

Impact of Diversity of Executive Team Career Experience and Cooperation Openness on Breakthrough Innovation Performance

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Received: May 15, 2023

Accepted: June 20, 2023

Online Published: June 29, 2023

doi:10.5539/ijbm.v18n4p182

URL: <https://doi.org/10.5539/ijbm.v18n4p182>

Abstract

In the era of rapid technological iteration in the digital economy, breakthrough innovation is the main source of core competitive advantage for enterprises. Based on Upper Echelons theory and Resource-based theory, using A-share listed companies in the computer, communication, and other electronic equipment manufacturing industries from 2010 to 2021 as research samples, this study explores the impact of diversity of executive team career experience on breakthrough innovation performance, and examines the mediating effect of cooperation openness and the moderating effect of absorptive capacity. The results indicate that the diversity of career experience in executive teams not only has a significant positive impact on breakthrough innovation performance, but also has a significant positive impact on cooperation openness; The cooperation openness has a significant positive impact on breakthrough innovation performance, and plays a partial mediating role between the diversity of career experience of executive teams and breakthrough innovation performance. The absorptive capacity positively regulates the relationship between cooperation openness and breakthrough innovation performance. This study provides a theoretical reference for enterprises to improve breakthrough innovation performance from the perspective of executive experience.

Keywords: executive team, diversity of career experience, cooperation openness, absorptive capacity, breakthrough innovation performance

1. Introduction

In the era of rapid technological iteration in the digital economy, the external environment is constantly changing, and the time to maintain a competitive advantage for enterprises is increasingly changing (Chung, & Kang, 2019). Therefore, in the face of fierce market competition, the impact of technological changes, and the constantly emerging business models, enterprises, relying on past gradual innovation, find it difficult to survive in the face of changes in the times, and even face the dilemma of being overtaken by other enterprises. At the same time, the development of some key industries in China still lacks key core technologies and faces a "bottleneck" technological dilemma. Compared with incremental innovation, breakthrough innovation can help enterprises to break the blockade of technological paths, enhance core competitiveness, and improve market value, so as to stand out in the environment of rapid technological change. Therefore, how to improve the breakthrough innovation performance of enterprises has become a growing focus of attention for both enterprises and the country. In existing innovation research, the perspective of Upper Echelons theory has received widespread attention from scholars at home and abroad. This theory believes that the characteristics of executives play a crucial role in major strategic decisions and choices of different innovation models of enterprises (Zhang, Le, & Liu, 2020). At the same time, as the core of the enterprise management mechanism, executive members can provide heterogeneous knowledge and technology resources to the enterprise through their own different experience and generate creative thinking, which is likely to have a certain impact on the breakthrough innovation performance of the enterprise. Therefore, exploring whether the characteristics of executives can affect the breakthrough innovation performance of enterprises has become a research topic of practical significance.

The diversity of career experience in executive teams refers to the diverse work experience of executive team members in different occupational fields (Xia, 2022). At the same time, the past experience of executives shares their unique quality and perceptions, which will have an impact on corporate management. Executives with

different experience typically have the ability to obtain heterogeneous resources from external social networks (Allen, Lee, & Relche, et al, 2019). Currently, research on executive experience mainly focuses on its impact on corporate innovation. For example, Li (2017) and others believe that the richer the past experience of executives, the easier it is for them to acquire knowledge from their own experience and apply it to new scenarios, which is conducive to improving the innovation performance of the enterprise. Xia Han (2022) believes that executives cross-border experience not only accumulates diverse knowledge, but also has strong risk preferences, innovation willingness, and innovation ability. Yang Zhen et al. (2022) believe that the more experience executives have, the more heterogeneous cultural and social network information and resources they can bring to the enterprise, thereby enhancing the innovation investment and the willingness of the enterprise. However, Liu Xin et al. (2020) argue from a dual conflict perspective that executives' knowledge and skills based on past functional experience is prone to propose outdated solutions and viewpoints, which can have a destructive effect on the innovation performance of enterprises. From this, it can be seen that most scholars mainly study the impact of executive career experience on corporate innovation performance, but few scholars have paid attention to the potential impact of executive career experience on breakthrough innovation performance. Therefore, this article will explore the impact on breakthrough innovation performance from the perspective of the diversity of career experience in executive teams.

