

Digital Technology Capability and Enterprise Innovation Performance: The Mediating Role of Network Response

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Abstract. In the digital age, the continuous penetration and accelerated promotion of digital technology in all industries have gradually formed a powerful trend of the times, constantly driving rapid changes in social economy and production and life. Many enterprises have actively responded to changes in the network environment by leveraging digital technology, establishing new network structures and network relationships, which have brought continuous innovation vitality and innovation paradigms to the enterprises. However, research on the relationship and transmission path between digital technology and innovation performance is still in its infancy and cannot meet the urgent needs of current social practice. Therefore, exploring the influence mechanism of digital technology application level on enterprise innovation performance is an important topic. This paper explores the path of the effect of digital technology capabilities on enterprise innovation performance from a network perspective, aiming to study the relationship between digital technology capabilities and network response and enterprise innovation performance, as well as whether network response can act as a mediating factor between digital technology capabilities and enterprise innovation performance. The research results show that digital technology capabilities have a significant positive impact on enterprise innovation performance ($\beta = 0.230$, $p < 0.001$); digital technology capabilities have a significant positive impact on network adaptation ($\beta = 0.475$, $p < 0.001$); digital technology capabilities have a significant positive impact on network coordination ($\beta = 0.493$, $p < 0.001$); network adaptation has a significant positive impact on enterprise innovation performance ($\beta = 0.409$, $p < 0.001$); network coordination has a significant positive impact on enterprise innovation performance ($\beta = 0.280$, $p < 0.001$); the mediating effect of network adaptation between digital technology capabilities and enterprise innovation performance is 0.192, with a confidence interval not including 0 (0.145, 0.251), indicating a partial mediating effect; the mediating effect of network coordination between digital technology capabilities and enterprise innovation performance is 0.138, with a confidence interval not including 0 (0.082, 0.189), indicating a partial mediating effect.

Keywords: digital technology capability, network response, enterprise innovation performance

1. Introduction

In the current digital era, the application of digital technology profoundly influences human society and life, driving the rapid development of the digital economy and further promoting the radical transformation of business models. Emerging digital technologies represented by cloud computing, big data, the Internet of Things, artificial intelligence, blockchain, and 5G communication are profoundly affecting people's behaviors. Innovative data asset elements have triggered new production methods, management and operation models, and business model changes in enterprises, gradually pushing countries into the digital economy era. Currently, the world has entered the digital age, and the role of digital technology in social and economic development and innovation is becoming increasingly evident (Wu & Yan, 2021). Moreover, recent studies have highlighted the importance of corporate social responsibility and employee proactivity in enhancing corporate performance. For instance, Zhu et al. (2024) found that corporate social responsibility and employee proactivity play a mediating role in the relationship between organizational punishment and corporate performance, indicating that internal management and employee behavior can indirectly influence innovation performance. Additionally, frugal innovation has been shown to enhance the impact of innovation orientation on innovation performance, especially in small and medium-sized enterprises (Zhang et al., 2024).

However, due to the rapid spread of the novel coronavirus pneumonia (COVID-19) worldwide, the real economy has suffered a huge blow in the short term. The sudden outbreak of the epidemic has blocked the offline contact between enterprises, disrupted the original structure of the industrial chain and social network of enterprises, and weakened the connection among the original members of the social network. In contrast, the development of a large number of information and communication technologies and online services has accelerated sharply. A large number of enterprises have begun to promote new digital technology and flexible management models, and seek to use digital technology to respond and manage the network damage caused by this. The application of digital technology has restored and strengthened the weakened network connections, quickly adjusted and adapted the network structure and optimized and coordinated the network relationships. As a result, enterprises have established high-quality resource delivery channels based on digital technology capabilities and network responsiveness as behavioral carriers, achieving business model innovation in digitalization.

Previous studies have shown that digital technology alone cannot create value; it needs to be integrated into the business value creation process. Although the mechanism by which enterprises use digital technology to improve innovation performance has not been clearly defined (Martinez-Caro, 2020), the research of Kamalaldin et al. (2020) indicates that digital technology has changed the overall structure of business models, especially value propositions and enterprise relationships. The research of Nambisan et al. (2019) also confirmed that digital technology encourages manufacturing enterprises to create new value and develop relationships with network members by accelerating the provision of integrated products and services during their service-oriented transformation. Cai et al. (2019) believe that the relevance of digital technology enables enterprises to communicate effectively with diverse participants, promote the establishment of cooperation, and facilitate the acquisition of funds, knowledge, and other resources, thereby enhancing the innovation performance of enterprises.

Building upon the foregoing discourse, notwithstanding the burgeoning interest among numerous scholars in digital technology capabilities, the mechanisms by which these capabilities enhance corporate innovation performance remain ambiguous, and related research in this area is relatively scarce. Owing to certain destabilizing factors that have inflicted substantial disruption and impact on the social networks in which enterprises are embedded, this upheaval has compelled enterprises to explore novel avenues for leveraging digital technologies to elevate their network response and, in turn, enhance their innovation performance.

Consequently, this paper, grounded in the dynamic capability's theory, constructs a conceptual

model wherein digital technology capabilities serve as the independent variable, innovation performance as the dependent variable, and network response as the mediating variable. The paper endeavors to investigate the relationships among digital technology capabilities, network response, and enterprise innovation performance, verify the mediating role of network response (encompassing network adaptation and network coordination) in the relationship between digital technology capabilities and enterprise innovation performance, and attempt to delineate the boundaries of the influence of digital technology capabilities on innovation performance. This research thus enriches and supplements the existing body of theoretical knowledge.

2. Theoretical Basis and Literature Review

2.1. Dynamic Capability Theory

The dynamic capability theory was first proposed by Teece et al. (1997). This theory is used to explain how enterprises, in the face of rapidly changing external environments, build, mobilize, integrate and allocate internal and external advantageous resources to adapt to and even shape the post-change environment through advanced capabilities, and ensure that enterprises can maintain a sustained competitive advantage in complex social structures.

