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Research on the Influence Mechanism of Knowledge Sharing on the Innovation Ability of High-tech Enterprises

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Abstract

Background and Aim: In the context of the knowledge-driven economy, enhancing innovation capability has become crucial for high-tech enterprises. Although knowledge sharing is widely acknowledged as a driver of innovation, the mechanisms through which explicit and tacit knowledge contribute to different dimensions of innovation remain underexplored. This study aims to clarify how knowledge sharing influences innovation capability by introducing knowledge integration and absorptive capacity as key mediating and moderating variables.

Materials and Methods: Based on a comprehensive literature review, a conceptual model was developed. Quantitative empirical methods were employed using a structured questionnaire targeting high-tech firms in China. Data were analyzed through regression models to test the proposed hypotheses regarding the mediating effect of knowledge integration and the moderating effect of absorptive capacity.

Results: The findings reveal that both explicit and tacit knowledge sharing positively affect innovation capabilities, including organizational, production, and marketing innovation. Knowledge integration significantly mediates this relationship, while absorptive capacity strengthens the effect of knowledge sharing on knowledge integration.

Conclusion: This study contributes to the literature by constructing a mechanism model linking knowledge sharing and innovation capability in high-tech enterprises. It provides theoretical insights for knowledge management research and practical guidance for improving innovation performance through targeted knowledge sharing strategies.

Keywords: Knowledge Sharing; Innovation Capability; Knowledge Integration; Absorptive Capacity; High-Tech Enterprises

Introduction

Against the backdrop of rapid global technological advancement, innovation has become the core driving force for enterprises to gain competitive advantages and achieve sustainable development. The Chinese government has placed a strong emphasis on the role of scientific and technological innovation in national development, successively issuing a series of policies to promote corporate innovation. The Fifth Plenary Session of the 18th CPC Central Committee placed “innovation” at the forefront of the new development concepts, and the Fifth Plenary Session of the 19th CPC Central Committee explicitly stated that achieving self-reliance and self-strengthening in science and technology is a strategic underpinning of national development (He & Zhang, 2024). Among them, high-tech enterprises, characterized by intensive technology and knowledge, serve as a vital force leading the development of emerging industries and play a crucial supporting role in the realization of technological self-reliance (Lu, 2024).

However, amid fierce market competition and a highly uncertain environment, innovation activities of high-tech enterprises face numerous challenges, such as insufficient funding, technological barriers, talent shortages, and information silos (Han & Chen, 2016). These factors dampen the vitality of enterprise innovation and hinder breakthroughs in key technologies and the upgrading of industrial value chains. Given the knowledge-intensive nature of innovation, knowledge acquisition and sharing have become key paths for enterprises to enhance their innovation capacity. Under the current trend of accelerated integration of frontier technologies such as artificial intelligence, big data, and blockchain, how to effectively stimulate and manage the flow of knowledge both within and outside enterprises has become a central issue affecting the innovation performance of high-tech enterprises.

Knowledge sharing, as a critical mechanism for knowledge dissemination and collaboration among internal employees and external cooperative networks, is regarded as essential for organizational learning, technology integration, and resource synergy (Nonaka, 2009). In the report to the 20th National Congress

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of the Communist Party of China, General Secretary Xi Jinping clearly emphasized the need to promote deep integration among industry, academia, and research, strengthen the leading role of enterprises in technological innovation, and accelerate the establishment of an enterprise-centered innovation system (Du & Fan, 2024). In this context, knowledge sharing not only helps break through information blockades and technological silos, thereby improving R&D efficiency, but also promotes the collaborative allocation of inter-organizational resources and enhances the overall innovation performance of enterprises (Huang et al., 2023). However, in practical operations, issues such as knowledge hiding, cultural gaps, and communication barriers remain widespread (Tong, 2021), severely restricting the construction and effectiveness of knowledge sharing mechanisms.

Current research mainly focuses on the relationship between knowledge sharing and firm performance (e.g., Long & Wang, 2018), but there is still a lack of systematic research on the mechanism through which knowledge sharing influences the innovation process of high-tech enterprises. Specifically, it remains unclear through which pathways knowledge sharing affects technological innovation capabilities, and how different types of knowledge, organizational structures, and cooperative mechanisms play roles in the innovation process. This research gap limits the applicability of knowledge management theories in the high-tech field and leaves enterprises without clear theoretical guidance or practical frameworks for implementing knowledge sharing practices.

Therefore, this study aims to systematically explore the influencing mechanisms of knowledge sharing on the innovation capability of high-tech enterprises and to address the following research questions: How does knowledge sharing affect the innovation capability of high-tech enterprises? What mediating variables and moderating factors exist within the influencing pathways? To this end, this paper conducts a literature review and constructs a theoretical model, combined with empirical data analysis, to reveal how knowledge sharing is transformed into innovation capability at the organizational level, thereby providing theoretical foundations and policy recommendations for knowledge management practices and innovation strategies in high-tech enterprises.