In addition, the process mechanism of the diversity of executive career experience and innovation performance in the existing structure needs further exploration. The resource-based theory points out that executive career experience is a unique resource and ability within a company, and it is also the foundation for forming one's own core competitiveness. However, internal resource knowledge is limited, and enterprises can alleviate their own resource constraints by collaborating with external entities to obtain heterogeneous knowledge and technology, and combine with internal knowledge to generate new knowledge. The openness of cooperation is an important factor for enterprises to interact with the external environment and obtain external resources (Chesbrough & Henry, 2006). Through cooperation and openness, enterprises can effectively integrate internal and external knowledge resources, thereby improving the output effect of breakthrough innovation. Therefore, it is necessary to consider whether executive career diversity affects breakthrough innovation performance through this process mechanism from the perspective of cooperation openness. Looking at existing literature, most scholars consider cooperation openness as a pure factor affecting enterprise innovation (Kobarg, Stumpf-Wollersheim, & Welp, 2019), while some scholars consider cooperation openness as a contingency factor. However, existing research has overlooked the inclusion of both internal and external resource factors such as executive career experience and cooperation openness into the research framework. Therefore, this paper focuses on exploring the mediating effect of cooperation openness between the diversity of senior management team career experience and breakthrough innovation performance.

Enterprises need to continuously absorb new knowledge and acquire heterogeneous knowledge generated by external partners to carry out breakthrough innovation. Internal absorptive capacity of enterprises can help them internalize the acquired external heterogeneity and novelty knowledge into their own resources, and it is also an ability to solve practical problems. Therefore, while establishing a wide range of cooperation network relationships, enterprises need to have good absorptive capabilities and turn external heterogeneity technologies into their own, in order to generate new knowledge and achieve competitive advantages. However, there have been studies that use absorptive capacity as a pure factor to explore its relationship with innovation performance, or use it as a situational factor to analyze the moderating effect of the relationship between knowledge and innovation. No scholars have already incorporated it into the framework of executive career diversity and breakthrough innovation performance.

In summary, this article is based on Upper Echelons Theory and Resource-based theory, using data from 234 listed companies in China's A-share computer, communication, and other electronic equipment manufacturing industries from 2010 to 2021 as research samples, to analyze the relationship between the diversity of executive team career experience and breakthrough innovation performance, and to explore the mediating role of cooperation openness and the moderating role of absorptive capacity. The research conclusion of this article expands and deepens the theoretical research on executive characteristics and corporate technological innovation, providing reference theoretical and practical value for enterprises to improve breakthrough innovation performance.

2. Theoretical Assumptions

2.1 The Diversity of Career Experience in Executive Teams and Breakthrough Innovation Performance

Compared to incremental innovation, breakthrough innovation requires greater technological change in

enterprises, with characteristics such as high jumping, high risk, and low predictability. Moreover, this innovation activity is not easily accepted and recognized by various departments of the enterprise (Forés, & Camisón, 2016). Therefore, improving breakthrough innovation performance of enterprises cannot be achieved without the support, collaboration, and trust of various departments. The diversity of executive career experience refers to the diverse work experience of executives spanning different occupational fields. Executives with different career experience have a better understanding of the operations of various departments in the enterprise, as well as the job responsibilities of personnel in other positions. This can effectively resolve conflicts between departments, enhance cohesion within the enterprise, and enhance mutual trust and support among departments, thereby facilitating breakthrough innovation in the enterprise (Pearce, & Ensley, 2004). In addition, breakthrough innovation is a complex creative activity that requires breaking traditional thinking and pursuing novel information and knowledge (Story, Daniels, & Zolkiewski, et al, 2014). A team of executives with a single career experience may have a narrow perspective and tend to analyze and make formal judgments from the perspective of their position when making decisions. Compared to executives with a single career experience, the executive team has different career experience, which can provide them with knowledge from different perspectives and also bring interdisciplinary knowledge formed by different professions (Hu, & Liu, 2015). It can not only break the solidification of thinking, but also improve the breakthrough innovation performance of enterprises through the integration and reorganization of knowledge from different disciplines. In addition, executives with a single career experience may lead to an excessive reliance on internal resources and knowledge, which can easily lead to locking themselves in existing technological tracks and hinder the company's technological breakthroughs.

