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Article

Ambidextrous Innovation, Organizational Resilience and the High-Quality Development of Enterprises: A Dynamic Analysis Based on Enterprise Life Cycle

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Abstract: Ambidextrous innovation provides impetus and differentiated advantages for the high-quality development of enterprises from the innovation-driven perspective. Meanwhile, organizational resilience lays a solid foundation for high-quality development by ensuring the stable operation of enterprises and enabling them to respond flexibly to changes. Both of them jointly assist enterprises in achieving high-quality and sustainable development within a complex and changeable environment. Based on existing studies and the data of A-share listed companies in Shanghai and Shenzhen from 2012 to 2022, this paper introduces the dynamic perspective of the enterprise life cycle and explores the mechanism among ambidextrous innovation, organizational resilience and the high-quality development of enterprises. The research findings are as follows: (1) Both exploratory innovation and exploitative innovation can significantly promote the high-quality development of enterprises. (2) In different stages of the enterprise life cycle, the impact effects of exploratory innovation and exploitative innovation on the high-quality development of enterprises are different. Specifically, exploratory innovation exerts the greatest promoting effect on enterprises in the growth stage, while exploitative innovation has the most significant promoting effect on those in the maturity stage. (3) Organizational resilience plays a partial mediating role between the two dimensions of ambidextrous innovation and the high-quality development of enterprises. This study can help enterprises enhance the scientificity and effectiveness of implementing ambidextrous innovation activities in the context of coexisting crises, and provide certain theoretical guidance and practical implications for the high-quality development of enterprises.

Keywords: ambidextrous innovation; organizational resilience; high-quality development; enterprise life cycle

1. Introduction

In today's complex and uncertain global business environment, enterprises are faced with unprecedented challenges and opportunities. On the one hand, rapid technological advancements, swift changes in market demand, and fierce competition compel enterprises to constantly innovate in order to maintain their competitiveness. On the other hand, various emergencies, such as global public health crises, economic fluctuations, and natural disasters, have posed a severe test to the survival and sustainable development of enterprises. Consequently, the traditional mode of enterprise development can hardly adapt to the requirements of the new situation. High-quality enterprise development is no longer confined to the pursuit of scale expansion and short-term profit

growth; instead, it lays greater emphasis on sustainable competitiveness, innovation, the balance between economic and social benefits, and long-term value creation [1]. To achieve high-quality development, enterprises are required to be able to provide high-quality products and services to meet consumers' increasingly diversified and individualized needs. Meanwhile, they should possess efficient operation and management capabilities to allocate resources rationally, cut costs, and enhance productivity. Additionally, they need to actively fulfill their social responsibilities and attach importance to environmental protection, thus realizing the coordinated development of the economy, society, and the environment [2]. However, realizing the high-quality development of enterprises is by no means an easy feat, and many enterprises encounter multiple obstacles during the development process. For instance, the lack of innovative capabilities results in severe product homogenization, making it difficult for them to stand out in the market. In the face of sudden changes in the external environment, the absence of sufficient coping abilities causes the business to suffer a serious impact or even plunge into difficulties. With this background, how to realize the high-quality development of enterprises has become a focus of attention in both academic and practical circles.

Innovation serves as the core driving force for enterprise development. However, a single innovation model can no longer meet all the needs of enterprises' high-quality development. The real competitive advantage lies in the sustainable development and growth of enterprises, which can be achieved by those that carry out both exploitative innovation and exploratory innovation [3]. Exploitative innovation specifically emphasizes continuously extending existing technology and knowledge, expanding existing products and services, and enhancing the exploitability of existing products as well as the efficiency of marketing strategies through continuous quality improvement. In this way, it aims to satisfy current customer needs and market demands [4] [5]. Exploratory innovation is associated with complex search, basic research, innovation, variation, and risk tolerance. It involves the continuous pursuit of new knowledge and the development of new products and services that are designed to meet potential or emerging customer needs and market demands [6] [7]. Enterprises need to balance the synergistic development of these two types of innovation and avoid over-relying on one mode of innovation. Over-relying on exploratory innovation may result in excessive risks and waste of resources, while focusing solely on exploitative innovation might cause enterprises to fall into an innovation bottleneck and miss opportunities for long-term development [8].

In the current complex and dynamic environment, the process and results of innovation will expose enterprises to more uncertainty. In order to maintain competitiveness within this changing and uncontrollable environment, organizations must possess the abilities to foresee, prepare for, cope with, and adapt to both general changes and major sudden changes, namely organizational resilience [9]. Organizational resilience, as an implicit ability of organizations to effectively respond to the impact of unexpected events in uncertain environments, can assist firms in transforming the uncertainty in the innovation process into opportunities and conditions for innovation [10]. Enterprises with high organizational resilience are capable of giving early warnings, reserving resources, flexibly adjusting strategies to minimize losses, and optimizing changes after a crisis. By doing so, they can enhance the innovation efficiency and success rate of the enterprise, which helps the enterprise turn the crisis into an opportunity and achieve counter-trend growth as well as sustainable growth [11].

However, the development of an enterprise is a dynamic process, and it will undergo different life cycle stages during its development [12]. Enterprises at each stage possess different characteristics and face distinct problems and challenges. Correspondingly, their requirements for ambidextrous innovation and organizational resilience, as well as the impact of these two factors on the high-quality development of the enterprise, will also differ. Nevertheless, few scholars have explored the impact of innovation on enterprise high-quality development and the dynamic relationship between ambidextrous innovation and enterprise high-quality development in different life cycle stages from the perspectives of exploratory innovation and exploitative innovation. Therefore, by adopting the dynamic perspective of the enterprise life cycle and conducting in-depth research on the relationship among ambidextrous innovation, organizational resilience, and enterprise high-quality development, we can reveal its intrinsic mechanism of action more comprehensively and accurately.

This, in turn, can provide powerful theoretical support for enterprises to formulate reasonable strategic decisions at different stages of their development.

The contributions of this paper are as follows: Firstly, it comprehensively takes into account the innovation heterogeneity and enterprise life cycle heterogeneity, conducts an in-depth analysis of the differences in the impact of ambidextrous innovation on enterprise high-quality development at different stages, and provides incremental evidence for the empirical research on the relationship between innovation and enterprise high-quality development. Secondly, organizational resilience is incorporated into the research path where innovation affects enterprise high-quality development, clarifying the mechanism through which ambidextrous innovation influences enterprise high-quality development by enhancing organizational resilience. Thirdly, exploring the relationship between ambidextrous innovation and the high-quality development of enterprises at different life cycle stages can assist enterprises in carrying out exploratory and exploitative innovation activities in a more scientific and targeted manner in the VUCA (Volatile, Uncertain, Complex, and Ambiguous) environment.

2. Theory and Hypotheses

2.1. *Ambidextrous Innovation and High-quality Enterprise Development*

Exploratory innovation aims to pursue brand-new technologies and knowledge. It has the potential to break through the existing technology accumulation and knowledge stock, thereby challenging the products and services in the current market. Exploratory innovation is dedicated to exploring new markets. During the process of researching and developing new technologies, new products, and new production processes, it creates the enterprise's own unique core competitive advantages. It brings more valuable products and services to customers in new markets and substantially improves the enterprise's competitive strength and development capability [7]. On the one hand, exploratory innovation assists enterprises in forming entry barriers in specific fields, which can establish unique professional capabilities and technological advantages for enterprises and create conditions for them to obtain excess profits, thus helping them form long-term competitive advantages and consolidate their leading position in the field [13]. On the other hand, exploratory innovation can promote the improvement of the overall technological level of the enterprise. It helps the enterprise explore new opportunities, develop new markets, enhance the organization's ability to perceive and adapt to technological changes and market changes, and open up a broader survival space for the enterprise. Consequently, this study concludes that exploratory innovation can not only increase the enterprise's future earnings, enhance its long-term competitiveness, and build the enterprise's core competitive advantage but also strengthen the enterprise's adaptability and responsiveness to market changes. Ultimately, it realizes the improvement of the enterprise's total factor productivity and promotes the enterprise's high-quality development.