Different from ordinary capabilities that act on a certain production link and complete basic tasks such as management and operation, dynamic capabilities are a kind of high-level capabilities involving higher-level activities, including sensing, seizing and transforming to maintain the guidance of other capabilities and resources by enterprises (Teece, 2018). Taking this as a starting point, dynamic capabilities have emerged as a pivotal theoretical construct for the academic community to explore the origins of competitive advantages for enterprises. They serve as a linchpin connecting enterprise resources and corporate strategies. Specifically, the strength of dynamic capabilities dictates the pace and degree to which enterprises can realign their distinctive resources with strategic imperatives. This occurs through three key activities: perceiving opportunities and threats, seizing opportunities, and reallocating resources. In terms of the sensing dimension, digital transformation has fortified enterprises' capacity to identify and appraise digital opportunities. Regarding the seizing dimension, digital transformation has augmented enterprises' ability to translate recognized opportunities into tangible actions and thereby extract value. In relation to the transforming dimension, digital transformation has enhanced enterprises' capabilities for resource reconfiguration and value creation (Zhang et al., 2025).

Khin & Ho (2019) believe that digital technology capabilities are a type of dynamic capabilities that enterprises should pay attention to, and this type of capability plays an important role in the digital transformation and digital innovation processes of companies. Zhu et al. (2020) and other scholars, based on the dynamic capability theory, explore the effect of digital technology on the business model innovation of new enterprises. Therefore, this paper adopts the dynamic capability theory to explain the process and phenomenon of enterprises enhancing digital technology capabilities to break through spatial barriers and restore close connections among network members in the context of the digital age.

2.2. Digital Technology Capability

Fichman (2014) defined digital technology capability as the ability of enterprises to integrate digital technology deeply with traditional physical components, with the aim of accelerating technological and product innovation. This definition underscores the substantial influence of digital technology capabilities on enterprise innovation. Zhuang et al. (2020) focused their research on Internet technology and defined digital technology capability as the ability of enterprises to utilize Internet facilities and Internet business platforms to create value for themselves and achieve strategic objectives. From the perspective of the resource-based view, Elia et al. (2021) defined digital technology capability as the ability that enterprises derive from fully mobilizing and leveraging digital

resources, which can enhance their domestic and international business management levels and innovation performance.

Since this paper aims to explore the impact of digital technology capabilities, which gradually emerge during enterprises' application of digital technology, on resource circulation channels, it adopts and extends this definition. The connotation of digital technology capability is thus expounded as follows: Digital technology capability is the comprehensive ability of enterprises to identify, acquire, and integrate essential resources and opportunities by fully leveraging digital technology, thereby enhancing their innovation levels, creating value, and attaining competitive advantages. Furthermore, the role of supply chain integration in mediating the impact of digital leadership on sustainable innovation has been demonstrated in case studies. For example, Li et al. (2025) found that supply chain integration mediates the impact of digital leadership on sustainable innovation, suggesting that optimizing internal and external resource relationships can enhance innovation performance.

2.3. Enterprise Innovation Performance

The concept of innovation performance stems from the description and evaluation of enterprises' technological innovation achievements. It represents the benefits accrued to enterprise performance through technological innovation, product innovation, or process innovation. It is the outcome of enterprises' absorption and utilization of external knowledge, combined with their internal knowledge, to conduct innovative activities (Foss, 2011). Bravo (2022) defined innovation performance as the value output achieved by enterprises through improving the innovation environment and promoting continuous innovation in technology, products, and other aspects.

In this paper, the definition of innovation performance focuses solely on the realm of innovation, excluding economic or social performance aspects. Moreover, the scope of innovation is not confined to technological innovation alone. Therefore, this paper posits that innovation performance refers to the comprehensive performance level generated by enterprises during the innovation process, encompassing technological innovation, product innovation, business model innovation, and so forth.

2.4. Network Response

Walsh (2020) defined network response as the process through which individuals respond and adapt in terms of language, behavior, etc., when their social network environment undergoes changes. Kleinbaum & Stuart (2014) argued that the speed of network response is manifested in the behavior of the subject and can be classified into adaptation behavior to network structure and coordination behavior to network relationships, namely network adaptation and network coordination.

Network adaptation reflects the behavior of enterprises in swiftly severing old connections and seeking to expand new ones when the characteristics of the internal and external network structures change. The purpose is to update and construct new network structures, thereby opening up new channels for high-quality resources, optimizing the existing network connection structure, and reducing the cost of maintaining network stability. Network coordination, on the other hand, reflects a series of coordination activities, including interaction, maintenance, and reinforcement, within and outside the enterprise's network relationships. This aims to strengthen the interaction between enterprises and among various internal network units, enhance the trust among network members, and ensure the sharing of material and information resources. However, in relevant network literature, there has been a long-standing debate regarding which network configuration can enhance enterprise performance. Specifically, the question remains as to whether network adaptation at the structural level or network coordination at the relational level is more advantageous for enterprises.

These studies have inspired this paper to delve deeper into the relationship between strong and weak network relationships, dense and sparse network structures, and enterprise innovation performance under specific conditions. Consequently, in the course of this research, network response is categorized into two dimensions: network adaptation and network coordination. The paper then

analyzes and compares the differential impacts of enterprises' network response behaviors on innovation performance from both structural and relational perspectives in the context of digital technology. Network response is herein defined as the behavioral process in which enterprises promptly adjust network structures and actively coordinate network relationships in response to changes in the internal and external network environment.