In summary, executives with more career experience can enhance trust and cohesion among various departments of the enterprise, reduce differences among departments under major decisions, and provide interdisciplinary knowledge from different job perspectives, which are conducive to the breakthrough innovation performance of the enterprise. Therefore, this article proposes Hypothesis 1:

H1: The diversity of career experience in executive teams positively affects the breakthrough innovation performance of enterprises.

2.2 The Diversity of Career Experience in Executive Teams and Cooperation Openness

The diversity of career experience in executive teams indicates that executive teams have different experience in different occupational fields. This article believes that the diversity of executive career experience promotes the openness of enterprise cooperation. Thereby, enterprises can obtain diverse knowledge and technology across technical fields. Firstly, executive members with more diverse career experience are more able to understand the knowledge foundation of the enterprise and identify shortcomings. Therefore, they will consider expanding the openness of cooperation to search for external knowledge foundations and increase the diversity of knowledge (Laursen, & Salter, 2006). And more career experience executives have, the more they can help companies understand knowledge and technology from different regions and fields, making it easier for companies to carry out and establish external partnerships, and obtain knowledge and technical resources from different regions and fields. In addition, executives with diverse experience are able to identify market opportunities in different fields, identify opportunities that are not easily perceived, and thus facilitate communication and communication with the current entities in the field to establish cooperation relationships. Therefore, this article proposes Hypothesis 2:

H2: The diversity of career experience in executive teams positively affects the openness of cooperation.

2.3 Cooperation Openness and Breakthrough Innovation Performance

Cooperation openness refers to the scale and scope of cooperation between enterprises and external innovation entities in the process of innovation activities. Cooperation openness can help enterprises search for more heterogeneous knowledge and technology, provide various problem-solving solutions and ideas (Laursen, & Salter, 2006), and predict the trend of technological development for enterprises, reducing trial and error risks (Wang, Chang, & Shen, 2015). Therefore, this study suggests that the degree of cooperation positively affects breakthrough innovation performance. On the one hand, cooperation openness enterprises can provide a large amount of external technology and knowledge resources for breakthrough innovation through cooperation with external entities, and complementary information such as internal technology and resources, thereby promoting breakthrough innovation performance. In addition, openness of enterprise cooperation can be achieved by establishing close connections with the outside world, path dependence and cognitive bias dilemma, and compensating for the lack of breakthrough innovation ability of enterprises. Finally, when the openness of enterprise cooperation is high, it can help enterprises better understand the current status and trends of industry and industrial technology development, better grasp the development trajectory and direction of industrial

technology, help enterprises accurately identify the prediction and market opportunities of external technology, and further provide more accurate solutions and ideas for breakthrough innovation activities of enterprises. Therefore, this article proposes Hypothesis 3:

H3: Cooperation openness positively affects the breakthrough innovation performance of enterprises.

2.4 Mediating Effect of Cooperation Openness

The diversity of executive career experience means that the richer the external social relationships that executives are exposed to, the wider the coverage of social networks established based on past experience in different professions. Thus, it is beneficial for enterprises to obtain different technological advantages from external partners (Lee, Yang, & Li, 2011). Therefore, a team of executives with diverse career experience can better access different external organizations through social networks, collaborate with them, access different resources, discover and obtain complementary knowledge necessary for breakthrough innovation, enrich the internal knowledge base of the enterprise, and help to combine new knowledge with existing knowledge, thereby improving the performance of breakthrough innovation in the enterprise. On the other hand, as executives have more career experiences, their teams are more inclined to explore new fields (Herrmann, & Datta, 2006). Breakthrough innovation requires enterprises to break away from and across the existing technological trajectory (Zhou, & Caroline Bingxin, 2012). If the enterprise only focuses on the current domain knowledge, it is easy to fall into path dependence and lose cognitive flexibility. Therefore, executives can inspire companies to constantly seek external partners through their different career experience, thereby acquiring new technologies from external fields, integrating heterogeneous knowledge from different fields, and breaking free from the limitations of a single technology field, avoiding cognitive barriers, and improving the breakthrough innovation performance of the company. Therefore, this article proposes Hypothesis 4:

H4: Cooperation openness plays a mediating role between the diversity of executive career experience and breakthrough innovation performance.