Objectives

This study aims to construct a systematic theoretical model to explore the influencing mechanisms of knowledge sharing on the innovation capability of high-tech enterprises. Specifically, the research focuses on the influence pathways of both explicit and tacit knowledge sharing in different types of innovation activities, such as product, marketing, and organizational innovation, and further analyzes the mediating role of knowledge integration and the moderating effect of absorptive capacity. Through empirical investigation and data analysis, this study seeks to reveal how knowledge management can be transformed into actual innovation outcomes in technology-intensive enterprises, thereby providing theoretical support and practical guidance for high-tech enterprises in formulating more effective knowledge sharing strategies.

Literature review

1. Innovation Capability of Enterprises

As a key competency in maintaining a firm's competitive advantage, innovation capability has long been a core topic in the fields of organizational management and strategic research. Joseph Schumpeter first proposed in 1911 that innovation is the driving force behind economic growth, which has since inspired sustained inquiry into firms' innovation capabilities (Schumpeter, 2017). In recent years, with intensified global competition and accelerated technological iteration, innovation has been redefined as the ability of enterprises to continuously acquire knowledge, integrate resources, and efficiently transform them into market value (Han & Chen, 2016). Studies have shown that enterprise innovation capability is not only influenced by investment in R&D but is also closely related to factors such as organizational learning, cultural climate, and external collaboration (Hu & Wu, 2023).

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However, although a large body of literature has attempted to explore the significance and constituent elements of innovation capability, most studies remain confined to the perspectives of technology and capital (Hu & Wu, 2023), lacking in-depth investigation into the process of knowledge flow—particularly the relationship between knowledge sharing behaviors and internal innovation outcomes. This provides a valuable entry point for the present research.

2. The Relationship between Knowledge Sharing and Innovation Capability

Knowledge sharing is regarded as one of the critical pathways to enhance organizational innovation capability. Wang and Noe (2010) define knowledge sharing as the act of knowledge exchange among organizational members, emphasizing its role in promoting collective intelligence and organizational learning. Further studies indicate that knowledge sharing can significantly improve technological and managerial innovation by facilitating information circulation and experiential accumulation (Bao et al., 2024). The open innovation theory proposed by Chesbrough (2003) also underscores the importance of external collaboration, advocating that firms should actively break down knowledge silos and achieve technological breakthroughs through knowledge sharing with supply chain partners. Raj and Srivastava (2016) point out that leadership style and organizational culture play particularly significant roles in fostering knowledge sharing, helping to create a conducive environment that, in turn, stimulates innovative behavior.

Nevertheless, many studies focus solely on the outcomes of knowledge sharing (Wang & Noe, 2010), while neglecting to explore how and why knowledge sharing works within organizations—particularly how it interacts with innovation capability. In addition, most research is based on static data and simple causal models (Raj & Srivastava, 2016), making it difficult to explain the complex dynamics between knowledge sharing and innovation in evolving organizational contexts. Therefore, this study aims to further explore how knowledge sharing influences innovation capability and under what conditions such influence becomes more effective.

3. Influencing Factors of Knowledge Sharing

Existing research on the influencing factors of knowledge sharing primarily focuses on three levels: individual, organizational, and external environment. It has been found that collectivist cultures tend to promote knowledge sharing, whereas hierarchical cultures may inhibit it (Liu et al., 2016). However, few studies have specified how such cultural factors impact innovation performance. At the organizational level, transformational leadership has been shown to promote knowledge sharing by building trust and motivating employees (Chen & Xu, 2013), though the applicability of these conclusions across different firms or industries requires further empirical validation.

Recently, inter-organizational knowledge sharing has attracted growing attention. For instance, Zhang et al. (2023) found that knowledge sharing among multinational supply chain partners can significantly enhance innovation performance. However, the transformation process from knowledge sharing to innovation capability remains underexplored, particularly how firms leverage their absorptive capacity, defined as the ability to assimilate and apply new knowledge, to realize such transformation. Absorptive capacity, as a key mediating variable linking knowledge input and innovation output, has not yet been sufficiently studied in the context of knowledge sharing and innovation. Hence, this study introduces this variable to fill the relevant theoretical gap.

In summary, although existing research has yielded valuable insights into the impact of knowledge sharing on enterprise innovation, three major gaps remain. First, most studies concentrate on identifying factors that promote knowledge sharing and its direct outcomes, while lacking deeper analysis of the specific processes and complex mechanisms involved. Second, the critical role of absorptive capacity—the firm's ability to internalize and utilize knowledge—has been inadequately examined, leaving unclear how it connects knowledge sharing and innovation. Third, most studies employ static analyses and survey-based methods, which fail to authentically capture the dynamic process of knowledge flow within organizations. Addressing these issues, this study systematically analyzes the mechanism through which knowledge sharing influences innovation capability, using absorptive capacity as a moderating variable. This not only

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contributes to the refinement of related theories but also offers practical implications for innovation management in high-tech enterprises, filling the research gap concerning the integrated mechanism of "knowledge sharing–absorptive capacity–innovation capability."