3. Research Methodology

3.1. Research Hypotheses and Research Model

3.1.1 Research on the Relationship between Digital Technology Capability and Innovation Performance

Blichfeldt & Faullant (2021) pointed out that digital technology has a profound impact on innovation performance. Zhu & Kramer (2005) found that the higher the development level of digital technology, the greater the possibility for enterprises to create valuable and sustainable digital technology capabilities, which is conducive to value creation and performance improvement of enterprises. Wang & Du (2021) pointed out that digital technology can express knowledge in various ways, enabling internal knowledge to be reorganized and restructured, and to absorb external heterogeneous knowledge in an open manner. The integration of internal and external knowledge improves the efficiency of enterprise innovation. The more heterogeneous knowledge employees are exposed to and the higher the efficiency of knowledge integration, the more conducive it is to generating new and valuable ideas, thereby effectively promoting the improvement of innovation performance.

Therefore, it can be seen that the dynamic digital technology capability can mobilize, reorganize and allocate the important resources needed by enterprises, and after developing new products and supporting services, it can innovate organizational structure, reshape the value system, and complete the innovation of business models. Based on this, the following research hypothesis is proposed:

- H1: Digital technology capability is positively correlated with enterprise innovation performance.

3.1.2 Research on the Relationship between Digital Technology Capability and Network Response

According to Nambisan et al. (2019), from the perspective of network adaptation, the openness of digital technology capability reshapes the structure of social networks. Digital technology fundamentally changes the degree, scale and scope of enterprise openness, which is reflected in the boundary resources that digital technology and platform owners hope to fully share with other entities in the network, as well as the openness of knowledge inflow and outflow in product and service development projects. From the perspective of network coordination, the connectivity of digital technology capability strengthens the relationships among network members. Zheng (2021) found that the stronger the digital technology capability level of an enterprise, the more likely it is to adopt a cooperative innovation strategy, that is, the more likely it is to expand the network scale to maintain close contact with more network members and obtain more knowledge and innovation resources.

Therefore, the relationship between digital technology capability and network response can be explained by the openness and connectivity of digital technology capability. Based on this, the following research hypotheses are proposed:

- H2: Digital technology capability is positively correlated with network response.
- H2a: Digital technology capability is positively correlated with network adaptation.
- H2b: Digital technology capability is positively correlated with network coordination.

3.1.3 Research on the Relationship between Network Response and Innovation Performance

Dyer & Hatch (2012) studied the relationship between innovation network structure and innovation performance, pointing out that the network structure creates conditions for enterprises to obtain necessary resources and provides the possibility for the accelerated diffusion of information, ultimately improving the innovation efficiency of enterprises. Hung & Chou (2013) explored the effect of innovation network relationships on innovation performance, indicating that network relationships can accelerate the effective integration of resources, increase the interaction frequency among network members, and also lay the foundation for the establishment of non-direct relationships, which is conducive to the output of enterprise innovation performance. At the network adaptation level, the network adaptive behavior of enterprises also includes changes in the subjective willingness of enterprises to contact external cooperative units. The complex environment makes enterprises more dependent on cooperation among network members. Enterprises can not only create more cooperation opportunities from within the social network and enhance their competitive advantages, but also have a stronger willingness to be open to external actors in the network. This helps enterprises to accept different knowledge resources and improve their innovation efficiency (Li, 2015). At the network coordination level, the coordination behavior of enterprises towards network relationships includes optimizing the strength of relationships, improving the durability of relationships, and enhancing the quality of relationships, all of which have a promoting effect on the innovation performance of enterprises (Chen, 2007).

It can be seen that the higher the network response level of an enterprise, the more quickly it can adapt to the complex changes in the network structure and timely coordinate the relationships with network members to obtain the necessary resources for enterprise development, improve the cooperation efficiency between enterprises and among network members, and achieve synergy. Based on this, the following research hypotheses are proposed in this paper:

- H3: Network response is positively correlated with enterprise innovation performance.
- H3a: Network adaptation is positively correlated with enterprise innovation performance.
- H3b: Network coordination is positively correlated with enterprise innovation performance.

This hypothesis is supported by studies that emphasize the importance of network relationships and data-driven decision-making in enhancing innovation performance. For instance, Zhang (2025) highlighted the role of interpersonal skills and big data and predictive analytics in enhancing humanitarian supply chains, which underscores the significance of network responsiveness in complex socio-economic contexts

3.1.4 The Mediating Effect of Network Response

As mentioned above, the advanced, open and associated characteristics of digital technology capabilities profoundly influence the network response behavior of enterprises. When enterprises adapt to network structures and coordinate network relationships, they can promote the output of their own innovation performance in multiple ways and with high efficiency. The quantity (breadth) and degree (depth) of digital technology application provide convenience for the extensive collection and precise analysis of market data (Blichfeldt & Faullant, 2021), enabling enterprises to have a first-mover advantage in technology development and market operation. However, due to the limited resources available to enterprises and the rapidly changing technological and market environment, enterprises will actively seek external supplies when lacking relevant network capital or innovation resources, and the network is the most direct external resource supply pool for enterprises (Zhang & Luo, 2020). Therefore, enterprises will actively coordinate their relationships with other network members based on their strategic needs by leveraging the associativity of digital technology capabilities. When enterprises continuously update and adapt to network structures and expand and coordinate network relationships, the channels for resource circulation are fully explored, effectively promoting the reorganization of internal and external resources and knowledge integration, which is

conducive to enterprises obtaining key innovation resources and inspiration, and ultimately improving their innovation performance levels (Ritala et al., 2015; Wang et al., 2018). In summary, a company's digital technology capabilities help accelerate the speed of network structure updates and reduce the cost of network relationship coordination, providing technical support and convenient channels for network adaptation and network coordination behaviors, achieving "cost savings and revenue generation" of innovation elements for the enterprise, and endowing the enterprise with more first-mover advantages and innovation vitality. Based on this, this paper proposes the following research hypotheses:

- H4: Network response plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.
- H4a: Network adaptation plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.
- H4b: Network coordination plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.

In conclusion, the theoretical model constructed in this paper is shown in Figure 1.