2.5 Moderating Effect of Absorptive Capacity

Cooperation openness can help enterprises establish extensive social network relationships and acquire external heterogeneous knowledge and technology resources, and the recognition, internalization, and application of knowledge are influenced by absorptive capacity, which is a key situational factor for breakthrough innovation performance (Belderbos, Carree, & Lokshin, 2004). Through the openness of cooperation, enterprises establish good cooperation relationships with partners, share knowledge and technology resources, and as their absorptive capacity improves, they extensively search for and learn high-value knowledge in different fields from external partners, increase the combination of new knowledge and internal knowledge, enhance the competitive advantage of the enterprise, and thus facilitate the output of breakthrough innovation. Secondly, the input of external knowledge and technology requires enterprises to transform, absorb, and utilize resources, and shape core resources for the enterprise. High absorptive capacity ensures the internalization of complex technologies, reducing the identification of mismatched and erroneous information (Bergh, & Lim, 2008). Finally, enterprises with high absorptive capacity can promote their low-cost and efficient acquisition of external heterogeneous knowledge, thereby expanding the heterogeneous knowledge required for breakthrough innovation. Enterprises with high absorptive capacity have strong industry insights and market forecasting capabilities, which can quickly identify external core technologies. By absorbing external technologies and integrating internal knowledge, it is beneficial to break through the existing technological trajectory. Therefore, this article proposes Hypothesis 5:

H5: Absorptive capacity has a positive moderating effect on the diversity of executive career experience and breakthrough innovation performance.

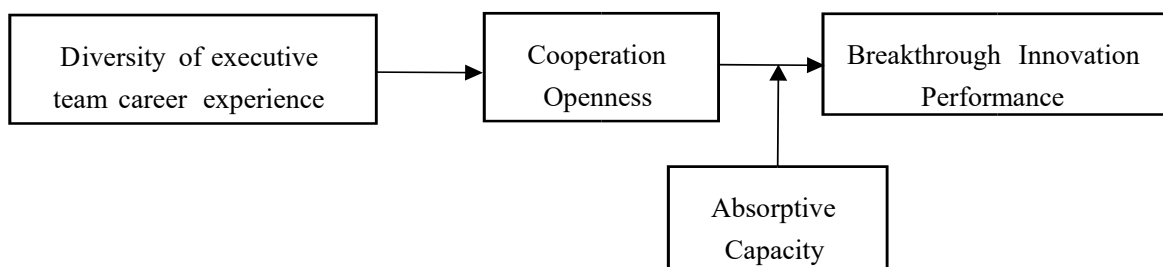


Figure 1. Theoretical Framework

3. Research Methods

3.1 Samples and Data

The research sample selected in this article is computer, communication, and other electronic equipment manufacturing enterprises listed on the Shanghai and Shenzhen A-shares from 2010 to 2021. Perform initial sample screening and processing as follows: (1) Eliminate ST, * ST, and other abnormal transaction status enterprise samples; (2) Excluding a large number of enterprise samples with missing patent data; (3) Excluding the sample of enterprises whose main variables are seriously missing, 1784 unbalanced panel data of 234 listed enterprises were finally obtained. The experience of senior executives and other financial data is all sourced from the CSMAR database, and missing data is supplemented through listed company annual reports, announcements, and online channels. The patent data are manually downloaded through the Dewant Database (DII), and this article uses Stata 16.0 software to process and analyze the data.

3.2 Variable Measurement

Dependent variable. Breakthrough innovation performance refers to the ability of enterprises to across different technological trajectories compared to technology categories that have not appeared in the previous five years. This article draws inspiration from the research of Guan, & Liu, (2016) , and measures breakthrough innovation performance by comparing the number of IPC patents that have not appeared in the first five years with the first four IPC numbers of companies applying for and granting patents in year t , compared to years $t-5$ to $t-1$. Due to the delay in patent application authorization and the need to reduce endogenous, the observation time of the dependent variable is delayed by one period. Specifically, the observation period for the dependent variable is set to t -year, while the observation period for variables other than the dependent variable is set to $t-1$ year.

Independent variable. The diversity of career experience in executive teams refers to the diverse work experience of executives in different functional departments. This article draws inspiration from the research of Yang Zhen et al. (2021). Members of the executive team have 10 types of work experience in production, research and development, design, marketing, finance, human resources, finance, law, management, and others, and the above work experience are assigned a value of 1 for accumulation.

