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Influence of Digital Transformation Capability on Operational Performance

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Abstract: With the changes in market environments and the development of digital technology, enterprises urgently need to develop the capability to adapt to profound changes in strategy and business processes. Some previous research regarded a digital marketing capability as a digital transformation capability, but other research explained the importance of digital competence to enterprises, from the perspective of resource allocation. However, they could not explain the phenomenon of enterprises on the usage of advanced digital technology to build the capability to refresh or replace the business model and the value creation process. This study constructed the dimensions of a digital transformation capability that contains three hub-factors (sensing, organizing, and restructuring) under the dynamic capability theory. This study collected 162 sets of enterprise data through a survey, and investigated the relationships of an enterprise's strategy orientation, digital transformation capability, and operational performance by using SPSS and SmartPLS 3. The results show that strategic orientation has a positive impact on a digital transformation capability, and that digital transformation capability has a positive impact on operational performance. In addition, the digital transformation capability plays a mediating role between strategic orientation and operational performance. Doubtlessly, enterprises need to focus on building their own digital transformation capabilities to create new enterprise value. A digital transformation capability will encourage enterprises to integrate their business processes and routines through digital technology to achieve a competitive advantage.

Keywords: customer orientation; technology orientation; digital transformation capability; sensing; organizing; restructuring; operational performance

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1. Introduction

With the changes in market environments, such as the development of digital technology and the personalization of consumer demand, most enterprises urgently need to develop the ability to adapt to profound changes in strategy and business processes. Digital transformation has become an indispensable way for enterprises to deal with the directions of networking and intelligence, to improve quality and efficiency, and to reshape core competitiveness [1]. Moreover, digital transformation has influenced all industries, especially so for the more traditionally stable manufacturing industry, which is forced to urgently optimize resource allocation, innovate production methods, and improve production efficiency [2]. The digital technology trend and the design principles used by enterprises in digital transformation include the smart factory, 3D printing, advanced manufacturing solutions, artificial intelligence, big data analytics, cloud computing, cyber security, the industrial Internet of Things, mixed reality (virtual and augmented reality), and simulation of connected machines [3]. Under the new pattern of global high-quality development, enterprises should not only pay attention to revenue and profit objectives, but also set out the road of sustainable development. Digital transformation capabilities are the catalyst for

the sustainable development of enterprises. More and more enterprises are beginning to use digital technology to promote transformation and upgrading, developing sustainable digital transformation capabilities by reshaping the value chain, and achieving production and developmental benefits. Therefore, in the era of the digital economy, it is necessary to clarify how to establish an action mechanism for sustainable competitive advantage by developing a digital transformation capability in enterprises.

The deep integration of digitalization and industrialization changed the traditional production and operation management methods, and offers the potential for the improvement of product development, production efficiency and customer service [4]. In view of the company's existing traditions, they will face greater challenges and barriers when searching and implementing digital business model transformation. They are often forced to deal with conflicts and trade-offs between existing and new ways of doing business [5]. Companies may start with smaller changes and gradually transform their traditional business processes into digital business processes. For example, automotive companies use sensors to detect blind spots to avoid accidents and enhance the safety features of their products [6]. Therefore, in this study, digital transformation refers to the company using advanced (information, communication and control), integrated platforms/digital production technologies to effectively and extensibly connect various stakeholders (technology providers, manufacturing factories, supply chains and service providers) to achieve short-cycle, multi-variety and personalized digital operation production.

In the existing research related to digital transformation capabilities, some of the previous studies regarded an e-commerce capability or a digital marketing capability as a digital transformation capability. They argued that a digital capability in e-commerce includes agility and responsiveness, multi-channel communication, visualization, and governance [7]. However, e-commerce is only one aspect of digital transformation for enterprises. Measuring only one aspect of an e-commerce capability or a digital marketing capability to investigate the digital transformation capability is not enough. Other research explained the importance to enterprises of digital competence from the perspective of resource allocation [8], however enterprises not only need to deeply explore the management changes brought by digitalization, but they also need to make adaptive adjustments to the action mechanism of a dynamic capability. Most of the research based on a dynamic capability in the context of digital transformation [9] included sensing, seizing, and transforming [10–12]. But they could not explain the real phenomenon of enterprises on the advanced use of digital technology to build a capability to refresh or replace the business model and the value creation process. This study tries to provide an entry point to develop new digital transformation capabilities from the process perspective.