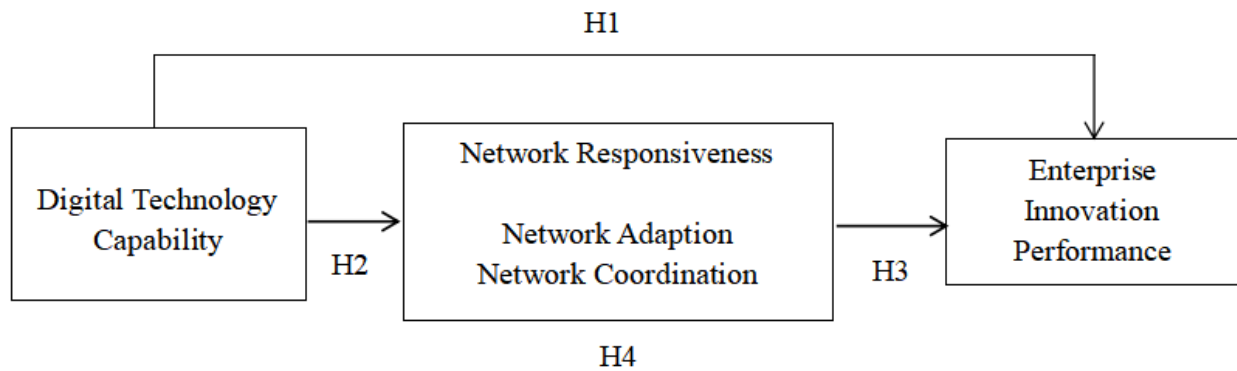


Fig. 1: Conceptual Model

3.2. Sample and Data Collection

This paper collected relevant research data through the distribution of questionnaires. The research subjects were personnel from multiple industries in Beijing, Tianjin, and Hebei Province. The selection of multiple industries in the Beijing-Tianjin-Hebei region as samples was based on the fact that China has a vast territory, and the Beijing-Tianjin-Hebei region, as China's "Capital Economic Circle", has a relatively rich industrial structure and diversified enterprise development, with an increasing number of high-tech enterprises year by year. This study adopted the questionnaire survey method, and the obtained data were cross-sectional data and failed to capture the dynamic processes of the survey subjects. In fact, certain variables and enterprise information often changes continuously with the evolution of internal and external environments, and it is difficult to fully reveal their internal evolution mechanisms and long-term effects based solely on cross-sectional data. Therefore, future research can introduce a longitudinal tracking design. The questionnaire covered basic information of enterprises, such as the years of operation, nature, category, and scale of the enterprises, and included measurement items for four variables. The final questionnaire was distributed through both online and offline channels. Online data were mainly collected through "Questionnaire Star", while offline data were collected through social relationships and field research. The start and end time of this survey was from December 2024 to February 2025. A total of 550 questionnaires were distributed, 530 were returned, and after eliminating invalid questionnaires that did not meet the requirements, 490 valid questionnaires were obtained, with a questionnaire validity rate of 89%.

The basic information of the questionnaire is shown in Table 1. The specific details are as follows: ① in terms of gender, there were more males, accounting for 58%; ② in terms of age, the largest

proportion of respondents were aged 31-40, reaching 51%; ③ in terms of education level, those with a undergraduate and associate degrees accounted for the majority, totaling 387 people, or 79%; ④ in terms of years of operation, enterprises with 1-10 years of operation accounted for the largest proportion, reaching 65%; ⑤ in terms of the nature of the enterprise, 264 people worked in private enterprises, accounting for 54%; ⑥ in terms of industry category, the construction or real estate industry had the largest proportion, at 22%, followed by high-tech manufacturing, accounting for 21%; ⑦ in terms of enterprise scale, 321 enterprises had 100-1000 employees, accounting for 66%.

Table 1. Sample Description

Variable		Attribute	Frequency	Percentage
Individual Level	Gender	Male	285	58%
		Female	205	42%
	Age	Under 30 years old	75	15%
		31-40years old	252	51%
		41-50years old	135	28%
		Over 50 years old	28	6%
		High school degree or below	10	2%
	Educational level	College degree	107	22%
		Bachelor degree	280	57%
		Graduate degree	93	19%
		Operating life	1-5years	121
		6-10years	199	40%
		11-20years	111	23%
		More than 20 years	59	12%
	Enterprise Nature	State-owned enterprise	160	33%
		Private enterprise	264	54%
Sino-foreign joint venture		34	7%	
Wholly foreign-owned enterprise		32	6%	
High-tech manufacturing industry		101	21%	
Enterprise Level	Traditional manufacturing industry	85	17%	
	Construction or real estate industry	108	22%	
	Wholesale and retail trade	27	5%	
	Industry Category	Transportation and logistics industry	31	6%
	Finance and insurance industry	47	10%	
	Service industry	62	13%	
	other	29	6%	
	Enterprise Scale	Less than 100 people	46	9%
	100-300 people	146	30%	
	301-1000 people	175	36%	
1001-2000 people	88	18%		
	More than 2000 people	35	7%	

3.3.Variable Measurement

In response to the above research hypotheses, this study examines variables such as digital technology capability, network response, and enterprise innovation performance. A 7-point Likert scale is adopted, with respondents choosing and scoring based on their degree of agreement with each item, ranging from 1 = strongly disagree to 7 = strongly agree. To ensure the accuracy and scientific nature of the questionnaire, each item is designed based on established scales and research findings in the academic field, and then refined and modified according to requirements such as reasonable language and standardized wording, making it more in line with the real background and research context. The details are as follows:

(1) Digital Technology Capability. Regarding digital capability, Zhou & Wu (2010) proposed a scale consisting of 5 items, covering aspects such as digital opportunity recognition, digital technology control, digital transformation response, and digital product development, which has good reliability and validity. At the same time, this scale provides a reference basis for relevant empirical research on digital technology, indicating that digital technology capabilities can promote the digital transformation of enterprises and enhance their identification of digital opportunities. Therefore, while referring to this scale and combining it with Chen (2023) 's measurement scale for digital technology capabilities, this study ultimately proposes a scale consisting of five items.