Mediating variable. The openness of cooperation has expanded the channels for enterprise knowledge acquisition, and external organizations have established research and development partnerships to help them break through resource constraints and other difficulties. Therefore, cooperation patent application can reflect the R&D cooperation relationship between enterprises and other innovative entities. Therefore, this article draws on the research of Katila et al. and uses the ratio of the number of cooperation patent applications by enterprise i in ($t-3$, $t-1$) years to the total number of patent applications to measure the degree of cooperation openness.

Moderating variable. The absorptive capacity of an enterprise refers to the ability of the corporate identity to identify information such as external knowledge or technology, absorb information and transform it into internal resources. Therefore, many scholars at home and abroad measure the absorptive capacity of enterprises based on the intensity of R&D investment (Belderbos, Carree, & Lokshin, 2004). In view of this, this article also uses the ratio of R&D investment to operating income to measure the absorptive capacity of enterprises.

Control variables. According to the existing research, the following variables are controlled, including the age of the enterprise. Company's listing years plus one is taken as natural logarithm, and the nature of the enterprise is measured by dummy variables. If the enterprise is a non-state-owned enterprise, the value is 0, and if it is a state-owned enterprise. The value is 1; the scale of the enterprise is measured by taking the natural logarithm after adding one to the total assets of the enterprise.

4. Empirical Results

4.1 Descriptive Statistical Analyze

Table 2 presents the results of descriptive statistics and correlation coefficient analysis. From this table, it can be seen that the variance of breakthrough innovation performance is significantly different from the average value and is a non-negative counting variable. In addition, after the Hausman test, this article is suitable for regression analysis using a fixed effects negative binomial model. From the results of correlation coefficient analysis, hypothesis 1 has been preliminaries validated, and the maximum correlation coefficient value of the main variable is 0.334, which is less than 0.65; At the same time, the result of variance inflation factor (VIF) test shows that the maximum VIF is 1.2, far less than 10, so there is no serious multicollinearity in this paper.

Table 1. Descriptive statistics and correlation analysis

Variables	1	2	3	4	5	6	7
1 BIP	1						
2 Experience	0.111***	1					
3 Open	0.092***	0.055**	1				
4 AC	-0.053**	-0.003	-0.052**	1			
5 Size	0.334***	0.158***	0.114***	-0.067***	1		
6 Age	0.097***	0.085***	-0.03	-0.008	0.272***	1	
7 SOE	0.096***	0.086***	-0.013	-0.063***	0.295***	0.198***	1
Mean	7.709	6.485	0.259	0.091	21.881	2.723	0.273
Std	10.109	1.272	0.263	0.097	1.139	0.416	0.446
Vif	-	1.03	1.02	1.01	1.20	1.11	1.12

Note. *, **, and *** respectively indicate significant differences at levels of 0.1, 0.05, and 0.01.

4.2 Analysis of Regression Results

As showed in Table 3, a total of 5 models were analyzed, of which Model 1 is the benchmark model and only all control variables were included in the model. Model 2 is the main effect test of this paper, which is based on model 1 and adds the independent variable (the diversity of senior management team's career experience). Model 3 verifies the impact of the diversity of senior management team's career experience on cooperation openness, and Model 4 is a mediating effect test model, adding mediation variables on the basis of Model 2. Model 5 is the moderating effect test model of this article, and interaction term variables and moderating variables are added to Model 4.

Main effect. Firstly, breakthrough innovation performance is set as the dependent variable, and then the age, size, and nature of the enterprise are added. Finally, the diversity of career experience in the executive team is regressed using the regression equation. From Model 1 and Model 2, it can be seen that the control variables have a significant positive impact on breakthrough innovation performance, and the diversity of executive team career experience has a significant positive impact on breakthrough innovation performance ($\beta = 0.038$, $p < 0.1$) Hypothesis 1 is validated.

