018	0.003	0.003	year	Control		
	(-0.62)	(0.37)	(0.08)	N	9686	9686	9686
intang	-1.971***	1.091***	-1.196***				
	(-6.77)	(10.73)	(-2.73)				

(2)Mediation Effects of Resource redundancy and Resource Flexible

Models (4) and Models (8) verify the relationship between resource redundancy, resource flexibility and board differences, and resource redundancy and resource flexibility have significantly affected the board differences, P <0.01. Model (5) - (7) comprehensively inspect the relationship of the board differences, resource redundancy and exploratory innovation, exploitative innovation and ambidextrous innovation. Model (9) - (10) comprehensively inspect the relationship of the board differences, resource flexibility and exploratory innovation, exploitative innovation and ambidextrous innovation.

Learning from Wen Zhonglin and Ye Baojuan (2014) mediation effective test method is to test resource redundancy and resource flexibility, see Figure 2. From the previous analysis, the relationship between the board difference and the three innovations is significant. Therefore, it is remarkable to check the difference between the board difference and resource redundancy and resource flexibility β0, resource redundancy and three innovative coefficient β1, and resource flexibility and three innovative coefficient β2.

In the model (4), the factor of board difference and the factor of resource redundancy are significant. In the model (6) and model (7), resource redundancy has significant impact on exploitative innovation and ambidextrous innovation, and β0β1 and β0’ have the same log, indicating that resource redundancy plays some mediation effects in the influence of board differences on exploitative innovation and ambidextrous innovation, that is, H2a and H2c are established; but in the model (5), resource redundancy is not significant for exploratory innovation, according to the flow of Figure 2, we need to make a Bootstrap test, inspection results are shown in Table 6. The result is that β0 and β1 are significant, and the β0β1 and β0' have the same log, and the resource redundancy also plays a part of the mediation between the board difference and exploratory innovation, that is, H2a is supported.

In the model (8), the factor of board difference and the factor of resource flexibility are remarkable. In the model (9) - (11), the impact of resource flexibility on three innovations, indicating that indirect effects and direct effects are significant. In the model (10), the β0β1 and β0’ have the same log, indicating that the resource flexibility plays a part of the mediating role between the board difference and exploitative innovation, that is, H3b is supported. In the models (9) and (11), β0β1 and β0’ have different log, that is, H3a and H3c are not supported.

Table 5 Mediation Effects Of Resource Redundancy and Resource Flexibility

Variables	4	5	6	7		8	9	10	11
	sr	r	d	rd		rf	r	d	rd
v	-0.174***	-0.144***	-0.013*	-0.172***		0.025***	-0.153***	-0.014***	-0.182***
	(-3.90)	(-9.22)	(-2.54)	(-7.29)		(4.44)	(-9.87)	(-2.63)	(-7.76)
sr		0.043	0.090***	0.154**					
		(0.88)	(5.27)	(2.09)					
rf							0.340***	-0.024**	0.338***
							(12.12)	(-2.47)	(7.98)
size	-0.003	-0.006	0.022***	-0.012		-0.052***	0.011	0.021	0.004
	(-1.26)	(-0.48)	(4.80)	(2.09)		(-10.77)	-0.83	(4.43)	(0.21)
dual	-0.055	0.467	-0.303***	-0.079		0.197***	0.397**	-0.304***	-0.154
	(-1.46)	(2.53)	(-4.72)	(-0.28)		(2.97)	(2.17)	(-4.72)	(-0.56)

board	-0.051***	0.095	-0.035	0.023		0.175***	0.033	-0.035	-0.043
	(-3.48)	(1.31)	-1.42	(0.22)		(6.84)	(0.47)	(-1.43)	(-0.41)
soe	0.012	0.017	0.002	0.001		0.007	0.015	0.003	0.0009
	(1.95)	(0.60)	(0.26)	(0.04)		(0.71)	(0.53)	(0.38)	(0.02)
intang	-0.832***	-1.935***	1.166***	-1.067**		0.05	-1.988***	1.093***	-1.213***
	(-13.81)	(-6.58)	(11.37)	(-2.41)		(0.48)	(-6.88)	(10.74)	(-2.78)
gro	-0.055***	-0.208***	0.046***	-0.143**		0.050***	-0.228***	0.042***	-0.169***
	(-6.44)	(-4.99)	(3.19)	(-2.29)		(3.40)	(-5.52)	(2.94)	(-2.71)
lev	-1.273***	-0.04	-0.059	-0.257		0.070***	-0.119	-0.172***	-0.477***
	(-71.61)	(-0.38)	(-1.59)	(-1.61)		(2.29)	(-1.40)	(-5.74)	(-3.70)
tth	0.02	0.907***	-0.515***	0.353***		0.271***	0.815***	-0.506***	0.264**
	(1.10)	(10.28)	(-16.73)	(2.66)		(8.54)	(9.28)	(-16.37)	(1.99)
constant	1.655***	-0.031	-0.049	0.755		1.322***	-0.409	0.131	0.563
	(26.29)	(-0.10)	(-0.45)	(1.59)		(12.03)	(-1.35)	(1.23)	(1.23)
year	control					control			
N	9686	9686	9686	9686		9686	9686	9686	9686