(2) Enterprise Innovation Performance. This study mainly studies the impact of network structure adjustment and network relationship changes on enterprise innovation performance in a digital context. Xiao (2018), referring to the measurement scales of innovation performance by scholars such as Ritter (2004) and Bell (2005), explored the impact of knowledge-oriented IT capabilities on innovation performance and used network relationships as a moderating variable, which shares similarities with the research variables in this study. Moreover, this scale is applicable to the measurement of innovation performance in multiple industries. Therefore, while referring to the scale of innovation performance in this literature, this paper appropriately integrates, modifies, and introduces a digital technology background, ultimately proposing a scale consisting of 5 items.

(3) Network Response. Luo (2020), combining the research results of scholars such as Gulati & Puranam (2009) and Kleinbaum & Stuart (2014), developed a measurement scale for network response. This study used network response as a mediating variable to explore its impact on enterprise performance, and the scale has good reliability and validity, which is similar to the research in this study. Therefore, after making appropriate modifications to this scale and integrating it with the specific digital technology background of this study, a scale consisting of 8 items is proposed to measure network adaptation and network coordination respectively.

3.4. Reliability and Validity Analysis

This study utilized SPSS 26.0 and AMOS 24.0 software to conduct reliability and validity analyses on the aforementioned scales. All items were proposed in the context of digital technology, and the test results are presented in Table 2. The results show that the Cronbach's α coefficients of all variables are greater than 0.8, indicating a high level of scale reliability. In terms of convergent validity, the factor loading of all items are greater than 0.5, suggesting that the items corresponding to each variable are representative. Moreover, the CR values are all above 0.8 and the AVE values are all above 0.5, indicating that the questionnaire has good convergent validity.

Table 2. Reliability and Validity Analysis of the Scale

Variable Names	Measurement Questions	Factor Loading	Cronbach's α	CR	AVE
Digital Technology Capability	DTC1 Enterprises possess significant capabilities in digital technology.	0.775	0.875	0.875	0.570
	DTC2 Enterprises have the ability to identify new digital opportunities.	0.775			
	DTC3 Enterprises have the ability to respond to digital transformation.	0.760			
	DTC4 Enterprises have the ability to utilize digital technology to develop innovative products, services or processes.	0.763			
	DTC5 Enterprises have the ability to master the most advanced digital technology.	0.705			
Enterprise Innovation Performance	EIP1 Enterprises often take the lead in launching new products and technologies in the industry.	0.707	0.893	0.894	0.631
	EIP2 Enterprises often take the lead in applying new processes and technologies in the industry.	0.806			
	EIP3 The improvements and innovations of enterprises' products and technologies receive very good market responses.	0.820			
	EIP4 Enterprises' products incorporate first-class advanced processes and technologies.	0.836			
	EIP5 The success rate of enterprises' new product and technology development is very high.	0.796			
Network Adaption	NA1 Enterprises flexibly adjust their network structure to adapt to changes in strategic priorities.	0.802	0.838	0.842	0.575
	NA2 Enterprises encourage employees to break old traditions and conventions to adapt to the evolution of network relationships.	0.677			
	NA3 Enterprises grasp the direction of network evolution and adapt quickly.	0.816			
	NA4 Enterprises can quickly adapt to the changing speed of network relationships.	0.731			
	NC1 Enterprises coordinate the relationship between various departments to cope with the changing network relationship.	0.810			
Network Coordination	NC2 Enterprises coordinate relations with network members to obtain necessary resources.	0.843	0.845	0.846	0.586
	NC3 Enterprises coordinate the breadth and depth of cooperation to cope with changes in network relationships.	0.723			
	NC4 Enterprises coordinate the allocation of various resources to keep up with changes in network relationships.	0.675			

This study constructed nested models through confirmatory factor analysis to test the discriminant validity of digital technology capabilities, enterprise innovation performance, network adaptation, and network coordination. Based on the 4-factor model, three alternative models were also proposed. The 3-factor model combined digital technology capabilities and enterprise innovation performance; the 2-factor model combined digital technology capabilities, enterprise innovation performance, and

network adaptation; and the 1-factor model combined digital technology capabilities, enterprise innovation performance, network adaptation, and network coordination.

As shown in the discriminant validity test results in Table 3, the 4-factor model significantly outperformed the other models in all indicators, with the best model fit. The model fit indicators were $\chi^2/df=1.820$, RMSEA=0.042, SRMR=0.043, CFI=0.966, TLI=0.963, IFI=0.966. $\chi^2/df<3$, RMSEA<0.1, SRMR<0.1, CFI>0.9, TLI>0.9, IFI>0.9. All model fits met the judgment criteria, indicating that the scale has good discriminant validity. The above test results show that the scale used in this study has good reliability and validity and can be used for subsequent research.

Table 3. Reliability and Validity Analysis of the Scale

Fitting index	χ^2	df	χ^2/df	RMSEA	SRMR	CFI	TLI	IFI
Standard			<3.00	<0.08	<0.08	>0.9	>0.9	>0.9
4-factor model	440.850	241	1.820	0.042	0.043	0.966	0.963	0.966
3-factor model	1242.381	245	4.645	0.087	0.070	0.851	0.835	0.851
2-factor model	1628.515	247	6.137	0.101	0.080	0.786	0.763	0.787
1-factor model	3147.348	251	12.485	0.150	0.142	0.520	0.475	0.522

4. Results

4.1.Descriptive Statistics and Correlation Analysis

As shown in Table 4, the means, standard deviations and correlations of digital technology capability, enterprise innovation performance, network adaptation and network coordination are presented. The results indicate that digital technology capability is significantly positively correlated with enterprise innovation performance ($r = 0.459$, $p < 0.01$), network adaptation ($r = 0.376$, $p < 0.01$), and network coordination ($r = 0.395$, $p < 0.01$); network adaptation is significantly positively correlated with enterprise innovation performance ($r = 0.549$, $p < 0.01$), and network coordination is significantly positively correlated with enterprise innovation performance ($r = 0.499$, $p < 0.01$). It can be seen from this that all r values are greater than 0 and all p values are less than 0.01, which proves that all variables are significantly positively correlated. The relationship among the variables in this study has been preliminarily supported, and the research hypotheses can be further tested.