Exploitative innovation relies on the existing knowledge and technology within an enterprise to continuously upgrade and optimize current products, services, and production processes, which has the characteristics of a high success rate, short cycle and low investment, and has become an important way to satisfy the current demand of the target market of the enterprise and to maintain the stability of the market position. On the one hand, exploitative innovation can significantly cut down the enterprise's costs and enhance the operational efficiency of the organization, thereby improving the short-term financial performance of the enterprise and strengthening the stability of the organization's existing business. On the other hand, exploitative innovation helps to enhance the competitiveness of existing products, better meet the needs of mainstream customers in the current market, increase customer loyalty and customer stickiness, effectively maintain the enterprise's current market share, and reinforce its existing competitive position and core competitive advantages. Consequently, exploitative innovation has emerged as a key strategy for enterprises to improve their production processes, cater to the explicit needs of the market, and consolidate their current position, which helps organizations to achieve expected and stable returns and also reduces the risk of instability in market demand, thereby promoting the sustainable and high-quality development of the enterprise [14]. Based on the above analysis, this paper puts forward the following research hypotheses:

H1a: Exploratory innovation has a significant positive impact on the high-quality development of enterprises.

H1b: Exploitative innovation has a significant positive impact on the high-quality development of enterprises.

2.2. *The Mediating Role of Organizational Resilience*

Exploratory innovation aims to go beyond the existing knowledge stock of the enterprise by researching and developing new products and new technologies. It can improve the enterprise's adaptability to external market changes and technological changes, better buffer the adverse impacts of emergencies on the enterprise, and enhance the enterprise's ability to defend itself and adapt in the event of a crisis [15]. Exploratory innovation emphasizes broadening the scope of knowledge search. During the process of responding to crises and emergencies, the long-term accumulation of new knowledge and new technologies can help enterprises break through stereotypes, shorten response time, and provide more diversified and flexible solutions to better cope with the challenges. This contributes to the enhancement of the enterprise's resilience [16]. Meanwhile, exploratory innovation activities require enterprises to collect information on customer needs, technological development, and market changes on a wider scale. To a certain extent, this can improve the organization's forecasting ability [17], and also accumulate a wealth of experience in coping with various challenges. As a result, the enterprise can make predictions in advance and react quickly when facing risks and emergencies, minimizing negative shocks and maintaining the organization's stability.

Exploitative innovation is dedicated to meeting customer needs in the current market. It aims to improve customer loyalty by optimizing and upgrading products and services. Meanwhile, it continuously assesses the opportunities and threats in the current market and predicts the recent development trend of the industry [18], which helps to enhance the organization's ability to defend against market changes and its ability to perceive such changes. On the one hand, the development of exploitative innovation activities makes enterprises more sensitive to current market changes and shifts in customer demand. When dealing with unexpected crisis events, they can react faster than other enterprises and make timely adjustments to products and services. This effectively reduces the adverse effects of market changes, maintains the stability of short-term earnings, and facilitates the survival of enterprises in the face of adversity [19]. Exploitative innovation enables organizations to maintain the behavior pattern of constantly paying attention to market changes and industry development trends. It also allows them to continuously optimize products and adjust resources in response to market changes, which can effectively enhance the stability of organizational development [20]. Hence, both these two types of innovation can contribute to strengthening organizational resilience. From the perspective of dynamic capabilities, the essence of organizational resilience lies in the ability to handle challenges through the reconfiguration of resources and continuous adjustment. As the core ability for organizational growth in dynamic environments, it enables enterprises to recover and rebound swiftly after encountering unexpected events and crises and to thrive in the face of adversity [21]. The enhancement of organizational resilience emphasizes the improvement of organizational learning ability, crisis prediction ability, and resource integration and coordination ability, all of which are crucial components of organizational dynamic ability [22]. Therefore, the enhancement of organizational resilience represents the further enhancement of the organization's comprehensive ability, laying a solid foundation for improving the comprehensive strength and development quality of the enterprise. In summary, during the process of enterprise development, the implementation of innovation activities can achieve the integration and restructuring of resources. It can also enhance the organization's ability to anticipate, cope with, and adapt to changes, thereby strengthening the enterprise's own competitive advantage and resilience. This, in turn, helps the enterprise achieve long-term and stable performance and promotes its sustained and high-quality development. Based on the above analysis, this paper puts forward the following research hypotheses:

H2a: Organizational resilience mediates the relationship between exploratory innovation and the high-quality development of enterprises.

H2b: Organizational resilience mediates the relationship between exploitative innovation and the high-quality development of enterprises.

2.3. The Impact of Ambidextrous Innovation on the High-Quality Development of Enterprises at Different Stages of the Enterprise Life Cycle

Enterprise innovation activities permeate the entire life cycle of an enterprise. According to the enterprise life cycle theory, enterprises in different life cycle stages possess distinct organizational structures, resource bases, and operate within different market environments. They also face varying development goals, business risks, and innovation requirements. Consequently, the impacts of ambidextrous innovation on the high-quality development of enterprises may vary across different life cycle stages. Given that the sample enterprises are all listed companies and have generally passed the start-up period, the start-up stage and the growth stage are combined into the growth stage. Subsequently, the enterprise life cycle is divided into the growth stage, the maturation stage, and the recession stage for the purpose of analyzing the differences in the effects of the two dimensions of ambidextrous innovation on the high-quality development of enterprises from these three stages [23].

Enterprises in the growth stage are typically characterized by a relatively small scale, a low market share, and high production costs. They have a strong incentive to innovate and tend to place greater emphasis on the development of new products [24]. At this stage, enhancing market recognition and expanding the market are crucial for the survival of the enterprise. On the one hand, the development of exploratory innovation activities can offer the market unique and brand-new products or services, thereby quickly opening up the market, improving the enterprise's visibility, and enhancing market recognition. To a certain extent, this can attract external investors to make investments and alleviate the financing difficulties that enterprises often face during the growth stage [25], thus promoting the development of the enterprise. On the other hand, enterprises can consolidate the achievements of exploratory innovation by continuously optimizing existing products and services through exploitative innovation. This can further reduce production costs and improve the operational efficiency of the organization, thereby maintaining the current earnings of the enterprise and facilitating its high-quality development.

Enterprises in the maturation stage tend to have a mature management system. On the one hand, they possess a stable business model and a relatively high market share. On the other hand, they face fierce market competition, which leads to a slowdown in the enterprise's development speed and a lack of new profit growth points. Compared with enterprises in the growth stage, those in the maturation stage have more existing accumulations. The R&D efforts are usually reduced as the core technology and R&D capabilities of the enterprise have been basically formed. They have a higher dependence on existing technologies and products, and the focus of their R&D has shifted to exploitative innovation, such as improvements in processes and procedures [26]. Exploitative innovation exploits the potential of existing products and services by fully developing and exploiting the original technology. By relying on technological monopoly and product advantages, enterprises can obtain considerable returns through this type of innovation. Meanwhile, the implementation of exploratory innovation activities can assist enterprises in opening up new markets, exploring more potential opportunities, and identifying new profit growth points, thereby increasing their development space. To a certain extent, this can prolong the maturity period of the enterprise and inject continuous vitality into the sustainable development of the organization.