To explain the real-world phenomenon of digital production technology, enterprises use advanced integrated platforms to effectively and broadly connect their various stakeholders to form and achieve diverse and personalized digital production processes in the short term. This is digital transformation that enables the production of various personalized products by innovatively changing the traditional production process. How should manufacturing enterprises push for digital transformation in the era of the 4th Industrial Revolution? This study empirically investigates how Chinese enterprises develop a digital transformation capability to obtain sustainable competitiveness. This study proposes the following three research questions: (1) What are the dimensions of a digital transformation capability? (2) What are the influencing factors of an enterprise's digital transformation capability? (3) What is the relationship between the enterprise's digital transformation capability and its operational performance? This study tries to construct the dimensions of a digital transformation capability. It contains three hub-factors (sensing, organizing and restructuring) under the dynamic capability theory.

The contributions of this study are as follows. First, this study empirically provides a relationship in which enterprises with high strategic orientation have higher digital transformation capability according to the basis of the resource-based theory. Second, this study empirically explains the necessity for efforts that, according to the dynamic

capability theory, enterprises must make to enhance their digital transformation capabilities based on the changes in digital environments. Third, this study empirically provides ways that an enterprise's digital transformation capability can positively affect business processes and improve operational performance. This study contributes academically by presenting empirical research results that can construct digital transformations in the era of the digital economy and improve an enterprise's operational performance to obtain sustainable competitive advantage. Limitations that could not be addressed in this study will be presented separately after a discussion of the research results.

2. Literature Review

2.1. Dynamic Capability Theory

Dynamic capability theory originated from the characteristics of enterprises in order to effectively deal with the changes in market environments of the 1990s. In market dynamics such as economic globalization and diversification of consumer demand, a dynamic capability refers to the organization's flexible capability to properly allocate internal and external resources, quickly make marketable products, effectively grasp changing business opportunities, and continuously maintain a competitive advantage. Most enterprises have implemented a digital strategy to improve competitive advantage [13]. This study proposes a new approach to the business transformation capability, and empirically explores the impact of strategic orientation on operational performance through a digital transformation capability.

Through literature reviews of previous research, this study found that the dynamic capability theory evolved on the basis of information processing theory (1970s), the resource-based view (1980s), and core competence theory (1990s). Information processing theory was first proposed by Galbraith [14]. When the information processing capability fits with the enterprise's demand for information processing, the enterprise can obtain sustainable competitive advantage and improve organizational performance [15]. Resource-based view (RBV) was first proposed by Penrose [16]; when the environment changes, the value of the enterprise's existing resources also changes. If the adjustment is not made in time, the enterprise's previous competitive advantage will no longer exist [17]. As a supplement and development of resource-based view, Prahalad et al. [18] first proposed the core competence theory. Core competence is a unique enterprise resource that is specially organized to improve the efficiency of other resources [19].

Since Teece et al. published the paper titled Dynamic capability and strategic management (1997), scholars have carried out a lot of research on dynamic capability. Teece et al. [9] argued that to cope with a rapidly changing environment, enterprises integrate, establish, and reconfigure their internal and external competitiveness. Moreover, they proposed the dimensions of a dynamic capability that includes integrate-build-reconfigure processes. Teece [10] believed that a dynamic capability enables enterprises to create, deploy, and protect the intangible assets that support superior long-run business performance. Moreover, skills, processes and procedures, organizational structure, and the decisions or rules of an enterprise have an impact on its dynamic capabilities, such as sensing, seizing, and reconfiguring.

Therefore, based on previous studies of dynamic capability, we conclude that although the driving factors and mechanisms of dynamic capability in these previous studies are slightly different, they all emphasized that dynamic capability refers to the ability of an enterprise to purposefully change basic resources in response to environmental changes. In particular, enterprises are now in the digital era and have to respond to environmental changes through digital transformation, constructing a digital transformation capability to keep consistent with new digital strategies.