Table 4. Descriptive Statistics and Correlations of the Variables

Variable	Mean	S.D.	DTC	EIP	NA	NC
DTC	3.615	0.915	1			
EIP	3.560	0.955	0.459**	1		
NA	3.579	0.919	0.376**	0.549**	1	
NC	3.599	0.889	0.395**	0.499**	0.451**	1

Note: * $p<0.05$, ** $p<0.01$.

4.2.Mediating Effect Test

This study uses AMOS 24.0 to fit the structural equation model to test the mediation model. The structural equation model is shown in Figure 2. Combined with Table 5, it can be seen that the mediation model fits well ($\chi^2/df= 2.922$, RMSEA = 0.065, SRMR = 0.079, CFI = 0.950, TLI = 0.936, IFI = 0.951). Digital technology capability is significantly positively correlated with enterprise innovation performance ($\beta = 0.230$, $p < 0.001$), Hypothesis H1 is verified; digital technology capability is significantly positively correlated with network adaptation ($\beta = 0.475$, $p < 0.001$),

Hypothesis H2a is verified; digital technology capability is significantly positively correlated with network coordination ($\beta = 0.493$, $p < 0.001$), Hypothesis H2b is verified.

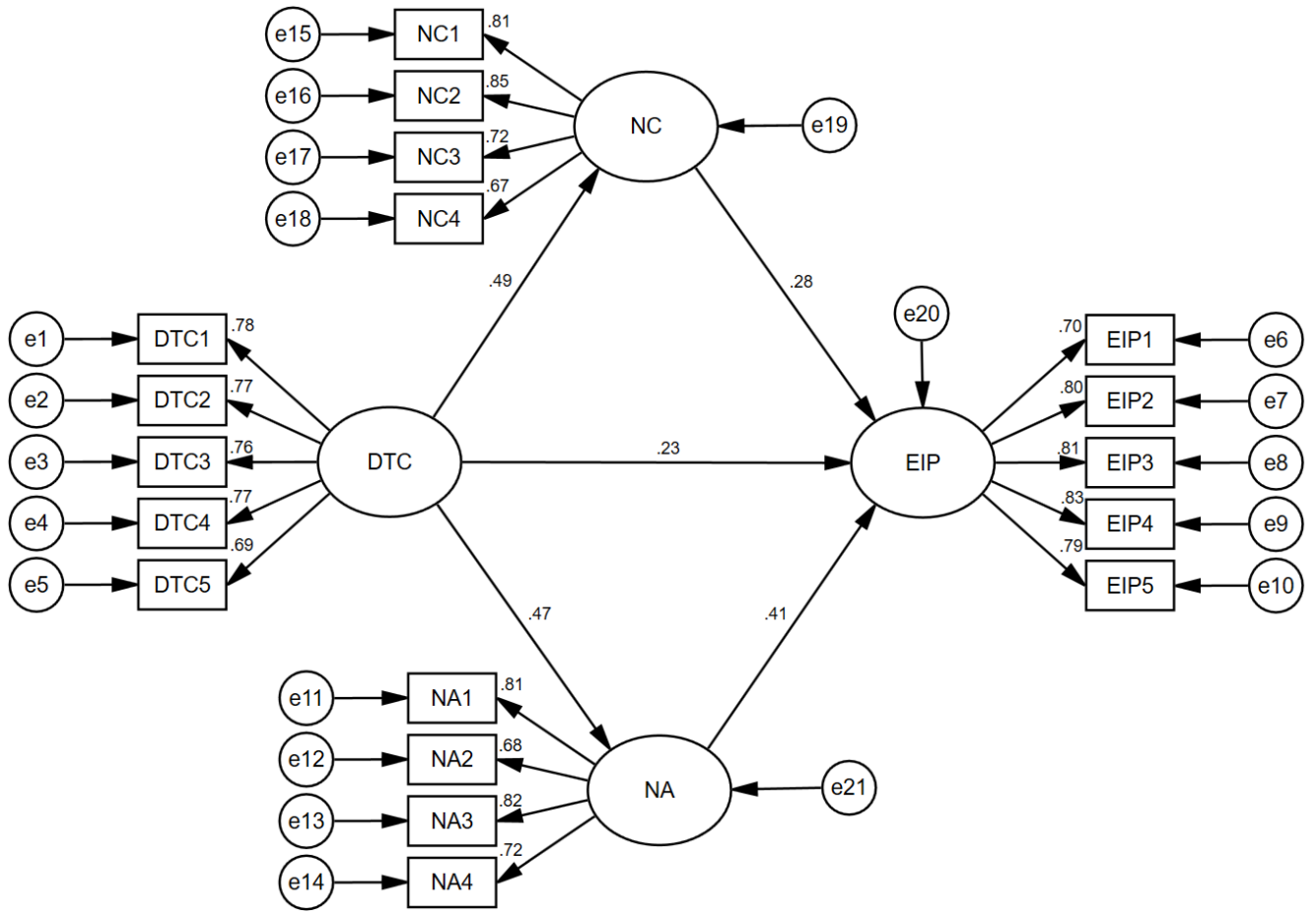


Fig. 2: Mediating Effect Model

Network adaptation is significantly positively correlated with enterprise innovation performance ($\beta = 0.409$, $p < 0.001$), Hypothesis H3a is verified; network coordination is significantly positively correlated with enterprise innovation performance ($\beta = 0.280$, $p < 0.001$), Hypothesis H3b is verified.