Conceptual Framework

This study constructs a research model aiming to explore how knowledge sharing influences the innovation capability of high-tech enterprises through knowledge integration and absorptive capacity. The model positions knowledge sharing as the core independent variable and divides it into two dimensions: explicit knowledge sharing and tacit knowledge sharing. It examines both the direct and indirect impacts of these dimensions on enterprise innovation capability. Innovation capability, as the dependent variable, encompasses three key dimensions—organizational innovation, product innovation, and marketing innovation—thus providing a comprehensive reflection of innovation performance across management, technology, and market domains.

Regarding the impact pathways, this study focuses on the mediating role of knowledge integration and the moderating effect of absorptive capacity. Knowledge integration functions as a mediating variable that links knowledge sharing to innovation capability, representing the transformation process from knowledge sharing to knowledge application. Absorptive capacity serves as a moderating variable, either amplifying or attenuating the effect of knowledge sharing on knowledge integration, and reflects the enterprise's differential ability to assimilate and utilize external knowledge.

The study proposes three core hypotheses. First (H1), knowledge sharing has a directly positive effect on the innovation capability of high-tech enterprises. Second (H2), knowledge integration mediates the relationship between knowledge sharing and innovation capability. Third (H3), absorptive capacity plays a positive moderating role in the effect of knowledge sharing on knowledge integration. This theoretical framework not only reveals the internal mechanism through which knowledge management impacts innovation, but also provides a theoretical foundation for high-tech enterprises to optimize knowledge-sharing practices. By empirically testing these hypotheses, the study offers valuable insights for enhancing enterprise innovation effectiveness.

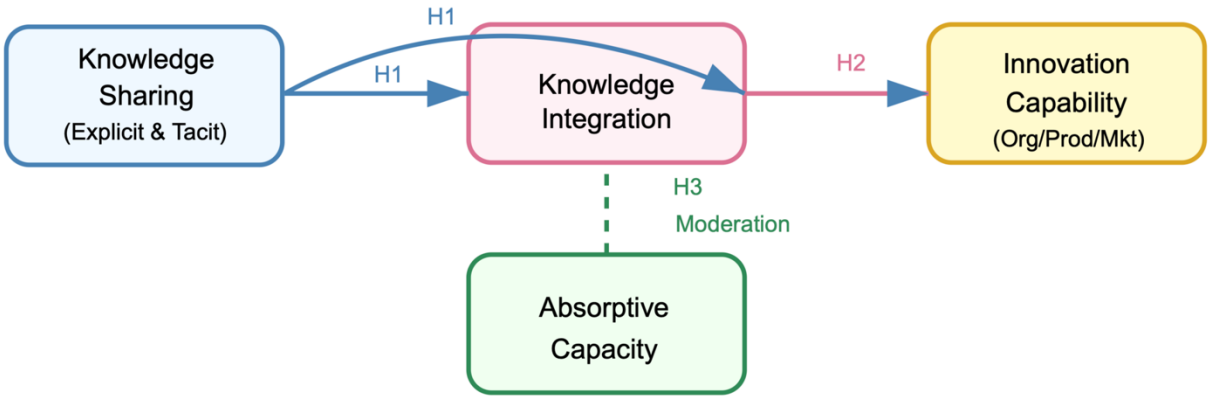

Figure 1 Research Framework
Note: Constructed by the researcher

Methodology

This study adopts an empirical research approach to systematically examine the mechanism by which knowledge sharing influences the innovation capability of high-tech enterprises.

1. Research Hypotheses

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Based on existing theoretical foundations, this study proposes three core hypotheses to construct a comprehensive theoretical framework.

H1: Knowledge sharing has a direct positive effect on the innovation capability of high-tech enterprises.

Previous studies have demonstrated that knowledge sharing serves as a key driving force of innovation in enterprises. Both its explicit and tacit forms are believed to significantly enhance innovation capability (Nonaka, 2009). Explicit knowledge sharing typically occurs through documents, manuals, and standard operating procedures, whereas tacit knowledge sharing relies on informal communication and interpersonal interactions, involving skills, experience, and intuition (Holste & Fields, 2010). Therefore, this study hypothesizes that knowledge sharing has a direct positive effect on the innovation capability of high-tech enterprises.

H2: Knowledge integration plays a critical mediating role between knowledge sharing and innovation capability.

Some researchers argue that knowledge integration enables high-tech enterprises to transform dispersed information and knowledge into systematized innovation resources (Jin & Li, 2012). The study by Özveren and Gürpinar (2024) also suggests that through knowledge integration, enterprises can effectively apply both explicit and tacit knowledge to product, marketing, and organizational innovation, thereby enhancing the overall innovation capability of high-tech firms. Hence, this study hypothesizes that knowledge integration plays a critical mediating role between knowledge sharing and innovation capability.

H3: Absorptive capacity positively moderates the effect of knowledge sharing on knowledge integration.