2.2. Strategic Orientation

Previous studies on strategic orientation emphasized the importance of a digital transformation strategy, the difference between a digital transformation strategy and an IT

strategy, and the impact of strategic orientation on capability [20–22]. The digital strategy is to use digital resources to create value to affect the enterprise's business strategy [11]. Organizations have to respond to the changes in the market environment, the development of digital technology, the personalization of consumer demand, and the fierce competition in the industry through a digital transformation strategy [20]. Digital transformation goes beyond the traditional IT role in supporting existing business processes because it can redefine a value proposition [21]. Strategic orientation is an important driver of dynamic capability, including customer and technology orientation [22].

From the perspective of demand and supply in market development, the traditional industrial chain layout and manufacturing method can no longer meet the enterprise's needs of small-scale customization and high-quality delivery. Enterprises urgently need to use digital transformation to improve productivity [1]. The application of digital technology has greatly stimulated the market potential. Enterprises use digital technology to analyze customers, improve the matching efficiency of demand and supply using algorithms, and significantly reduce transaction costs [2]. At the same time, enterprises can have a large number of potential customers through accurate portraits of customers, and the product schemes in the database can be recombined to provide feasible marketing schemes. On the other hand, to resolve the inconsistency in demand and supply of personalized products, companies must plan to supply small units of a product. We can see that enterprises not only need to solve the problem of producing and selling products; they also need to meet the needs of consumers faster and more comprehensively. Therefore, digital transformation is good for enterprises to accurately match demand and supply in their respective market segments and solve a series of problems such as low efficiency in resource allocation, insufficient profitability, weak core competency, and so on.

This study explores the impact of strategic orientation on a digital transformation capability from two aspects: customer orientation and technology orientation. Customer orientation means the use of digital terminals as the best carrier to integrate a customer's key journeys, realize B2C end-to-end interactions, support customized and personalized products, accurately collect and gain insights into customer needs, remove intermediary links, and improve operational efficiency and the customer experience [22]. Consumer demands are rapidly changing; they create new value with brand images through designing and customizing products [13]. Technology orientation means that the system of the enterprise, with the development of digital technology, is dynamically reconstructed along with changes in enterprise needs, and technology innovation and new technology development can be used to build on the changes in the internal and external environments of the enterprise [22]. The MIS literature increasingly emphasizes the presence of gaps in an organizational capability due to technological and environmental changes, and many studies call for coping with these issues, especially in the digital context [21].

2.3. Digital Transformation Capability

Through the literature review of previous studies, we can summarize the importance of aligning an IT strategy with a business strategy. Previous studies focused on the use of purely digital technology, an IT-business aligning capability, or a dynamic ability as a digital transformation capability. Levallet and Chan [22] suggested that organizations can use and leverage a digital capability, such as an IT infrastructure and an information management capability, to foster managerial improvisation depending on the type of unexpected event. The digital capability studied by Levallet and Chan [22] was completely biased toward an IT-enabled capability. Tumbas and Berente [23] studied the digital capability of entrepreneurial growth in the field of entrepreneurship and tended toward a technical aligning capability rather than a digital transformation capability. Yeow et al. [11] and Warnera and Wägerb [12] used case analysis to build a digital transformation capability. Although they considered sensing, seizing, and reconfiguring the three components of a digital transformation capability, they could not explain the phenomenon of organizing

external digital resources into internal processes, as well as sustainable digital development of enterprises when the enterprise conducts a digital transformation.

The digital transformation capability proposed in this study refers to an enterprise's capability corresponding to the digital environment. It is a necessary capability for the enterprise's survival and is consequently shown in Figure 1. Based on previous studies, this study combined actual phenomena with the dimensions of a digital transformation capability for the enterprise. Digital transformation capability refers to the enterprise's ability to use advanced platforms such as information, communication, and control mechanisms. And it provides integrated platforms of digital production technologies to connect various stakeholders effectively and extensively, such as technology providers, manufacturing factories, supply chains, and service providers. Organizations with a digital transformation capability can achieve short-cycle, multiple-variety, and personalized digital operation performance. Accordingly, three dimensions of a digital transformation capability (sensing customer needs and technology trends in the digital environment, organizing internal and external resources, and restructuring organizational innovations) are important to achieving sustainable competitiveness in the organization.