(3) The Moderating Role of Network centrality

Model (12) and Models (13) introduce this adjustment variable of network centrality, analyzing its effects as a situation variable respectively regulates the board difference in resource redundancy and resource flexibility. According to the regression of Table 6, network centrality in the model (12) is significant to the negative adjustment of the board difference inhibition resource redundancy, that is, H4a is supported, and the stronger of the board network is, the board difference is redundant The less inhibitory effect is, and it is even possible that the bigger the difference between the board of directors is conducive to the resource redundancy of the enterprise. In the model (13), the network centrality and the difference between the board of directors is significant and the coefficient is positive, and the network centrality will enhance the inhibitory effect of the board difference on the flexibility of resource, that is, H4b.

Table 6 the Moderating Role of Network Centrality

Variables	12	13	Variables	12	13
	sr	rf		sr	rf
v	0.030***	-0.047**	intang	-0.599***	0.012
	(2.60)	(-2.47)		(-11.20)	(0.15)
vre	-0.002*	-0.003**	gro	-0.036***	0.020**
	(-1.81)	(-2.09)		(-5.33)	(1.83)
size	0.014***	-0.049***	lev	-1.109***	0.035
	(-4.99)	(-10.48)		(-62.33)	(1.21)
dual	-0.076**	0.193***	tth	0.03	0.247***
	(-1.95)	(2.98)		(1.53)	(7.58)
board	-0.034**	0.144***	constant	1.771***	1.361***
	(-2.27)	(5.69)		(2.64)	(13.14)
soe	0.013**	-0.007	year	Control	
	(2.22)	(-0.69)	N	9686	9686

5. Robust Test

5.1 Test Method for Variable Replacement

To verify the difference between the board of directors is the inherent cause of the ambidextrous innovation strategy decision, and solve the endose problems such as missing variables, attempting to test the main regression model with alternative variables. Learning from the method of Guan & Liu (2016)[24], use the invention patent number to measure the exploratory innovation, measure exploitative innovation with utility model patents and appearance patents, alternative models (1) - (13) the cost-drive expenditure and capital expenditure account for the proportion of capitalization expenditures, for alternative variable tests, the test results are basically consistent with the conclusions obtained above, explaining the quantitative way of exploratory innovation and

exploitative innovation, the main results of this study have little effect. Due to the space problem, the regression result is no longer listed.

6. Conclusions and Suggestions

6.1 Research Conclusions

This article is based on resource dependence theory, the agent theory and high-end echelon theory, selects some of the A-share listed company in 2015-2019 as the research object, explore the influence of the board differences to exploratory innovation, exploitative innovation and ambidextrous innovation, resources redundancy and resource flexibility in the intermediary and network centrality for the adjustment of the difference between the board differences and resource ability, form the following conclusions: ①Board difference inhibited the exploratory innovation, exploitative innovation and ambidextrous innovation, and the inhibition of ambidextrous innovation is stronger; ② resource redundancy has partial intermediaries in the relationship between the board differences and three innovations; ③resource flexibility has partial intermediary role in the relationship between the board difference and exploitative innovation, but the intermediary effect between the board difference and the exploratory innovation and the ambidextrous innovation is not significant, there is a mask effect;④network centrality mitigate the inhibitory effect of the board differences for resource redundancy, but exacerbated the board differences for resource flexibility inhibitory effect.

6.2 Management Inspiration

First, you should focus on the inhibitory effects of the board differences to the innovative decision-making strategy of exploratory innovation, exploitative innovation and ambidextrous innovation. When electing the members of the board of directors, pay attention to the difference in gender, educational background, age and other aspects of the board of directors, try to hire the age-related, academically similar board members, reducing the possibility of disputes between members, enhancing the trust and tacit understanding between members, create a good innovation atmosphere; and the gap between men and women in the board of directors should not be too disparity, and the existence of female directors can provide a diversified perspective for corporate innovation, and improve the diversity of innovation decisions.

Second, pay attention to the mediation effects of resource redundancy. It is recommended that enterprises fully plan human, material resources and other resources, improve the efficiency of resources, avoid excessive redundant resources, and enhance the innovation atmosphere within the enterprise, stimulate the effectiveness of enterprise exploratory innovation, exploitative innovation and ambidextrous innovation.

Third, pay attention to the mediation effects of resource flexibility. Enterprises should expand the effective use range of resources, reduce resource conversion costs and conversion time, and avoid excessive differences between board members, and difficult to coordinate resource allocation and configuration use, which caused insufficient resources required for innovation, and ambidextrous innovation is affected by inhibitory.

Fourth, give full play to the key role of directors' network. Directors can use their status to obtain scarce resources in the directors network, achieve effective supply and flexibility in resources, help companies enhance the core competitiveness of innovation, provide protection and support for business exploratory innovation, exploitative innovation and ambidextrous innovation.

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