Absorptive capacity refers to an organization's ability to identify, acquire, assimilate, and apply external knowledge (Lin & Wang, 2023). Based on the analysis by Wang et al. (2023), in high-tech enterprises, absorptive capacity is essential for the effective internal transformation of shared knowledge. The degree to which knowledge sharing produces favorable outcomes is largely determined by the firm's level of absorptive capacity. Therefore, this study hypothesizes that absorptive capacity positively moderates the effect of knowledge sharing on knowledge integration.

2. Research Variables

In order to accurately examine the influence of knowledge sharing and knowledge integration on enterprise innovation capability, as well as the moderating effects of absorptive capacity and innovation climate, it is essential to scientifically and reasonably measure each variable. The following section explains the conceptual definitions of the key variables and introduces the main measurement approaches currently adopted. Lastly, the primary measurement items of the core constructs are identified, with detailed references and specific scales provided. The design of research variables in this study is as follows:

2.1 Measurement of the innovation ability of enterprises

Enterprise innovation ability refers to the ability of an enterprise to continuously develop and apply new products, new services, new technologies, and new processes in a rapidly changing market environment. The measurement methods of enterprise innovation ability mainly include: the objective index method, the subjective evaluation method, and the comprehensive index method. This study adopts the mature subjective evaluation scale, draws on the scale developed by Zhan & Tang (2018), and divides the enterprise innovation ability into three dimensions: production innovation, marketing innovation, and organizational innovation. Each dimension contains 4 measurement items, and is measured by a Likert 5-point scale. Enterprise innovation ability measurement items include:

(1) Organizational innovation ability: the enterprise actively introduces new management concepts, flexible organizational structure, encourages employees to put forward improvement suggestions, etc.

(2) Production innovation ability: continuous improvement of the production process, investment in research and development, the application of advanced technology to improve efficiency, etc.

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(3) Marketing innovation ability: adopt innovative marketing strategy, unique method of customer relationship management, active use of new media, etc.

2.2 Measurement of knowledge sharing

Knowledge sharing refers to the transfer of knowledge to others through means of communication and cooperation. It plays an important role in the improvement of innovation ability. The measurement methods mainly include the evaluation of behavior frequency, willingness, attitude, and knowledge sharing quality. This study used the knowledge sharing scale developed by Hu (2008), covering the sharing of explicit and tacit knowledge, using the Likert 5-point scale, containing 8 items.

Knowledge sharing measurement includes:

(1) explicit knowledge sharing: the organization can obtain required documents from associated enterprises, record workflow, participate in external knowledge base updates, etc.

(2) Implicit knowledge sharing: technical personnel share work experience with external parties, participate in technical exchanges, maintain close contact with personnel of related enterprises, etc.

2.3 Measurement of the absorption capacity

Absorption ability refers to the ability of enterprises to identify, acquire, digest, transform, and use external knowledge to enhance their innovation and competitiveness. These include potential absorption capacity (knowledge acquisition and digestion) and realization absorption capacity (knowledge transformation and application).

The measurement of absorption ability is mainly included in:

(1) structured questionnaire method: to evaluate the performance of enterprises in each absorption ability dimension through the questionnaire.

(2) Objective index method: objective data such as R & D investment, number of patents, and proportion of technical personnel are used to measure.

(3) Comprehensive evaluation method: combining subjective and objective indicators, the absorption ability is comprehensively evaluated.

This part of the study adopts the absorptive capacity scale developed by Zhang et al. (2023), which comprehensively considers various dimensions of absorptive capacity and demonstrates high reliability and validity.

2.4 Mediation variables

Knowledge integration refers to the process of effective combination, coordination, and application of knowledge from different sources, forms, and contents to create new knowledge or improve organizational performance. Knowledge integration emphasizes cross-domain and cross-departmental collaboration and comprehensive utilization of knowledge.

The measurement methods of knowledge integration mainly include:

(1) Ability assessment method: evaluating the ability of organizations in knowledge acquisition, absorption, transformation, and application.

(2) Process evaluation method: to investigate the efficiency and effect of the knowledge integration process, including knowledge sharing, collaborative work, and innovation output.

(3) Results evaluation method: to measure the innovation results, performance improvement, and other results brought by knowledge integration.

This paper refers to the study of Jin & Li (2012), adopts the knowledge integration scale developed, and finally uses 8 items.

2.5 Control variables

Enterprise age: Existing literature points out that the length of establishment of an enterprise has a certain impact on its innovation ability (Hu & Wu, 2023). For this purpose, the age of the enterprise is divided into five stages: (1) 1 to 3 years; (2) 3 to 5 years; (3) 5 to 10 years; and (4) more than 10 years.

Enterprise size: Enterprise size is an important indicator to measure enterprise resources and market influence, and it also has an impact on innovation ability. This variable is measured by the total

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number of employees by the following four levels: (1) less than 100; (2) 100-500; (3) 500-1000, and (4) more than 1000.

Enterprise ownership: involving the ownership structure of the enterprise, classified as (1) state-owned and (2) non-state-owned.