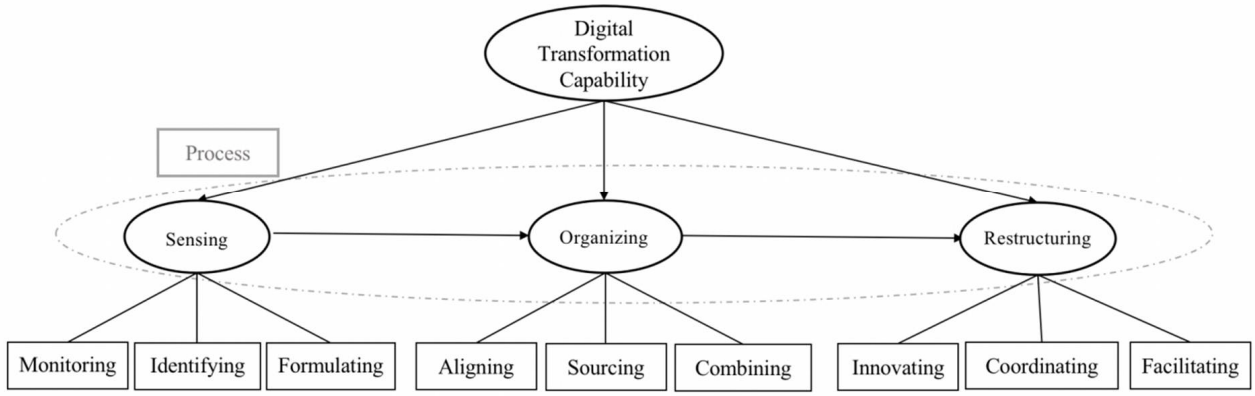

Figure 1. The Digital Transformation Capability.

In the context of today's digital transformations, the value network that the enterprise depends on is becoming larger and more complex. The ability to sense changes in the digital environment is becoming increasingly important. The enterprise continuously monitors changes and trends in the marketplace, and opportunities and threats in the environment. The enterprise identifies inefficiencies in existing business processes and opportunities for organizational change based on market conditions. Subsequently, the enterprise foresees a wide range of actionable options based on its surroundings, and then formulates a digital transformation strategy. Therefore, *sensing* in this study refers to the organizational ability to monitor changes, identify problems and opportunities, and formulate a digital transformation strategy.

To solve the problems of the enterprise's survival and development effectively, the organizational capability to fully organize the internal and external digital resources related to the business cannot be ignored. The enterprise aligns a digital transformation strategy with the enterprise's business goals and strategies. The enterprise sources digital resources by the expected impact on business performance and combines internal and external resources for the digital transformation. Therefore, the term *organizing* in this study refers to the organizational capability to align digital resources with business needs, source digital resources, and then fully combine the available internal and external resources for a digital transformation of the organization.

Different from the use of technology and the alliance of departments, digital transformation is a process that requires continuous and comprehensive changes in organizational structures, business processes, and employee skills. So, the ability to restructure sustainable digital development is indispensable. While innovating its digital resources, the enterprise continuously coordinates the available resources and facilitates sustainable development of

its digital strategy to improve organizational performance. Consequently, *restructuring* in this study refers to the organizational ability to innovate digital resources, coordinate with organizational structures, and facilitate sustainable development of digital resources.

2.4. Operational Performance

Improving performance is the substantial goal of all enterprises, and therefore, factors related to improvement of performance have become core issues in management research [24]. Enterprises are committed to growth to ensure survival [10]. Performance is the evaluation of an enterprise's operations, either from the results it has achieved or through the potential for future achievements [25]. Good operational performance is the foundation of the enterprise's survival and development [26]. The performance from a digital transformation can be judged by various factors, such as operational performance [27].

Digital transformation can improve the operational performance of the organization. Wamba and Mishra [28] argued that manufacturing enterprises invest in digitalization to enable the reduction in data processing costs by automating data collection, warehousing, and diagnostics. Helfat and Raubitschek [29] suggested that improved use of digital tools improves customer engagement and development of product-service systems, including improvements in remote diagnostics and process management. Hong et al. [30] pointed out that enterprises achieve mass production through digitalization and reduce product costs. Dubey et al. [31] proposed in their research on manufacturing organizations that big data analysis and artificial intelligence can improve operational performance under the influence of environmental dynamism.