Enterprises in the recession stage are confronted with a market downturn, overcapacity, as well as the risk of certain products becoming obsolete. In the absence of a successful shift in the market and investment in new products for transformation, these enterprises will gradually face extinction [27]. Although exploitative innovation, which involves upgrading and optimizing existing products, can assist enterprises in alleviating the issues of customer loss and capital shortage in the short term, it fails to address the genuine difficulties that enterprises encounter during the recession stage. Consequently, enterprises in this stage are more inclined to adopt a riskier strategy. They are compelled to conduct a broader range of exploratory innovation activities to develop new products and technologies, thereby opening up new development pathways. Through continuous value creation, they can reshape market boundaries and promote the enterprise's secondary business,

enabling the enterprise to enter a new round of the life cycle and thus achieve sustainable development [28]. In summary, for enterprises in the recession stage, exploratory innovation proves to be more conducive to their development. Based on the above points, the current study proposed the following hypothesis.

H3a: For firms in the growth stage, both exploratory innovation and exploitative innovation contribute to high-quality development. Moreover, the contribution of exploratory innovation to high-quality development is more significant than that of exploitative innovation.

H3b: For firms in the maturation stage, both exploratory innovation and exploitative innovation make contributions to high-quality development. Moreover, the contribution of exploitative innovation to high-quality development is more significant than that of exploratory innovation.

H3c: For firms in the recession stage, both exploratory innovation and exploitative innovation contribute to the high-quality development of enterprises. Moreover, the contribution of exploratory innovation to the high-quality development is more significant than that of exploitative innovation.

3. Research Design

3.1. Sample Selection and Data Sources

This paper selects China's A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 as the research sample and collects relevant data from the CSMAR database, the WIND database, and the China Research Data Services Platform (CNRDS). To ensure the reliability of the regression results, the sample data collected in this paper are processed in the following ways: (1) Enterprises with significant missing data regarding major indicators are excluded. (2) Samples of companies in the financial and insurance industries, as well as ST and *ST companies are excluded. (3) All continuous variables are winsorized at the 1% level.

3.2. Variable Setting

3.2.1. Explained Variables

Enterprise High-Quality Development (TFP): Referring to the research of Chen and Liu [29], this paper employs the single-indicator of firm total factor productivity to measure the high-quality development of firms. Enterprise total factor productivity, which represents the comprehensive productivity of various factors within an enterprise, plays a vital role in enhancing the quality of enterprise development. As a result, it is frequently utilized as an important criterion by scholars when evaluating the high-quality development of enterprises. In this paper, the LP method is adopted to calculate the total factor productivity of enterprises for the purpose of measuring the high-quality development of enterprises in the benchmark regression. Additionally, the OP method is utilized to conduct the robustness test.

3.2.2. Explanatory Variables

Ambidextrous Innovation: Referring to Tang and Yu [30], this paper employs the number of patent applications filed by the firm in a given year as a variable measurement benchmark. Invention patents signify that enterprises have achieved breakthroughs and innovations in technology, which aligns with the conceptual connotation of exploratory innovation. Meanwhile, design and utility model patents are primarily concerned with improving the functions and quality of existing products, thus reflecting the connotation of exploitative innovation. Consequently, this paper adopts the natural logarithm of the number of invention patents plus one to measure exploratory innovation and utilizes the natural logarithm of the sum of the number of design and utility model patents plus one to measure exploitative innovation.

3.2.3. Mediating Variables

Organizational Resilience (Resilience): Referring to Liu [31], this paper measures organizational resilience from the perspectives of both performance growth and financial volatility. Specifically, performance growth is measured by the cumulative sales revenue growth over a three-year period,

while financial volatility is gauged by the standard deviation of a firm's monthly stock returns. Subsequently, these two metrics are computed through the entropy method to ultimately obtain a composite metric for organizational resilience.

3.2.4. Control Variables

Based on the studies conducted by existing scholars, the following indicators were selected as control variables: years of listing (Age), enterprise size (Size), profitability (Roa), solvency (Lev), enterprise growth (Growth), enterprise risk (Risk), and the size of the board of directors (Board).

Specific variable descriptions are shown in table 1:

Table 1. Variable definitions and deescriptions.

Type	Variable Name	Variable Symbol	Variable Definition
Explained Variable	High-Quality Enterprise Development	TFP	Total Factor Productivity Of Enterprises By Lp Method
	Exploratory Innovation	Exploratory	Ln (Number Of Patents For Inventions + 1)
Explanatory Variable	Exploitative Innovation	Exploitative	Ln (Number Of Design And Utility Model Patents + 1)
Mediating Variable	Organizational Resilience	Resilience	Composite Indicator Of Growth In Performance And Financial Volatility
Control Variable	Number of Years Listed	Age	Age Of Listing
	Enterprise Size	Size	Natural Logarithm Of Total Assets
	Profitability	Roa	Return On Assets = Net Profit/Total Assets
	Solvency	Lev	Gearing Ratio = Liabilities/Total Assets
	Corporate Growth	Growth	Revenue Growth Rate
	Business Risk	Risk	Consolidated Leverage = Financial Leverage * Operating Leverage
	Board Size	Board	The Number Of Board Members Is Taken As a Natural Logarithm
	Year	Year	Year Dummy Variable
	Industry	Ind	Industry Dummy Variables

3.3. Classification of Enterprise Life Cycle Stages

This paper refers to Dickinson's cash flow approach to classify the life cycle of a firm [32]. In this approach, the determination of the life cycle stage in which a firm is located is based on the signs of the firm's net cash flow from operating activities, net cash flow from investing activities, and net cash flow from financing activities. Following Xie [33], the business life cycle is divided into three stages: the growth stage, the maturation stage, and the recession stage, as presented in Table 2.

Table 2. Classification of enterprise life cycle stages.

Growth Stage		Maturati on Stage	Recession Stage				
Incepti on	Growth Stage	Maturati on Stage	Turbulent Stage	Turbulent Stage	Turbulent Stage	Recessi on Stage	Recessi on Stage

Cash Flow From Operati ng Activitie s Symbol								
Cash Flow From Investin g Activitie s Symbol	-	+	+	-	+	+	-	-
Cash Flow From Financin g Activitie s Symbol	-	-	-	-	+	+	+	+
	+	+	-	-	+	-	+	-

3.4. Modeling

In order to test the relationship between the two dimensions of ambidextrous innovation proposed in Hypothesis 1 and the high-quality development of enterprises, this paper constructs models (1) and (2):

$TFP = \alpha_0 + \alpha_1 Exploratory + \alpha_2 Control + \sum Ind + \sum Year + \varepsilon_1$ (1)

$TFP = \alpha_0 + \alpha_1 Exploitative + \alpha_2 Control + \sum Ind + \sum Year + \varepsilon_1$ (2)

To test the relationship between the two dimensions of ambidextrous innovation and organizational resilience as hypothesized in Hypothesis 2, regression models (3) and (4) are constructed:

$Res = \beta_0 + \beta_1 Exploratory + \beta_2 Control + \sum Ind + \sum Year + \varepsilon_2$ (3)

$Res = \beta_0 + \beta_1 Exploitative + \beta_2 Control + \sum Ind + \sum Year + \varepsilon_2$ (4)

For the mediating role of organizational resilience, this paper adopts the step-by-step testing method to verify the relationship among ambidextrous innovation, organizational resilience [34], and the high-quality development of enterprises. This is done by adding the mediating variable, organizational resilience, on the basis of models (1) to (4), and constructing the model as follows:

$TFP = \gamma_0 + \gamma_1 Exploratory + \gamma_2 Res + \gamma_3 Control + \sum Ind + \sum Year + \varepsilon_3$ (5)

$TFP = \gamma_0 + \gamma_1 Exploitative + \gamma_2 Res + \gamma_3 Control + \sum Ind + \sum Year + \varepsilon_3$ (6)

Where TFP represents the high-quality development of firms, Exploratory represents exploratory innovation, Exploitative represents exploitative innovation, Res indicates organizational resilience, Control represents a series of control variables, α , β , and γ are constants, ε is the residual term, and two dummy variables, industry and year, are controlled within the model.