Enterprise Type: Depending on the industry, enterprise type plays a decisive role in innovation strategy and ability. The types include: (1) electronic information; (2) biology and new medicine; (3) aerospace; (4) new materials; (5) high-tech services; (6) new energy and energy conservation; (7) environmental protection; (8) cultural creativity; and (9) modern agriculture.

3. Data Collection

This study employed a questionnaire survey method, with the design outlined as follows:

3.1 Sample Selection

To comprehensively assess the innovation capability of Chinese high-tech enterprises and their influencing factors, this study selected representative high-tech enterprises as the sample population. The target respondents were current employees of these companies, particularly managerial and R&D personnel closely involved in innovation activities. As these individuals are directly engaged in innovation processes, their insights are critical for evaluating enterprise innovation capability. A pilot study was conducted before the formal distribution of the questionnaire to assess its clarity and operability.

3.2 Scale Design

Knowledge sharing was measured using an 8-item scale developed by Hu (2008), comprising four items each for explicit and tacit knowledge sharing.

Innovation capability was assessed using a 12-item scale from Zhan and Tang (2018), including four items each for organizational, production, and marketing innovation.

All items were rated using a 5-point Likert scale (1 = “Strongly Disagree” to 5 = “Strongly Agree”).

3.3 Data Collection Procedure

The questionnaire was distributed via the “Wenjuanxing” platform, targeting major regions including Beijing, Guangdong, Shandong, and Yunnan provinces. A total of 100 questionnaires were distributed for the pilot study to refine the instrument. In the formal survey, 450 questionnaires were distributed, and 359 valid responses were ultimately collected.

Results

1. Descriptive Statistics Results

The official collection of this data lasted for three months from July 2024 to September 2024, and was mainly distributed in the form of a questionnaire star. The questionnaire was mainly distributed in Guangdong province, Shandong Province, Beijing City, Yunnan Province, and other places. A total of 450 questionnaires were issued in the formal survey. After excluding the invalid questionnaires with short answer times, wrong logic, and single answers, 359 valid questionnaires were recovered, with an effective rate of 79.78%.

In this paper, quantitative and qualitative descriptive statistics, reliability test, exploratory factor analysis, validation factor analysis, validity test, correlation analysis, and regression analysis were conducted on the valid data of the questionnaire by SPSS 27.0 and AMOS 28.0. In order to understand the relevant situation of the enterprises of the investigation objects, the research summarizes the establishment period, enterprise scale, enterprise form, and enterprise type of the enterprises of the investigation sample, see Table 1 for details.

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Table 1 Descriptive Statistics of Enterprise Information

Project	Classify	Frequency	Percentage
Enterprise years	1 To 3 years	72	20.1
	Three to five years	98	27.3
	Five to ten years	138	38.4
	More than 10 years	51	14.2
Scale	Less than 100 people	58	16.2
	Of 100-500 persons for each other	149	41.5
	500-1,000 people	119	33.1
	Over 1,000 people	33	9.2
Enterprise Form	Belong to the state	298	83.0
	Non-state	61	17.0
Form of Business Enterprise	Electronic information	55	15.3
	Biology and New Medicine	40	11.1
	Aerospace	45	12.5
	New material	31	8.6
	High technology services	25	7.0
	New energy and energy saving	18	5.0
	Environmental protection	43	12.0
	Culture creativity	34	9.5
	Modern agriculture	68	18.9

2. Reliability and Validity Analysis Results

2.1 Reliability Analysis Results

In this study, all Cronbach's α coefficients exceeded 0.8, indicating excellent internal consistency, as shown in Table 2.

(1) Knowledge Sharing: This scale comprises two dimensions—explicit knowledge sharing and tacit (implicit) knowledge sharing. The overall Cronbach's α was 0.860, with subscale coefficients of 0.847 for explicit knowledge sharing and 0.832 for tacit knowledge sharing. These results suggest that the questionnaire demonstrates a high level of consistency in measuring both forms of knowledge sharing.

(2) Innovation Capability: This construct includes three dimensions—organizational innovation, production innovation, and marketing innovation. The overall Cronbach's α was 0.884, indicating strong reliability in assessing the innovation capability of enterprises. The subscale coefficients were 0.856 for organizational innovation, 0.832 for production innovation, and 0.825 for marketing innovation, all reflecting good internal consistency.

(3) Knowledge Integration: Measured as a single dimension, this construct yielded a Cronbach's α of 0.903, demonstrating a strong correlation among the items and indicating the scale's effectiveness in capturing the degree of knowledge integration.

(4) Absorptive Capacity: This construct recorded the highest Cronbach's α coefficient at 0.936, underscoring the scale's excellent reliability in evaluating how effectively firms absorb and apply external knowledge. The high internal consistency across all scales affirms the scientific rigor and methodological soundness of the study, offering a robust measurement tool for future research and practical application.