3. Research Model and Hypotheses

3.1. Research Model

Most enterprises put a lot of effort into responding to rapidly changing environments. In the era of the 4th Industrial Revolution, it is very important to find existing inefficient business processes and to pursue innovative efforts by combining internal and external digital resources to match the organizational structure according to the digital business environment. Previous studies conducted with a resource-based view have shown that most organizations with a lot of resources have high performance [15–17]. In addition, existing studies based on core competency theory have shown that most organizations with core competencies have high performance [18,19]. However, existing studies were conducted in a stable environment, not a turbulent one. In the recent rapidly changing environment of the 4th Industrial Revolution, the results of existing studies are limited in explaining the real phenomenon.

To improve the explanatory power by eliminating the inefficiency of the existing business model, a new approach is needed to promote innovative combinations of internal and external digital resources suitable for the digital environment [9,10]. From a resource-based view, core competence theory and dynamic capability theory, this study proposes a conceptual research model to investigate the relationships among strategic orientation with a customer orientation and a technology orientation, the digital transformation capability with three dimensions (sensing, organizing, and restructuring), and operational performance through the digital transformation capability of the organization. The proposed research model is shown in Figure 2.

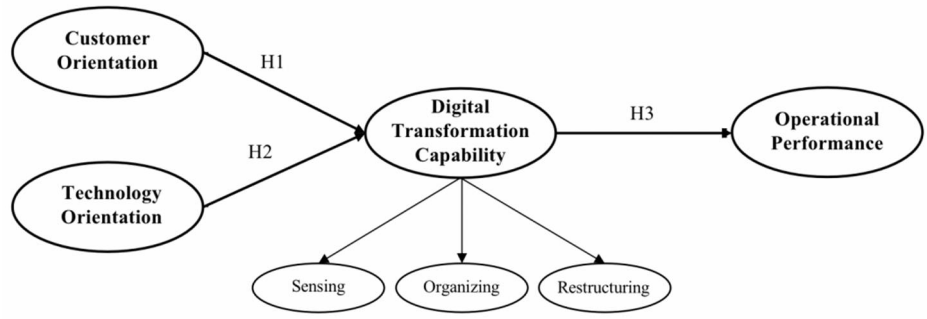

Figure 2. Research Model.

This study proposes that strategic positioning drives enterprises to develop a digital transformation capability to enhance operational performance. This study analyzes the impact of an enterprise's strategic orientation on its digital transformation capability, and also analyzes the impact of the digital transformation capability on operational performance. The objective of this study is to empirically investigate the relationship between strategic orientation and operational performance through a digital transformation capability in the digital environment. To respond to changes in the digital environment, customer orientation and technology orientation have positive impacts on the development of a digital transformation capability with sensing, organizing, and restructuring processes. The digital transformation capability also has a positive impact on operational performance of the organization. The digital transformation capability of a company with an organizational direction of customer orientation and technology orientation will positively affect the operational performance of the organization and ultimately have a positive effect on the company's sustainable competitive advantage.

3.2. Research Hypotheses

Strategic orientation is the activity direction for changing path dependence to match with the external environment. It has been used in many research situations, such as digitization and innovation [17,24,29,30]. According to Yu and Moon [8], digital strategic orientation refers to the overall strategic direction of an enterprise in the context of digital transformation, including the strategic measures to achieve it. This study is aimed at the current digital environment, based on digital strategic orientation studies, explaining the relationship between strategic orientation (customer orientation and technology orientation) and the digital transformation capability.

Racela and Thoumrungroje [32], grounded in resource-advantage theory, investigated how customer orientation as a higher-order or interconnected operational resource enhances enterprise performance through creativity and innovation capabilities among enterprises of different sizes and within different market contexts. They conceptualized customer orientation as an enterprise's capacity to create and deliver superior customer value through the processing of market intelligence, as demonstrated by the enterprise's composite operational resources of market-sensing, customer-relating, and customer-response capabilities. Pan et al. [33] used the resource-based view and its extended dynamic capability as a theoretical foundation, explored the role of strategic orientation (technology orientation and customer orientation) in promoting enterprises' digital capabilities, and new product development in the context of digital transformation.