Table 5. Path Analysis

Path			Standardized Coefficients	S.E.	t-value	p
DTC	→	EIP	0.230	0.052	4.092	***
DTC	→	NA	0.475	0.056	8.891	***
DTC	→	NC	0.493	0.052	9.263	***
NA	→	EIP	0.409	0.046	7.683	***
NC	→	EIP	0.280	0.048	5.512	***
$\chi^2/df=2.922$, RMSEA=0.065, SRMR=0.079, CFI=0.950, TLI=0.936, IFI=0.951						

Note: *** $p < 0.001$.

This study conducts a mediation effect test based on the bias-corrected non-parametric percentile Bootstrap method proposed by Wen et al. (2022), with 5000 Bootstrap iterations and a 95% bias-corrected confidence interval. The test results are presented in Table 6. The results show that the total effect of digital technology capability on enterprise innovation performance is 0.549, with a confidence interval that does not include 0 (0.476, 0.618), indicating a significant total effect. The direct effect of digital technology capability on enterprise innovation performance is 0.229, with a confidence interval that does not include 0 (0.125, 0.330), indicating a significant direct effect with an effect size of 41.07%. The mediating effect of network adaptation between digital technology capability and enterprise innovation performance is 0.192, with a confidence interval that does not include 0 (0.145, 0.251), indicating a partial mediating effect with an effect size of 34.49%, thus verifying Hypothesis H4a. The mediating effect of network coordination between digital technology capability and enterprise innovation performance is 0.138, with a confidence interval that does not include 0 (0.082, 0.189), indicating a partial mediating effect with an effect size of 24.39%, thus verifying Hypothesis H4b.

Table 6. Results of mediating effect test

Path	Effect Value	S.E.	95% Confidence Interval		Effect size
			Lower Limit	Upper Limit	
Total effect: DTC → EIP	0.549	0.035	0.476	0.618	100%
Direct effect: DTC → EIP	0.229	0.050	0.125	0.330	41.07%
Mediating effect 1: DTC → NA → EIP	0.192	0.026	0.145	0.251	34.49%
Mediating effect 2: DTC → NC → EIP	0.138	0.024	0.082	0.189	24.39%

4.3. Summary of Hypothesis Testing

This study examines the impact of digital technology capabilities on the innovation performance of enterprises, and all the hypotheses proposed in this study have passed the tests. Based on the above empirical data analysis results, the summary of the test results of the research hypotheses in this study is shown in Table 7.

Table 7. Summary of Hypothesis Testing

Number	Research Hypotheses	Test Results
H1	Digital technology capability is positively correlated with enterprise innovation performance.	Supported
H2	Digital technology capability is positively correlated with network response.	Supported
H2a	Digital technology capability is positively correlated with network adaptation.	Supported
H2b	Digital technology capability is positively correlated with network coordination.	Supported
H3	Network response is positively correlated with enterprise innovation performance.	Supported
H3a	Network adaptation is positively correlated with enterprise innovation performance.	Supported
H3b	Network coordination is positively correlated with enterprise innovation performance.	Supported
H4	Network response plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.	Supported
H4a	Network adaptation plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.	Supported
H4b	Network coordination plays a mediating role in the impact of digital technology capabilities on enterprise innovation performance.	Supported

5. Conclusion and Discussion

5.1. Research Conclusion

This study, grounded in the dynamic capability's theory, constructed a research model. Through questionnaire surveys of numerous enterprises across multiple industries, empirical analysis and discussions were carried out to verify the relationship and influence path between digital technology capabilities and enterprise innovation performance. Moreover, by introducing network response as a mediating variable, the study explored the boundary conditions of the impact of digital technology capabilities on network response in the digital era. Based on the foregoing analysis and verification, the key findings are summarized as follows:

(1) This finding aligns with the research of Blichfeldt & Faullant (2021) and other scholars, suggesting that the advanced nature inherent in digital technology capabilities can infuse new impetus into an enterprise's innovation endeavors, thereby enhancing the efficiency of innovation performance output. This implies that digital technology capabilities enable enterprises to maintain a digital strategic mindset and foresight. Enterprises can thus identify potential innovation elements and resources with acumen and efficiency, integrate and utilize them, and establish a chain innovation mechanism characterized by "advantageous capability cultivation-resource element integration-innovation performance enhancement". When an enterprise dedicates itself to digital technology

innovation, it can further reinforce and upgrade its digital technology capabilities. This, in turn, transforms the chain innovation mechanism into a circular one: "advantageous capability cultivation-resource element integration-innovation performance enhancement-advantageous capability cultivation", significantly propelling the output of enterprise innovation performance.

(2) Digital technology capabilities are significantly positively correlated with network adaptation and network coordination. This result is consistent with the conclusions put forward by Nambisan et al. (2019) and other scholars, indicating that the openness and connectivity of digital technology capabilities accelerate the interconnection among network entities, providing technical support for an enterprise's network adaptation and coordination behaviors. Specifically, the openness and connectivity of digital technology capabilities create new channels for enterprises to interact with the external environment. Enterprises can thus establish new cooperative relationships according to their development needs, expand the boundaries of their social networks, optimize network structures, and adapt to social environmental changes. Similarly, digital technology can be harnessed to strengthen an enterprise's connections with other members in the social network, thereby enhancing the willingness to cooperate and mutual trust among enterprises. Such close cooperation is conducive to enterprises' ability to withstand risks arising from rapid social environmental changes. Consequently, digital technology capabilities can strengthen an enterprise's network adaptation and coordination capabilities.