Mediating effect. Firstly, breakthrough innovation performance and cooperation openness are set as dependent variables, then control variables are added, and then independent variables such as executive team career experience diversity are added. Finally, intermediary variable cooperation openness is placed in the regression equation. From Table 2, it can be seen that the diversity of career experience in executive teams affect breakthrough innovation performance ($\beta = 0.038$, $p < 0.1$) There is a significant positive impact on the diversity of career experience in executive teams and their openness to collaboration ($\beta = 0.012$, $p < 0.05$) has a significant positive impact, and Hypothesis 2 is validated. Cooperation openness and breakthrough innovation performance ($\beta = 0.259$, $p < 0.01$) has a significant positive impact, and Hypothesis 3 is validated. After adding the mediating variable of cooperation openness, the diversity of career experience in executive teams affects breakthrough innovation performance ($\beta = 0.042$, $p < 0.05$) has a significant positive impact. Therefore, cooperation openness plays a partial mediating role between the diversity of career experience and breakthrough innovation performance in executive teams, and Hypothesis 4 is validated.

Moderating effects. Firstly, breakthrough innovation performance is added as the dependent variable in the regression model, followed by the gradual addition of control variables and intermediary variables such as cooperation openness, and the addition of moderating variables such as absorptive capacity. Finally, the interaction term between cooperation openness and absorptive capacity is placed in the regression equation. From Table 2, it can be seen that the interaction between cooperation openness and absorptive capacity have an impact on breakthrough innovation performance ($\beta = 0.048$, $p < 0.1$) There is a significant positive impact, indicating that absorptive capacity positively moderate the relationship between cooperation openness and breakthrough innovation performance. Hypothesis 5 is validated.

Table 2. Regression analysis results

VARIABLES	Model1	Model2	Model3	Model4	Model5
	BIP	BIP	Open	BIP	BIP
Experience		0.038*	0.012**	0.042**	
		(0.019)	(0.005)	(0.019)	
Open				0.259***	0.087***
				(0.097)	(0.026)
AC					-0.017
					(0.029)
Open*AC					0.048*
					(0.029)
Size	0.078**	0.072**	0.008	0.061*	0.070**
	(0.035)	(0.035)	(0.013)	(0.035)	(0.035)
Age	0.298***	0.301***	-0.035	0.340***	0.313***
	(0.114)	(0.114)	(0.062)	(0.115)	(0.116)
SOE	0.294***	0.291***	-0.130***	0.305***	0.310***
	(0.092)	(0.092)	(0.039)	(0.093)	(0.093)
Fixed	YES	YES	YES	YES	YES
Constant	-2.095***	-2.194***	0.147	-2.137***	-1.938**
	(0.756)	(0.759)	(0.300)	(0.760)	(0.756)
Observations	1,710	1,710	1,699	1,699	1,684
Number of id	220	220	220	220	220

Note. *, **, *** respectively indicate significant levels at 0.1, 0.05, and 0.01; the standard error of regression coefficients in parentheses.

4.3 Robustness Tests

In order to ensure the universality and stability of this article, the measurement method of replacing the dependent variable is adopted. Drawing on the measurement of breakthrough innovation performance by Lin Ming et al. (2016), the number of IPC categories that have not appeared within the enterprise compared to the top four IPC numbers from year t to year t-5 to t-1 is used. After the above tests, its significance and direction are basically consistent with Table 2.

Table 3. Robustness test: variable replacement

VARIABLES	Model1	Model2	Model3	Model4	Model5
	BIP	BIP	Open	BIP	BIP
Experience		0.042**	0.012**	0.044**	
		(0.018)	(0.005)	(0.018)	
Open				0.186**	0.067***
				(0.092)	(0.025)
AC					0.009
					(0.027)
Open*AC					0.052**
					(0.026)
Size	0.083**	0.076**	0.008	0.067*	0.070*
	(0.036)	(0.036)	(0.013)	(0.036)	(0.036)
Age	0.400***	0.400***	-0.035	0.424***	0.409***
	(0.126)	(0.126)	(0.062)	(0.127)	(0.128)
SOE	0.186*	0.182*	-0.130***	0.197**	0.211**
	(0.098)	(0.099)	(0.039)	(0.100)	(0.099)
Fixed	YES	YES	YES	YES	YES
Constant	-1.994**	-2.088***	0.147	-2.011**	-1.714**
	(0.779)	(0.783)	(0.300)	(0.785)	(0.781)
Observations	1,710	1,710	1,699	1,699	1,684
Number of id	220	220	220	220	220

Note. *, **, *** respectively indicate significant levels at 0.1, 0.05, and 0.01; the standard error of regression coefficients in parentheses.