4. Results

4.1. Descriptive Statistics

This study employed Stata 15 software for statistical analysis, and the results of the descriptive statistics of the main variables are presented in Table 3. As can be seen from the results in the table, the maximum value of enterprise high-quality development is 13.096, the minimum value is 5.204,

and the standard deviation is 1.036, which indicates that there are large differences in the development quality among different enterprises, and there exists the phenomenon of unbalanced development. The maximum values of exploratory innovation and exploitative innovation are 9.028 and 9.221, respectively, and the minimum value is 0. The means and medians of the two are relatively small, which indicates that the overall innovation level of enterprises is low, and there are still large differences in the innovation level among different enterprises, and there are still some enterprises that carry out fewer innovative activities. Moreover, the mean value of exploratory innovation is smaller than the mean value of exploitative innovation, indicating that, overall, enterprises produce more outputs from exploitative innovation activities than from exploratory innovation. The maximum value of organizational resilience is 0.974, and the minimum value is 0.742, indicating that there is also a certain gap in resilience capacity among different enterprises.

From the point of view of the control variables, the sample company asset size and enterprise years of experience of the maximum value and the minimum value have a significant gap, indicating that the selection of sample enterprises is more extensive, the size of the differences between the different enterprises is still more obvious, and the number of years on the market has large differences; enterprise revenue growth rate, the maximum value of 1.970, the minimum value of -0.412, indicating that the gap between the different enterprises is very large, and the ability to develop a more disparate. The results of the rest of the control variables are also all in line with the results of the other control variables. The results of the rest of the control variables are also within a reasonable range.

Table 3. Descriptive Statistics for Key Variables.

Variable Name	Sample Size	Average Value	Standard Deviation	Minimum Value	Median	Maximum Value
TFP	22418	8.373	1.036	5.204	8.256	13.096
Exploratory	22418	1.361	1.446	0	1.098	9.028
Exploitative	22418	1.424	1.589	0	1.098	9.221
Res	22418	0.891	0.054	0.742	0.899	0.974
Size	22418	22.290	1.295	20.045	22.085	26.302
Age	22418	9.660	7.262	0	8	30
Roa	22418	0.052	0.040	0.010	0.043	0.198
Risk	22418	2.128	2.139	0.873	1.447	15.48
Growth	22418	0.189	0.336	-0.412	0.128	1.970
Lev	22418	0.396	0.195	0.0482	0.387	0.833
Board	22418	2.127	0.198	1.099	2.197	2.890

4.2. Correlation Analysis

Before conducting the regression analysis of the model in this paper, a Pearson correlation test was first performed on each variable to avoid the influence of the multicollinearity problem. Table 4 shows the results of the correlation analysis of the main variables. From the results, it can be seen that the correlation coefficient between exploratory innovation and enterprise high-quality development is 0.141, and the correlation coefficient between exploitative innovation and enterprise high-quality development is 0.113, and both are significant at the 1% level. This preliminarily suggests that there is a positive correlation between the two dimensions of ambidextrous innovation and the high-quality development of the enterprise, and it provides us with preliminary evidence to test hypothesis 1. The correlation coefficients of exploratory innovation and exploitative innovation with organizational resilience are 0.020 and 0.011, respectively, and both are significant at the 1% level, which indicates that there is a positive impact of ambidextrous innovation on organizational resilience, and hypothesis 2 is also preliminarily verified.

Table 4. Correlation analysis.

	TFP	Explora tory	Exploit ative	Res	Size	Age	Roa	Risk	Gro wth	Lev	Boa rd
TFP	1										
Explora tory	0.141 ***	1									
Exploit ative	0.113 ***	0.714***	1								
Res	0.092 ***	0.020***	0.011*	1							
Size	0.795 ***	0.149***	0.117***	0.137 ***	1						
Age	0.370 ***	- 0.117***	- 0.141***	0.107 ***	0.450 ***	1					
Roa	0.024 ***	0.089***	0.075***	- 0.021 ***	- 0.097 ***	- 0.176 ***	1				
Risk	- 0.013 *	0.007	0.0110	- 0.002	0.095 ***	0.117 ***	- 0.436 ***	1			
Growth	0.090 ***	0.003	-0.015**	0.030 ***	0.019 ***	- 0.105 ***	0.172 ***	- 0.118 ***	1		
Lev	0.555 ***	0.007	0.030***	0.024 ***	0.567 ***	0.347 ***	- 0.398 ***	0.280 ***	0.056 ***	1	
Board	0.173 ***	0.024***	0.011*	0.011 *	0.262 ***	0.162 ***	- 0.037 ***	0.062 ***	- 0.032 ***	0.144 ***	1

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.3. Benchmark Regression Results

Column 1 of Table 5 presents the regression results between exploratory innovation and the high-quality development of enterprises. The results show that the regression coefficient of exploratory innovation on the high-quality development of enterprises is 0.023, which is significant at the 1% level. This indicates that exploratory innovation has a significant positive impact on the high-quality development of enterprises, thus validating hypothesis H1a. Column 2 of Table 5 presents the regression results of the relationship between exploitative innovation and enterprise high-quality development. The results indicate that the regression coefficient of exploitative innovation on the enterprise's high-quality development capability is 0.019, which is also significant at the 1% level. This suggests that exploitative innovation has a positive impact on enterprise high-quality development, thereby verifying hypothesis H1b of this paper.

This paper employs a step-by-step test to verify the mediating role of organizational resilience between the two dimensions of ambidextrous innovation and the high-quality development of enterprises. The first step tests the relationship between the explanatory variables and the dependent variable. According to the regression results of models (1)-(2) in Table 5, it is evident that both exploratory innovation and exploitative innovation have a significant positive correlation with the high-quality development of the enterprise, indicating that both dimensions of ambidextrous innovation contribute to the high-quality development of the enterprise. The second step tests the relationship between the explanatory variables and the mediator variable. The results of models (3)-(4) show a significant positive relationship between both exploitative innovation and exploratory

innovation and organizational resilience. The third step involves regression analysis again after adding the mediating variable, organizational resilience. According to the regression results of model (5), the regression coefficients of exploratory innovation on the high-quality development of enterprises and organizational resilience are 0.023 and 0.532, respectively, both significant at the 1% level. According to the regression results of model (6), the regression coefficients of exploitative innovation on the high-quality development of enterprises and organisational resilience are 0.019 and 0.522, also significant at the 1% level. Thus, organizational resilience has a partial mediating role between both exploratory innovation, exploitative innovation, and the high-quality development of the enterprise, indicating that ambidextrous innovation can promote the high-quality development of the enterprise through the enhancement of organizational resilience capacity, thereby supporting hypotheses H2a and H2b.