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Table 2 Reliability Analysis

Variable	Dimension	Number of Terms	Scale Cronbach's	Cronbach's
Knowledge Sharing	Explicit knowledge sharing	4	0.860	0.847
	Implicit knowledge sharing	4	0.832	
Innovation Ability	Organizational innovation	4	0.856	0.884
	Production innovation	4	0.832	
	Marketing innovation	4	0.825	
Knowledge Integration	Knowledge integration	6	0.903	0.903
Absorbing Capacity	Absorbing capacity	12	0.936	0.936

2.2 Validity analysis Results

As shown in Table 3, the KMO value is 0.951, greater than 0.8. Suggesting that the correlation between the sample data is high enough for factor analysis. KMO values greater than 0.8 are generally considered very good, indicating that a large amount of common variation is shared among the variables involved in the analysis. Second, the significance of the results was less than 0.001 (chi-square value 10698.400, degrees of freedom 1225), which indicates that the correlation matrix of the data is not a unit matrix and there is indeed correlation between variables, which is suitable for factor analysis of structural discovery.

Table 3 The KMO Test

Number of KMO sampling suitability quantities		0.951
Bartlett's sphericity test	Approximate chi-square	10698.400
	Free degree	1225
	Conspicuousness	0.000

2.3 Confirmatory Factor Analysis (CFA) Results

Validation factor analysis of innovation capacity using AMOS 28.0 yielded Table 4 with a good model fit. The analysis results show that the innovation ability scale performs well in structural validity and can accurately measure and reflect the organizational innovation, production innovation, and marketing innovation ability of enterprises. In particular, the estimates of both explicit and tacit knowledge sharing are high, indicating their significance in the organization. The results of organizational, production, and marketing innovations show that these structures can accurately measure and reflect the different innovation capabilities of an enterprise. Furthermore, the high CR values of knowledge integration and absorption emphasize its key role in supporting organizational innovation. Careful statistical analysis ensures the reliability and validity of the findings, providing a solid methodological basis for subsequent studies.

Table 4 Confirmatory Factor Analysis

Variable	Question item	Estimate	AVE	CR
Knowledge Sharing	Explicit knowledge-sharing 1	0.931	0.623	0.867
	Explicit knowledge-sharing 2	0.705		
	Explicit knowledge-sharing 3	0.781		
	Explicit knowledge-sharing 4	0.719		
	Implicit knowledge-sharing 1	0.818	0.558	0.834
	Implicit knowledge-sharing 2	0.706		
	Implicit knowledge-sharing 3	0.724		

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Variable	Question item	Estimate	AVE	CR
Innovation Ability	Implicit knowledge-sharing 4	0.734	0.604	0.859
	Organizational Innovation 1	0.852		
	Organizational Innovation 2	0.724		
	Organizational Innovation 3	0.749		
	Organizational Innovation 4	0.778		
	Production Innovation 1	0.838	0.559	0.834
	Production Innovation 2	0.742		
	Production Innovation 3	0.699		
	Production innovation 4	0.703		
	Marketing Innovation 1	0.848	0.551	0.829
	Marketing Innovation 2	0.707		
	Marketing Innovation 3	0.720		
	Marketing Innovation 4	0.682		
Knowledge Integration	Knowledge integration 1	0.784	0.608	0.903
	Knowledge integration 2	0.799		
	Knowledge integration 3	0.790		
	Knowledge integration 4	0.749		
	Knowledge integration 5	0.755		
	Knowledge integration 6	0.800		
Absorbing Capacity	Absorption ability 1	0.691	0.551	0.937
	Absorption ability 2	0.723		
	Absorption ability 3	0.773		
	Absorption capacity 4	0.755		
	Absorption ability 5	0.750		
	Absorption ability 6	0.761		
	Absorption ability 7	0.767		
	Absorption ability 8	0.737		
	Absorption ability 9	0.755		
	Absorption ability 10	0.750		
	Absorption capacity 11	0.761		
	Absorption ability 12	0.679		
	Absorption capacity 11	0.761		
	Absorption ability 12	0.679		

3. Main Effects Analysis Results

To explore how knowledge sharing affects the innovation ability of enterprises, this study used hierarchical regression analysis. This method gradually tests the influence of the control variables (enterprise age, enterprise size, enterprise form, and enterprise type) and the main explanatory variables (knowledge sharing) on the enterprise innovation ability. Results are presented in Table 5.

Table 5 Regression Analysis of Knowledge Sharing and Organizational Innovation Ability

	Model 1			Model 2		
	β	***t***	***VIF***	***β***	***t***	***VIF***
Enterprise years	0.256***	5.184	1.029	0.163***	3.676	1.075
Scale	0.263***	5.329	1.035	0.193***	4.370	1.061
Enterprise form	0.031	0.635	1.006	0.031	0.729	1.006
form of business enterprise	0.064	1.315	1.005	0.059	1.380	1.005
Knowledge sharing				0.451***	10.118	1.084
R^2		0.164			0.352	

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	Model 1			Model 2		
	β	***t***	***VIF***	***β***	***t***	***VIF***
Adjust the R^2		0.154			0.343	
F		17.340***			38.319***	
D-W price			1.643			

Note. * indicates p <0.05, ** p <0.01, and *** p <0.001

As shown in Table 5, the coefficient of determination for model 1 (R2 was 0.164 and adjusted R2 was 0.154, indicating moderate explanatory power of the model. After the introduction of the knowledge sharing variable, the R2 of model 2 significantly increased to 0.352, and the adjusted R2 was 0.343, showing that knowledge sharing significantly enhanced the explanatory power of the model. The coefficient of knowledge sharing in Model 2 was 0.451, and the significance level was p <0.001, marking a significant positive effect of knowledge sharing on enterprise innovation ability.