(3) This is in line with the viewpoints of Li (2015) and other scholars, suggesting that the optimization of network structure and the coordination of network relationships enhance the efficiency of information and resource transmission among network entities, thereby contributing to improved enterprise innovation performance. This indicates that enterprises' continuous efforts to optimize network structures and relationships can expand and refine the channels for resource delivery. This promotes the efficient exchange and rapid dissemination of information and knowledge among enterprises, facilitates mutual learning and complementary advantages, enhances the ability to acquire and absorb knowledge, and ultimately stimulates knowledge innovation and creation within the enterprise. Therefore, network adaptation and network coordination have a positive impact on enterprise innovation performance.

(4) Network adaptation and network coordination play a mediating role in the influence of digital technology capabilities on enterprise innovation performance. This finding is consistent with the research of Zhang & Luo (2020) and other scholars, indicating that digital technology capabilities can influence an enterprise's network adaptation and coordination behaviors, which in turn affect innovation performance. The research has verified the path through which digital technology capabilities drive network adaptation and coordination behaviors, ultimately leading to enhanced innovation performance. Therefore, network adaptation and network coordination serve as crucial mediators between digital technology capabilities and innovation performance.

5.2.Theoretical Contributions

This study, based on the dynamic capability's theory, conducted an in - depth analysis of the mechanism through which digital technology capabilities impact enterprise innovation performance. The main theoretical contributions are as follows:

(1) This study transcends the common perception of digital technology capabilities as static resources or direct drivers. By constructing a dynamic transmission model of "digital empowerment - network evolution - innovation performance", it deepens our understanding of the process by which the value of digital technology capabilities is realized. Previous research has predominantly focused on the direct impact of digital technology capabilities on enterprise innovation performance, while lacking in - depth exploration of the underlying transmission mechanism. This study, drawing on the dynamic capability's theory, elucidates the path through which digital technology capabilities enhance innovation performance by promoting network responsiveness. This offers a novel analytical perspective for understanding this relationship, thereby enriching the relevant literature in this field.

(2) This study innovatively deconstructs network response into "network adaptation" at the structural level and "network coordination" at the relational level. It further uncovers the differential contingency mechanisms of their mediating roles, thus advancing the refinement of related research. The results show that digital technology capabilities have a more pronounced driving effect on "network adaptation" (structural change), highlighting the role of digital technology as an "architect" in enabling enterprises to rapidly restructure their cooperative networks to seize opportunities. In contrast, the enhancement of "network coordination" (relational governance) is more complex, as it not only depends on technological tools but is also significantly influenced by existing social capital such as trust and culture. This distinction implies that even enterprises with strong digital technology capabilities may experience diminished innovation efforts if they neglect the careful coordination of relational aspects. Therefore, the theoretical contribution of this study lies not only in identifying the dual-path mediation but also in providing a contingency framework for understanding how digital technology capabilities differentially influence innovation outcomes through structural reorganization or relational deepening, depending on internal and external conditions. This framework represents an innovative contribution to the field.

5.3.Management Implications

Through theoretical research and empirical testing, this study has solved the problems of the path and influencing factors of the effect of digital technology capabilities on innovation performance. The management implications for enterprises are as follows:

(1) Digital technology is recognized as a key source of future competitiveness for enterprises due to its potential to unlock new value-creation and revenue - generation opportunities. Firstly, enterprises should be proactive in applying digital technology across various aspects, including product production, market analysis, and value-added services. By breaking down technological barriers and seeking synergies between digital technology and production models, enterprises can achieve digital transformation, thereby establishing a unique competitive edge and gradually attaining a leading position in the industry. Additionally, enterprises should actively recruit top - tier digital technology and high-tech talents, as their expertise can significantly invigorate the application of digital technology. Simultaneously, the establishment of a comprehensive digital technology training system for employees is essential to cultivate digital literacy and skills, foster a digital innovation culture, and encourage employees to actively engage in digital innovation initiatives. Moreover, enterprises should learn from the successful experiences of digital transformation in other companies while avoiding the pitfalls of failed transformations to ensure a smooth digital transition.

(2) Digital technology paves the way for new avenues of enterprise innovation. Innovation is a critical performance metric for contemporary enterprises, alongside economic performance. When pursuing technological, product, service, or business model innovation, enterprises can consider integrating digital technology. Digital empowerment can facilitate the seamless integration of management, production, and organizational methods. Specifically, digital technology can streamline organizational structures, leading to a "flatter" hierarchy. This not only reduces management costs but also enhances information dissemination efficiency, breaking down silos between departments and promoting cross-departmental collaboration. In addition, the integration of digital technology with production processes can give rise to intelligent production technologies and equipment, boosting production efficiency. For example, blockchain technology can enhance the traceability and transparency of business process information, while big data analytics can help enterprises understand customer preferences, enabling accurate market positioning and informed development planning.

5.4.Limitations and Future Research

(1) Due to the limited coverage of industries in the sample (excluding specific fields such as agriculture and mining), the generalizability of the conclusions of this study is somewhat restricted. Especially in some traditional industries or enterprises with low digital applicability, the introduction

effect of digital technology may have significant differences. Therefore, future research can focus on the response differences of similar enterprises in different backgrounds or compare the strategies and performance of different types of enterprises in the same background, so as to more deeply reveal the intrinsic relationship between digital technology capabilities, network response and innovation performance.

(2) This study uses the questionnaire survey method, and the obtained data are cross-sectional data, which cannot capture the dynamic process of variables such as digital technology capabilities and network response over time. In fact, these variables often change continuously with the evolution of internal and external environments, and it is difficult to fully reveal their internal evolution mechanisms and long-term effects with only cross-sectional data. Therefore, future research can introduce longitudinal tracking designs, collect multi-period data at different time points, and more clearly analyze the transmission path through which digital technology capabilities promote enterprise innovation performance by driving network adaptation and coordination behaviors.

In addition, factors such as corporate culture attributes and knowledge integration capabilities can be included, and by adding moderating or mediating variables, the understanding of the value realization process of digital technology capabilities can be deepened.

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