Table 5. Benchmark regression results.

Variables	(1) TFP	(2) TFP	(3) Res	(4) Res	(5) TFP	(6) TFP
Exploratory	0.023*** (8.07)		0.072*** (6.12)		0.023*** (7.93)	
Exploitative		0.019*** (7.33)		0.088*** (8.01)		0.019*** (7.15)
Res					0.532*** (3.30)	0.522*** (3.24)
Size	0.558*** (140.67)	0.561*** (143.34)	0.372*** (22.58)	0.372*** (22.96)	0.556*** (138.63)	0.559*** (141.22)
Age	0.003*** (5.27)	0.003*** (5.40)	0.025*** (10.07)	0.026*** (10.48)	0.003*** (5.04)	0.003*** (5.16)
Roa	3.772*** (34.60)	3.763*** (34.46)	-2.987*** (-6.61)	-3.112*** (-6.88)	3.788*** (34.72)	3.779*** (34.58)
Risk	-0.028*** (-15.28)	-0.029*** (-15.30)	-0.034*** (-4.38)	-0.034*** (-4.42)	-0.028*** (-15.18)	-0.028*** (-15.20)
Growth	0.108*** (9.77)	0.109*** (9.86)	-0.678*** (-14.73)	-0.667*** (-14.50)	0.112*** (10.05)	0.113*** (10.13)
Lev	1.234*** (46.53)	1.229*** (46.30)	-1.273*** (-11.58)	-1.299*** (-11.81)	1.241*** (46.66)	1.236*** (46.42)
Board	-0.064*** (-3.39)	-0.064*** (-3.37)	0.173** (2.19)	0.169** (2.14)	-0.065*** (-3.44)	-0.065*** (-3.42)
Constant	-4.824*** (-53.74)	-4.879*** (-55.03)	84.684*** (227.49)	84.676*** (230.51)	-5.274*** (-32.29)	-5.321*** (-32.68)
Ind	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	22418	22418	22418	22418	22418	22418
R-squared	0.739	0.740	0.837	0.837	0.729	0.731

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

On the basis of the above research, this paper divides the enterprise into three stages, namely growth, maturation, and recession, for group regression, and the group regression results are shown in Table 6. As can be seen from the results, the role of exploratory innovation in promoting the high-quality development of enterprises is significant at the 1% level in all three stages, and its promoting effect is the most pronounced in the growth stage. The role of exploitative innovation in the high-quality development of firms is also significant at all three stages (growth, maturation, and recession),

with the greatest contribution being made in the maturation stage. For enterprises in the growth stage, the regression coefficients of exploratory innovation and exploitative innovation on the high-quality development of enterprises are 0.026 and 0.017, respectively, both of which are significant at the 1% level, indicating that exploratory innovation promotes the high-quality development of enterprises more effectively than exploitative innovation in the growth stage, thus verifying hypothesis H3a. For firms in the maturation stage, the coefficient of exploratory innovation is 0.020, which is significant at the 1% level, while the coefficient of exploitative innovation is 0.022, which is also significant at the 1% level. This suggests that both exploratory and exploitative innovations can contribute to the high-quality development of the enterprises, and exploitative innovations contribute more than exploratory innovations. In the recession stage, the coefficient of exploratory innovation is 0.018, which is significant at the 5% level, and the coefficient of exploitative innovation is 0.011, which is significant at the 5% level. This also proves that both exploratory and exploitative innovations can promote the high-quality development of enterprises, thereby verifying hypothesis H3c.

Table 6. Enterprise life cycle grouping regression results.

Variables	Growth Stage		Maturation Stage		Recession Stage	
	TFP	TFP	TFP	TFP	TFP	TFP
Exploratory	0.026*** (6.02)		0.020*** (5.60)		0.018** (2.21)	
Exploitative		0.017*** (4.22)		0.022*** (5.95)		0.011** (2.57)
Size	0.547*** (88.82)	0.551*** (90.64)	0.564*** (97.77)	0.565*** (99.76)	0.582*** (53.39)	0.584*** (54.16)
Age	0.006*** (5.78)	0.006*** (5.80)	0.003*** (3.75)	0.003*** (3.90)	-0.006*** (-3.92)	-0.006*** (-3.90)
Roa	3.729*** (18.09)	3.769*** (18.28)	3.702*** (25.13)	3.671*** (24.86)	3.424*** (12.78)	3.427*** (12.78)
Risk	-0.034*** (-12.23)	-0.034*** (-12.17)	-0.026*** (-9.01)	-0.026*** (-9.06)	-0.024*** (-4.99)	-0.024*** (-5.00)
Growth	0.135*** (8.67)	0.134*** (8.53)	0.064*** (3.20)	0.068*** (3.39)	0.186*** (6.69)	0.186*** (6.68)
Lev	1.172*** (27.22)	1.169*** (27.10)	1.257*** (31.66)	1.249*** (31.43)	1.514*** (22.97)	1.511*** (22.92)
Board	-0.076** (-2.57)	-0.074** (-2.50)	-0.070** (-2.51)	-0.071** (-2.58)	-0.059 (-1.17)	-0.057 (-1.14)
Constant	-4.542*** (-32.44)	-4.641*** (-33.56)	-4.969*** (-38.03)	-4.996*** (-38.71)	-5.177*** (-21.29)	-5.231*** (-21.72)
Ind	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	9,363	9,363	8,897	8,897	4,158	4,158
R-squared	0.731	0.730	0.784	0.784	0.692	0.692

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.4. Robustness Tests

4.4.1. Replacement of Explained Variable Measures

In order to test the robustness of the findings of this paper, the total factor productivity of enterprises calculated by the OP method is used to replace the measure of the explanatory variable for high-quality enterprise development. The model is then re-estimated based on the new indicator after replacement, and the regression results are shown in Table 7. It can be observed that after changing the measure of the high-quality enterprise development variable, the regression coefficient of exploratory innovation on high-quality enterprise development is 0.005, which is significant at the 5% level. The regression coefficient of exploitative innovation on high-quality enterprise development is 0.007, which is significant at the 1% level. The relationship between exploratory innovation and exploitative innovation and high-quality enterprise development remains significant and positive, which is in line with the results from the previous section. Consistent with the previous results, after adding the mediating variable of organizational resilience, the coefficients of the explanatory variables of exploratory innovation and exploitative innovation are positive and significant, and the coefficients of the mediating variables are also significant. This proves that the mediating effect of organizational resilience remains valid and is consistent with the findings of the previous study, indicating that the findings of this paper possess a certain degree of robustness.

Table 7. Regression results with replacement of explanatory variables.