This result supports the hypothesis that H1 means that knowledge sharing can significantly improve the innovation ability of enterprises. The variance inflation factor (VIF) is below 5 for all variables, indicating that the model does not have serious multicollinearity problems. The results of regression analysis not only verified the positive effect of knowledge sharing on enterprise innovation ability, but also supported H1.

4. Mediation Effect Test Results

The Model 4 in the PROCDESS macro program is used to test the intermediary role of knowledge integration between knowledge sharing and enterprise innovation ability, taking enterprise age, enterprise size, enterprise form, and enterprise type as the control variables, knowledge sharing as the independent variable, enterprise innovation ability as the dependent variable, and knowledge integration as the intermediary variable.

As shown in Table 6, the total effect of knowledge sharing on enterprise innovation ability is significant (β =0.451,95%CI [0.364,0.539]), and the direct effect of knowledge sharing on enterprise innovation ability (β =0.324,95%CI [0.242,0.407]) between knowledge sharing and enterprise innovation ability (β =0.127,95%CI [0.082,0.172]), so knowledge integration plays a intermediary role between knowledge sharing and enterprise innovation ability, assuming H2 is established.

Table 6 Test of the Mediation Effect of Knowledge Integration

	Effect	**Boot SE**	**Boot LLCI**	**Boot ULCI**
Gross effect	0.451	0.045	0.364	0.539
Direct effect	0.324	0.042	0.242	0.407
Mesomeric effect	0.127	0.023	0.082	0.172

5. Regulation Effect Test Results

In this study, Model 1 in the PROCESS macro program was used to test the regulation of absorption capacity between knowledge integration and enterprise innovation ability, and the results are shown in the table below.

Table 7 The Relationship Between Knowledge Sharing and Enterprise Innovation Ability

Variable	***β***	***se***	***t***	***p***	**LLCI**	**ULCI**
Enterprise years	0.151	0.044	3.447	0.001	0.065	0.236
Scale	0.204	0.049	4.178	0.000	0.108	0.301
Enterprise form	0.028	0.109	0.257	0.797	-0.186	0.242
form of business enterprise	0.017	0.014	1.226	0.221	-0.010	0.045
Knowledge sharing	0.391	0.045	8.734	0.000	0.303	0.479
Absorbing capacity	0.245	0.045	5.466	0.000	0.157	0.333
Knowledge sharing (absorption capacity	0.214	0.047	4.540	0.000	0.121	0.306
R^2			0.420			

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Variable	*β*	*se*	*t*	*p*	LLCI	ULCI
F			36.263			

As shown in the above table, the interaction term of knowledge sharing and absorption ability significantly positively affects the innovation ability of enterprises ($\beta = 0.214$, $p < 0.05$). As the standardized regression coefficient value is 0.214, greater than 0, it indicates that the absorption ability plays a positive regulatory role in the influence of knowledge sharing on enterprise innovation ability, assuming H3 is established.

In summary, this study empirically verified the positive mechanism by which knowledge sharing influences innovation capability in high-tech enterprises and systematically elucidated the pathway of "knowledge sharing–knowledge integration–innovation capability."

The findings first support Hypothesis H1, demonstrating that knowledge sharing—encompassing both explicit and tacit dimensions—has a significant positive effect on firms' innovation capability ($\beta = 0.451$, $p < 0.001$). This result aligns with Nonaka's (2009) theory of knowledge creation, underscoring the notion that knowledge flow serves as a foundational driver of innovation in technology-intensive enterprises.

Secondly, the study confirms Hypothesis H2, revealing that knowledge integration plays a critical mediating role in the relationship between knowledge sharing and innovation capability (mediating effect $\beta = 0.127$). This finding supports a core proposition of the resource-based view (RBV), suggesting that knowledge resources must be systematically integrated to be transformed into innovative outcomes.

Finally, the study validates Hypothesis H3, showing that absorptive capacity significantly enhances the effect of knowledge sharing on knowledge integration (moderating effect $\beta = 0.214$). This result is consistent with dynamic capabilities theory, highlighting the boundary condition of a firm's ability to assimilate knowledge in the innovation process.