5. Conclusion and Discussion

5.1 Research Conclusions

This article takes the impact of diversity of executive career experience on breakthrough innovation performance as the starting point, and explores the following three questions: (1) How does diversity of executive career experience affect breakthrough innovation performance of enterprises? (2) Can the diversity of executive career experience affect the breakthrough innovation performance of enterprises through cooperation openness? (3) Does absorptive capacity regulates the impact effect between cooperation openness and breakthrough innovation? This study uses data from 234 listed companies in China's A-share computer, communication, and other electronic equipment manufacturing industries from 2010 to 2021 as the research sample. Through theoretical assumptions and empirical analysis, the following conclusions are drawn: The diversity of executive career experience can coordinate departmental conflicts and bring interdisciplinary knowledge to enterprises. It not only has a significant positive impact on breakthrough innovation performance, but also has a significant positive impact on cooperation openness; the degree of cooperation openness has a significant positive impact on breakthrough innovation performance, and plays a partial mediating role between the diversity of career experience of executive teams and breakthrough innovation performance. The absorptive capacity positively regulates the relationship between cooperation openness and breakthrough innovation performance.

5.2 Theoretical Contributions

The theoretical contributions of this article mainly focus on the following two points: (1) Based on Upper Echelons theory. This article explores the relationship between the diversity of executive career experience and breakthrough innovation performance at the executive level. However, most existing scholars focus on the relationship between executive experience and technological innovation, with few scholars paying attention to the impact of diversity of executive career experience on breakthrough innovation performance, enriched the relevant research on executive characteristics and breakthrough innovation performance. And bring analysis and discussion from different perspectives on how to improve breakthrough innovation performance for enterprises. (2) Starting from the Resource-based theory. It is found that cooperation openness plays a partial mediating role between the diversity of executive career experience and breakthrough innovation performance. This reveals the important impact of cooperation openness on breakthrough innovation, expands the application scope of Resource-based theory, and provides a new perspective for executive experience and breakthrough innovation performance. At the same time, it has opened up the black box between executive career experience and breakthrough innovation performance. (3) Considering absorptive capacity as a moderating variable, the inclusion of executives, cooperation openness, and internal absorptive capacity within the same framework confirms the output of breakthrough innovation and requires consideration of internal absorptive capacity within the enterprise, providing a reference for future research.

The management implications of this study mainly reflect the following three aspects: (1) In the cultivation of executives, attention should be paid to their experience and exercises in different professions. Cultivate the ability of executives to think from different perspectives and use their own experience to solve problems in different scenarios and unconventional issues within the enterprise. (2) In the era of constantly changing external environment. Enterprises need to reduce the risks brought by environmental uncertainty by obtaining information and resources. Experienced executives can give them advantages over experienced executives in terms of information sources, social cognitive abilities, and organizational abilities. Therefore, when enterprises make major decisions or breakthrough innovation, they should optimize the composition of executive members and consider introducing executives with rich cross-border experience, in order to provide a new perspective for decision-making, bring more heterogeneous knowledge, and enhance their ability to handle and solve problems. (3) Enterprises not only needs to collect and integrate internal resources and information, but also expands cooperation with external entities to obtain rich external heterogeneous and complementary knowledge, accelerate the breakthrough of internal technology and the detachment of the original technology track.

5.4 Research Shortcomings and Prospects

This article enriches the research on executive career experience and corporate technological innovation, but there are still certain limitations that deserve further improvement and will research in the future. (1) The research sample of this article is the computer, communication, and other electronic equipment manufacturing industries listed on China's A-share market, and the source of this data is listed in public enterprises. The research object and research period have limitations, and the scope of sample data is also limited. Therefore, it may affect the universality and validity of the conclusions, and in the future, it will can be further extended to other manufacturing industries and the period of expanding sample data, in order to conduct more

comprehensive exploration of research issues. (2) Due to the fact that the data of executives come from data disclosed by listed companies, there may be some companies that may not fully disclose the characteristics of executives. At the same time, the measurement methods and dimensions of executive career experience are diverse, and future research can use questionnaire surveys to obtain first-hand data such as executive character information for variable measurement.

Acknowledgments

Thanks to project ZR2019MG033 supported by Shandong Provincial Natural Science Foundation and key project 2022RZB03022 supported by Shandong Provincial Soft Science Foundation for supporting the paper.

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