Variables	(1) TFP	(2) TFP	(3) Res	(4) Res	(5) TFP	(6) TFP
Exploratory	0.005** (1.99)		0.072*** (6.12)		0.005*** (2.55)	
Exploitative		0.007*** (2.82)		0.088*** (8.01)		0.007*** (2.93)
Res					0.293*** (3.30)	0.330*** (3.24)
Size	0.397*** (100.85)	0.401*** (103.36)	0.372*** (22.58)	0.372*** (22.96)	0.396*** (99.45)	0.400*** (101.86)
Age	0.004*** (6.14)	0.003*** (5.54)	0.025*** (10.07)	0.026*** (10.48)	0.004*** (6.00)	0.003*** (5.38)
Roa	2.914*** (26.93)	2.955*** (27.28)	-2.987*** (-6.61)	-3.112*** (-6.88)	2.923*** (26.99)	2.965*** (27.35)
Risk	-0.025*** (-13.36)	-0.025*** (-13.34)	-0.034*** (-4.38)	-0.034*** (-4.42)	-0.025*** (-13.30)	-0.025*** (-13.28)
Growth	0.148*** (13.49)	0.146*** (13.22)	-0.678*** (-14.73)	-0.667*** (-14.50)	0.150*** (13.60)	0.148*** (13.36)
Lev	0.990*** (37.61)	0.993*** (37.72)	-1.273*** (-11.58)	-1.299*** (-11.81)	0.994*** (37.64)	0.998*** (37.77)
Board	-0.108*** (-5.71)	-0.105*** (-5.59)	0.173** (2.19)	0.169** (2.14)	-0.108*** (-5.73)	-0.106*** (-5.62)
Constant	-2.735*** (-30.71)	-2.822*** (-32.09)	84.684*** (227.49)	84.676*** (230.51)	-2.983*** (-18.40)	-3.102*** (-19.20)
Ind	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	22418	22418	22418	22418	22418	22418
R-squared	0.637	0.637	0.312	0.311	0.641	0.641

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.4.2. Lagged Explanatory Variables

The results from the previous benchmark regression demonstrate that ambidextrous innovation can effectively promote the high-quality development of enterprises. However, the development status of enterprises may also influence innovation activities. Specifically, enterprises at a higher level of development are more likely to increase R&D investment in innovation activities due to their more advanced technological levels and management concepts. Consequently, ambidextrous innovation and the high-quality development of enterprises may have a causal relationship with each other. Therefore, this paper employs the instrumental variable method to conduct an endogeneity test. It takes the one-period lag of exploratory innovation and exploitative innovation as the instrumental variable and re-regresses the model using the two-stage least squares method, thereby alleviating the endogeneity problem resulting from reverse causality or omitted variables.

The final results are presented in Tables 8. Columns 1 and 3 display the results of the first-stage regressions of exploratory innovation and exploitative innovation on the instrumental variables, respectively. It can be observed that the regressions are all significant at the 1% level, and the F-values are much greater than 10, indicating that the selected instrumental variables do not suffer from the problem of weak instrumental variables. Columns 2 and 4 show the second-stage regression results, respectively. It can be seen that the regression coefficient of exploratory innovation on the high-quality development of enterprises is 0.027, and the regression coefficient of exploitative innovation on the high-quality development of enterprises is 0.023. Both coefficients are significant at the 1% level, and the results of the re-regression using the instrumental variable method are consistent with the previous conclusions, which indicates that the conclusions of this paper are robust.

Table 8. Lagged explanatory variables regression results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	TFP	TFP	Res	Res	TFP	TFP
Exploratory	0.022*** (7.13)		0.057*** (4.48)		0.021*** (7.01)	
Exploitative		0.018*** (6.23)		0.064*** (5.37)		0.017*** (6.10)
Res					0.595*** (3.22)	0.594*** (3.24)
Size	0.557*** (126.36)	0.560*** (128.91)	0.348*** (19.38)	0.351*** (19.83)	0.555*** (124.60)	0.558*** (127.06)
Age	0.004*** (6.77)	0.005*** (6.87)	0.017*** (6.12)	0.017*** (6.38)	0.004*** (6.61)	0.004*** (6.71)
Roa	3.769*** (30.78)	3.761*** (30.66)	-3.036*** (-6.08)	-3.112*** (-6.22)	3.787*** (30.90)	3.780*** (30.79)
Risk	-0.028*** (-12.64)	-0.029*** (-12.67)	-0.040*** (-4.33)	-0.040*** (-4.36)	-0.028*** (-12.53)	-0.028*** (-12.56)
Growth	0.139*** (10.72)	0.140*** (10.78)	-0.762*** (-14.40)	-0.754*** (-14.25)	0.144*** (11.00)	0.145*** (11.06)
Lev	1.237*** (41.16)	1.231*** (40.92)	-1.168*** (-9.53)	-1.191*** (-9.71)	1.244*** (41.30)	1.239*** (41.05)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	TFP	TFP	Res	Res	TFP	TFP
Board	-0.064*** (-3.04)	-0.064*** (-3.05)	0.204** (2.37)	0.201** (2.33)	-0.066*** (-3.10)	-0.066*** (-3.11)
Constant	-4.854*** (-48.63)	-4.913*** (-49.84)	68.029*** (167.10)	67.981*** (169.16)	-5.259*** (-32.78)	-5.316*** (-33.30)
Ind	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
N	17656	17656	17656	17656	17656	17656
R-squared	0.748	0.747	0.844	0.844	0.748	0.748

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.4.3. Bootstrap Method to Test the Mediation Effect

In order to test the robustness of the mediating effect, this paper employs the Bootstrap method to re-test the mediating effect of organizational resilience. The test results are shown in Table 9. We can observe that the effect value of the direct effect and the indirect effect of the mediating variable within the 95% confidence interval does not include 0, which further verifies that the mediating effect of organizational resilience exists.

Table 9. Bootstrap method mediation effect test.

		Coef	Std. Err.	[95% Conf. Interval]	
Exploratory	indirect effect	0.0018	0.0008	0.0002	0.0034
	direct effect	0.0657	0.0261	0.0132	0.1174
Exploitative	indirect effect	0.0014	0.0003	0.0009	0.0020
	direct effect	0.0235	0.0033	0.0170	0.0300

4.4.4. Instrumental Variables Approach

The findings from the previous benchmark regression demonstrate that ambidextrous innovation can effectively drive the high-quality development of enterprises. Conversely, the development status of enterprises may also influence innovation activities. Enterprises with a higher development level, due to their more advanced technological capabilities and management concepts, are more prone to increasing R&D investment in innovation activities. Thus, ambidextrous innovation and the high-quality development of enterprises may be mutually causal.

Consequently, this paper employs the instrumental variable method to conduct an endogeneity test. The one-period lag of exploratory and exploitative innovation is taken as the instrumental variable, and the model is re-regressed using the two-stage least-squares method. This approach aims to mitigate the endogeneity issues arising from reverse causality or omitted variables.

The final results are presented in Table 10. Columns 1 and 3 display the first-stage regression results of exploratory and exploitative innovation on the instrumental variables, respectively. It can be observed that these regressions are all significant at the 1% level, with F - values far greater than 10. This indicates that the selected instrumental variables do not suffer from the problem of weak instrumental variables. Columns 2 and 4 show the second-stage regression results, respectively. The regression coefficient between exploratory innovation and the high-quality development of

enterprises is 0.027, and that between exploitative innovation and the high-quality development of enterprises is 0.023. Both are significant at the 1% level. The results of the re-regression using the instrumental variable method are consistent with the previous conclusions, suggesting that the conclusions of this paper are robust.

Table 10. Instrumental variable method regression results.