Discussion

This study constructs a theoretical model of the "knowledge sharing–organizational learning–innovation capability" mechanism based on the developmental context of high-tech enterprises and empirically validates the relationships among these variables. The results demonstrate that knowledge sharing has a significant positive effect on the innovation capability of high-tech enterprises, with organizational learning playing a partial mediating role. This further elucidates the internal pathway through which knowledge sharing enhances innovation capability via organizational learning. These findings not only enrich the theoretical framework of knowledge management and organizational learning but also provide theoretical support for innovation management practices in high-tech enterprises.

From a theoretical perspective, this study aligns with and extends the non-additive resource-based view (RBV) and organizational learning theory. It emphasizes that knowledge sharing, as a critical internal resource, does not exert its utility through linear accumulation but rather facilitates knowledge absorption, integration, and re-innovation through the transformative process of organizational learning, thereby enhancing innovation capability. Additionally, the proposed mediation model offers a novel perspective for understanding the mechanism between knowledge sharing and innovation capability, addressing the gap in prior research that overlooked mediating variables.

Compared to existing studies, this research exhibits advantages in model construction, variable design, and empirical methodology. On one hand, unlike previous studies that focused solely on the direct impact of knowledge sharing on innovation, this study incorporates organizational learning into the analytical framework, rendering the influence pathway more comprehensive. On the other hand, the application of structural equation modeling (SEM) systematically analyzes variable relationships, enhancing the scientific rigor and persuasiveness of the conclusions and providing a reference for future research.

Despite contributing to the refinement of the theoretical model, this study has certain limitations. First, the sample is predominantly drawn from high-tech enterprises in eastern China, limiting regional representativeness. Second, the reliance on cross-sectional data restricts the ability to dynamically capture the evolving relationship between knowledge sharing and innovation capability.

Therefore, future research could expand in the following directions: (1) broadening the geographical scope of the sample to improve the generalizability and external validity of the findings, and (2)

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incorporating longitudinal data to further examine causal relationships and long-term effects among variables. Additionally, exploring the moderating role of external environmental factors, such as policy support and industry characteristics, could enhance the practical applicability and theoretical explanatory power of the research.

Conclusion

This study examines the dynamic relationships among knowledge sharing, organizational learning, and innovation capability within the context of knowledge management practices in high-tech enterprises. It not only reveals the positive impact of knowledge sharing on corporate innovation capability but also provides an in-depth analysis of the bridging and transformative role of organizational learning in this process. Unlike traditional studies that treat knowledge sharing merely as a static resource flow, this research emphasizes its dynamic process, where knowledge value is transformed and innovation capability is enhanced through organizational learning mechanisms, thereby offering a clearer theoretical foundation for understanding innovation pathways in knowledge-driven enterprises.

Methodologically, this study employs structural equation modeling (SEM) to meticulously delineate the path relationships among variables and validates the robustness of the model using empirical data. The findings highlight the mediating mechanism of organizational learning between knowledge sharing and innovation capability. Compared to prior studies that predominantly adopted bivariate analysis, this research extends and systematizes the pathway mechanism, providing valuable methodological insights for studying complex organizational behaviors.

The findings hold significant practical implications. In the current era of emphasizing independent innovation and high-quality development, enterprises should not only design effective knowledge-sharing mechanisms but also foster a learning-oriented culture to facilitate the efficient flow and restructuring of knowledge within organizations. This dual approach can drive both technological and managerial innovation. Future research could explore new contexts, such as digital transformation and industrial ecosystem collaboration, to expand the external boundary effects of knowledge sharing, refine the theoretical framework, and support enterprises in achieving sustained and systematic innovation capability enhancement.

Recommendation

Building upon this study's systematic examination of the relationships among knowledge sharing, organizational learning, and innovation capability in high-tech enterprises, the following recommendations are proposed for future theoretical advancement and practical application.

First, future research should adopt an interdisciplinary perspective by integrating theories and methods from information technology, organizational behavior, and managerial psychology. This approach would help elucidate the micro-level behavioral mechanisms of knowledge sharing in digital environments and their impact on the evolution of learning pathways, thereby facilitating the development of more dynamic theoretical models.

Second, in terms of corporate practice, enterprises should strengthen the development of platform-based knowledge-sharing mechanisms. By leveraging internal knowledge management systems and collaborative tools, firms can institutionalize informal knowledge exchange while optimizing incentive structures to encourage employee knowledge contribution and utilization. Moreover, organizational learning should extend beyond skill training and knowledge absorption to foster a problem-oriented, reflective learning culture that enhances learning depth and innovation precision.

Third, from a policy perspective, governments should promote regional innovation ecosystems by encouraging knowledge collaboration and collective learning among high-tech enterprises, thereby establishing shared networks across industrial chains. Additionally, policymakers should address practical barriers faced by small and medium-sized enterprises (SMEs) in knowledge sharing, such as resource constraints and cultural differences, through targeted support strategies.

Lastly, future studies could explore the moderating effects of contextual variables (e.g., corporate culture, leadership styles) or employ longitudinal data to examine the long-term impact of knowledge sharing on innovation performance. Such efforts would enhance the applicability and forward-looking relevance of this research.

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