Variables	Phase I Exploratory	Phase II TFP	Phase I Exploitative	Phase II TFP
1. Exploratory	0.824*** (188.53)			
Exploratory		0.027*** (7.13)		
1. Exploitative			0.795*** (170.15)	
Exploitative				0.023*** (6.24)
Size	0.065*** (10.58)	0.555*** (124.18)	0.068*** (9.81)	0.558*** (127.12)
Age	-0.003*** (-3.36)	0.005*** (6.89)	-0.006*** (-5.40)	0.005*** (7.04)
Roa	0.943*** (5.52)	3.744*** (30.54)	1.246*** (6.36)	3.732*** (30.35)
Risk	-0.001 (-0.19)	-0.028*** (-12.65)	0.000 (0.08)	-0.029*** (-12.69)
Growth	-0.037** (-2.04)	0.140*** (10.80)	-0.057*** (-2.74)	0.141*** (10.88)
Lev	0.067 (1.59)	1.235*** (41.15)	0.066 (1.38)	1.230*** (40.89)
Board	0.046 (1.56)	-0.066*** (-3.11)	0.054 (1.60)	-0.066*** (-3.11)
Constant	-1.731*** (-12.37)	-4.783*** (-46.94)	-2.091*** (-13.22)	-4.845*** (-48.25)
Ind	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	17656	17656	17656	17656
R-squared	0.759	0.748	0.736	0.747

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.5. Further Analysis

4.5.1. Heterogeneity Test Based on the Nature of Property Rights

Given that state-owned enterprises (SOEs) and non-state-owned enterprises (non - SOEs) differ in terms of their internal and external environments, resource bases, organizational structures, and systems, there are substantial disparities in their implementation of innovation activities and innovation inputs. Thus, when studying the impact of innovation activities, the nature of property rights must be considered.

Consequently, this paper categorizes all sample enterprises into SOEs and non-SOEs based on the property-rights nature and conducts group regression. The aim is to examine whether the

difference in property-rights nature influences the relationship between exploratory innovation, exploitative innovation, and the high-quality development of enterprises.

Table 11 presents the results of the grouping test for SOEs and non-SOEs. Columns (1) and (2) show the test results for the SOE group. The regression results between exploratory innovation, exploitative innovation, and the high-quality development of enterprises are not significant. Columns (3) and (4) display the regression results for the non-SOE group. In the non-SOE group, the regression coefficients of exploratory innovation and exploitative innovation are 0.043 and 0.004 respectively, and both are significant at the 1% level. This indicates a significant positive correlation between exploratory innovation, exploitative innovation, and the high-quality development of enterprises.

The reason for these divergent results might be that, compared to non-SOEs, SOEs generally enjoy a higher market position and a robust resource base. As a result, they face less survival pressure, tend to pursue stable development, and have a relatively weak innovation willingness. Additionally, their innovation mechanisms may not be well-established, and the rates of R&D achievements and result transformation are low. Consequently, the enhancement of the high-quality development ability of SOEs through innovative activities is limited.

In contrast, non-SOEs operate in a more competitive market environment. They are under pressure to innovate continuously to maintain their core competitiveness, avoid market elimination, and ensure the survival and long term development of the enterprise.

Table 11. Test for heterogeneity in the nature of property rights.

Variables	State-owned enterprise group		Non-State Enterprise Group	
	TFP	TFP	TFP	TFP
Exploratory	0.0004 (0.07)		0.043*** (10.12)	
Exploitative		-0.00003 (-0.03)		0.004*** (4.50)
Size	0.558*** (88.95)	0.563*** (90.87)	0.567*** (106.46)	0.566*** (107.41)
Age	0.008*** (7.60)	0.008*** (7.46)	-0.004*** (-5.13)	-0.004*** (-4.84)
Roa	3.532*** (15.96)	3.529*** (15.91)	3.871*** (31.74)	3.845*** (31.49)
Risk	-0.028*** (-9.56)	-0.027*** (-9.48)	-0.029*** (-11.93)	-0.029*** (-11.92)
Growth	0.188*** (8.91)	0.189*** (8.95)	0.078*** (6.13)	0.080*** (6.31)
Lev	1.153*** (23.95)	1.145*** (23.77)	1.213*** (38.43)	1.206*** (38.20)
Board	-0.223*** (-6.55)	-0.226*** (-6.63)	0.015 (0.66)	0.015 (0.65)
Constant	-13.446*** (-10.68)	-13.471*** (-10.35)	-19.997*** (-18.08)	-19.694*** (-17.10)
Ind	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	7813	7813	14605	14605
R-squared	0.297	0.297	0.302	0.298

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

4.5.2. Heterogeneity Test Based on Industry Nature

Enterprises with different industry natures exhibit significant disparities in terms of market environment, innovation level, and access to innovation resources. Moreover, their reliance on innovation varies as well.

To explore whether there are differences in the impact of ambidextrous innovation on the high-quality development of enterprises in high-tech and non-high-tech industries, this paper refers to the method of defining high-tech industries proposed by Peng and Mao [35]. It categorizes enterprises into high-tech and non-high-tech industry groups and then examines the relationships between exploratory innovation, exploitative innovation, and the high-quality development of enterprises within each industry group separately.

Table 12. Tests for heterogeneity of industry properties.

Variables	High-tech industry group		Non-high-tech industry group	
	TFP	TFP	TFP	TFP
Exploratory	0.042*** (8.25)		0.023*** (4.56)	
Exploitative		0.005*** (6.18)		0.002* (1.80)
Size	0.518*** (88.67)	0.522*** (90.84)	0.580*** (107.81)	0.583*** (109.88)
Age	0.011*** (12.62)	0.011*** (12.60)	-0.001 (-1.28)	-0.001 (-1.30)
Roa	3.911*** (27.49)	3.906*** (27.42)	3.771*** (23.49)	3.763*** (23.38)
Risk	-0.035*** (-12.70)	-0.035*** (-12.74)	-0.024*** (-9.51)	-0.024*** (-9.47)
Growth	0.050*** (3.16)	0.051*** (3.23)	0.156*** (10.21)	0.155*** (10.16)
Lev	1.297*** (36.26)	1.285*** (35.82)	1.166*** (30.62)	1.165*** (30.56)
Board	-0.015 (-0.60)	-0.017 (-0.66)	-0.075*** (-2.80)	-0.074*** (-2.73)
Constant	-3.289*** (-6.69)	-3.362*** (-6.84)	-5.264*** (-44.02)	-5.335*** (-45.17)
Ind	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	9,657	9,657	12,761	12,761
R-squared	0.725	0.725	0.744	0.744

Note: *** denotes 1% level of significance, ** denotes 5% level of significance, * denotes 10% level of significance.

As can be seen from the regression results in Table 12, the regression coefficients of exploratory innovation on the high-quality development of enterprises in the two groups are 0.042 and 0.023, respectively, and both are significant at the 1% level. This indicates that the positive impact of exploratory innovation on the high-quality development of enterprises is more pronounced in enterprises within high-tech industries.

The regression result of exploitative innovation on the high-quality development of high-tech enterprises is 0.005, which is significant at the 1% level, while the regression coefficient for non-high-tech industries is 0.002, which is only significant at the 10% level.

From the above results, it is evident that the bimodal innovation in the high-tech industry group generally makes a greater contribution to the high-quality development of firms than that in the non-high-tech industry.

This conclusion may stem from the fact that for most enterprises in non-high-tech industries, they focus more on the cost and quality of their products, and innovation is not a top priority. Even

if the innovation level is low, it will not have a significant impact on the survival and development of these enterprises.

In contrast, the high-tech industry, which is technology-intensive and knowledge-intensive based on high technology, mainly relies on exploratory innovation. Enterprises invest a substantial amount of capital and scientific researchers in the research and development of new products and technologies to provide customers with higher-quality, more diversified, and differentiated products and services in order to capture the market.

Therefore, in the high-tech industry, having a higher level of technology and a faster R&D speed is more crucial, and these aspects are inseparable from innovation activities. Enterprises with a low level of innovation will face the risk of being phased out of the market if they are unable to adapt to technological and product iterations.

5. Discussion

Taking organizational resilience as the mediating variable, this paper incorporates ambidextrous innovation, organizational resilience, and enterprise high-quality development into the same research framework. It explores the impact of ambidextrous innovation on enterprise high-quality development at different life cycle stages and reveals the mechanism through which ambidextrous innovation influences enterprise high-quality development capability under the VUCA environment.

Using Shanghai and Shenzhen A-share listed companies as research samples, in line with the research content of this paper and based on the organizational ambidextrous theory, dynamic capability theory, and enterprise life cycle theory, we propose hypotheses and conduct empirical tests. Eventually, the following research conclusions are drawn:

Firstly, both exploratory innovation and exploitative innovation can effectively promote the high-quality development of enterprises. Exploitative innovation can significantly enhance short-term financial performance, stabilize current earnings, and maintain an enterprise's market position and core competitiveness by improving existing products and technologies and providing better products and services for customers in the current market. Exploratory innovation, on the other hand, aims to tap new profit growth points, capture new market opportunities, and gain sustainable competitive advantages in the future by creating new knowledge, products, and technologies. Hence, both exploratory innovation and exploitative innovation can effectively contribute to the high-quality development of an enterprise to a certain extent.

Secondly, there are differences in the effects of the two dimensions of ambidextrous innovation, namely exploratory innovation and exploitative innovation, on the high-quality development of enterprises in different life cycle stages. During the three stages of growth, maturity, and decline, the positive effects of both exploratory innovation and exploitative innovation on the high-quality development of enterprises are significant. Exploratory innovation has the most significant promoting effect on enterprises in the growth stage, while exploitative innovation plays the most prominent role in promoting the high-quality development of enterprises in the maturity stage.

Thirdly, both exploratory innovation and exploitative innovation can facilitate the improvement of organizational resilience within enterprises. By observing crisis events, constantly predicting industry developments, and learning from the coping behaviors of other industry enterprises, those enterprises that have been carrying out exploratory innovation and exploitative innovation activities over a long period can effectively enhance their organizational anticipation, coping, and adaptive abilities. This enables enterprises that are constantly exploring new opportunities to more actively engage in creative knowledge integration, helps them better identify and handle risks, and strengthens their crisis coping capabilities. Moreover, an enterprise's ability to cope with crises can be utilized to drive its own development.

Fourthly, organizational resilience has a partial mediating effect between exploratory innovation, exploitative innovation, and the high-quality development of enterprises. Enterprises can enhance their resilience through the implementation of exploratory innovation and exploitative innovation activities, which, in turn, has a positive impact on the quality of their development. Organizational resilience is essential for enterprises to achieve high-quality development. The continuous implementation of innovation activities not only promotes the upgrading of enterprise

products and services but also enhances the resilience of enterprises, helping them flexibly respond to risks and challenges in the market, consolidate their core competitive advantages, and thus drive the high-quality development of enterprises.

5.1. Implications of the Study

Firstly, exploratory innovation and exploitative innovation are equally vital to enterprise development. Therefore, ambidextrous innovation activities should be carried out in a scientific manner to continuously inject impetus into enterprise development. During the process of enterprise growth, attention should not only be paid to stability and efficiency but also placed on long-term competitive advantages. To this end, enterprises ought to establish an ambidextrous innovation synergy mechanism in light of the internal and external environments as well as the requirements of their development characteristics. Meanwhile, they should combine their own resource advantages and organizational traits to make appropriate selections regarding ambidextrous innovation activities and allocate resources reasonably between exploratory innovation and exploitative innovation, thus achieving coordination and balance between the two. In daily operations, on one hand, enterprises should conduct exploratory innovation activities to explore new markets and seize new opportunities to guarantee their future development. On the other hand, they should also focus on exploitative innovation to continuously improve existing products, technologies, and capabilities, thereby enhancing operational efficiency and maintaining their current survival and development. Moreover, the relationship between exploratory innovation and exploitative innovation should be managed well simultaneously to realize the balance and complementarity of the two, which can provide a more enduring and powerful driving force for enterprise development.

Secondly, enterprises should integrate their own development stage with the internal and external environments to formulate dynamic and differentiated innovation strategies. In a VUCA (Volatile, Uncertain, Complex, and Ambiguous) environment, the market landscape is changing rapidly, and the progress of science and technology is evolving on a daily basis. As a result, enterprises need to constantly adjust their innovation models and development strategies by devising a framework for selecting and adjusting enterprise strategy orientation based on the diverse internal and external environments they encounter at each development stage. When determining whether to adopt a radical or conservative innovation strategy, they should also take into account the life cycle stage and development characteristics of the enterprise itself. It is crucial to comprehensively evaluate the adaptability of exploratory and exploitative innovations at different stages and allocate enterprise resources rationally. Scarce high-quality resources should be distributed appropriately between exploratory and exploitative innovations to maximize innovation efficiency. This targeted innovation approach will enable enterprises to continuously enhance their innovation levels and foster core competitive advantages, thereby better achieving high-quality development.

Thirdly, while carrying out innovation activities, enterprises should also attach importance to the cultivation of organizational resilience and strike a balance between innovation risks and resilience capabilities. In the current VUCA environment, numerous low-probability crisis events occur frequently. The objective of an enterprise is not only to develop and expand but also to possess the ability to respond promptly to emergencies and progress steadily. During the process of conducting innovative activities, it is necessary to establish a comprehensive risk control mechanism, strengthen internal prevention, foster risk awareness, and improve its perception and decision-making abilities when confronted with risks, so as to promote the enterprise's "dualistic" activities. When formulating strategies and making decisions regarding innovation activities, enterprises should combine them with the actual situation, fully analyze the market environment, competitive landscape, and internal and external resources to reasonably formulate plans for exploratory innovation and exploitative innovation, thereby achieving effective risk distribution and risk management. At the same time, enterprises should focus on cultivating resilience during the innovation process. The enhancement of organizational resilience is beneficial for enterprises to seize development opportunities while dealing with crises and achieve counter-trend growth. When facing emergencies, highly resilient enterprises can quickly detect and respond to various risks, effectively integrate and coordinate internal and external resources, and make steady progress by virtue of

organizational resilience. Organizations should build resilience capabilities and adopt a proactive prediction attitude instead of a reactive response approach to face innovation risks, enabling them to respond swiftly to environmental changes and seize market opportunities.

5.2. Limitations and Future Research

Constrained by factors such as research methodology, research capability, data processing, and variable measurement, this study still has certain limitations.

Firstly, in this paper, ambidextrous innovation is divided into two dimensions, namely exploratory innovation and exploitative innovation, to explore its impact on the high-quality development of enterprises. However, in practice, enterprises usually conduct these two types of innovation activities simultaneously. This paper discusses the dimensions of exploratory innovation and exploitative innovation separately and fails to consider the impact of the balance and complementarity of ambidextrous innovation at a deeper level. Hence, future research could be enriched from more dimensions and perspectives related to ambidextrous innovation, so as to gain a more comprehensive and in-depth understanding of the impact of ambidextrous innovation on enterprises.

Secondly, the variable measurement of Organizational resilience in this paper has some limitations. Organizational resilience is a complex concept encompassing multiple levels and dimensions. In future research, more scientific and rigorous data and indicators can be employed to measure Organizational resilience.

Finally, the control variables selected in this paper may have limitations. The development of an enterprise is affected by numerous factors. This paper only chose some of the main factors with a relatively greater impact as control variables, which might lead to the omission of other factors. Moreover, factors such as the external environment and the macroeconomic situation were not taken into account. In future research, it should be considered to incorporate more factors into the model for the study of the high-quality development of the enterprise.

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