Lin and Kunnathur [34] examined the impact mechanism of strategic orientation on big data capabilities from three aspects (customer orientation, technology orientation, and entrepreneurship orientation) and empirically verified that strategic orientation is conducive to the development of a big data capability in enterprises. In this study, customer orientation refers to the extent to which the enterprise has a sufficient understanding of its target customers to continuously create superior value for them. Therefore, this study proposes the following hypotheses.

Hypothesis 1 (H1). *Customer orientation has a positive impact on a digital transformation capability.*

Hypothesis 1a (H1a). *Customer orientation has a positive impact on sensing in a digital transformation capability.*

Hypothesis 1b (H1b). *Customer orientation has a positive impact on organizing in a digital transformation capability.*

Hypothesis 1c (H1c). *Customer orientation has a positive impact on restructuring in a digital transformation capability.*

In their research on strategic orientation, digital capabilities, and new product development in emerging market enterprises, Pan et al. [33] carried out structural equation modeling by using sample data from Chinese manufacturing enterprises to empirically test their arguments. They found that technology orientation and customer orientation play a critical role in driving an enterprise's digital capability. Moreover, they tested how the two dimensions of strategic orientation tend to exert different effects on new product development, with technology orientation playing a more significant role than customer orientation in contributing to new product development.

Lin and Kunnathur [34] demonstrated a connection between a big data capability and the three strategic orientation concepts. The relationship between a big data capability and the three strategic orientations reinforced the strategic dimension in a big data capability. More specifically, based on an extensive review of the literature on strategic orientation, they concluded that customer, entrepreneurial, and technology orientations contribute to the development of a big data capability. In this study, technology orientation refers to the extent to which the enterprise is inclined to introduce or use new digital manufacturing technologies in the transformation process. Therefore, this study proposes the following hypotheses.

Hypotheses 2 (H2). *Technology orientation has a positive impact on a digital transformation capability.*

Hypotheses 2a (H2a). *Technology orientation has a positive impact on sensing in a digital transformation capability.*

Hypotheses 2b (H2b). *Technology orientation has a positive impact on organizing in a digital transformation capability.*

Hypotheses 2c (H2c). *Technology orientation has a positive impact on restructuring in a digital transformation capability.*

Pan et al. [33], based on previous RBV research, defined digital capability with a flexible IT infrastructure and an information management capability. They emphasized that a digital capability is the key capability of enterprises in a technological environment. The development of a digital capability by enterprises is good for dealing with rapidly developing technical problems and various uncertainties. Taking the industrial robot in the production process of the manufacturing enterprise as an example, the automatic production line not only improves accuracy in the operation but also improves efficiency and reduces costs. Dubey et al. [31] drew on the dynamic capability view of enterprises and on contingency theory to test the relationship between big data analytics powered by AI and operational performance. Their findings showed that big data analytics powered by AI have a significant and positive effect on operational performance. Big data analytics powered by a dynamic AI capability enables organizations to improve operational performance by creating new products or services, improving product or service quality, reducing costs, and reducing market risks of product or service innovations. Tanriverdi and Lim [35] believed that digital technologies could support an enterprise's capability to sense the complexity of its environment to design a response that is able to help maximize its chances of survival through the adaptation or redefinition of its core activities. Helfat and Raubitschek [29]

provided a theoretical analysis of digital transformation capabilities, showing the influence of organizational performance on digital platform-based ecosystems.

In this study, digital transformation capability refers to the extent to which the enterprise can use advanced platform technologies, such as information, communication, and control, to effectively connect various stakeholders, such as technology providers, manufacturing factories, supply chains, and service providers. To achieve short-cycle, multi-variety, and personalized digital production capabilities, operational performance refers to increasing operational efficiency and effectiveness through digital transformation. Therefore, this study proposes the following hypotheses.

Hypotheses 3 (H3). *A digital transformation capability has a positive impact on operational performance.*

Hypotheses 3a (H3a). *Sensing in a digital transformation capability has a positive impact on operational performance.*

Hypotheses 3b (H3b). *Organizing in a digital transformation capability has a positive impact on operational performance.*

Hypotheses 3c (H3c). *Restructuring in a digital transformation capability has a positive impact on operational performance.*

4. Research Design

4.1. Measurement

The purpose of this paper is to conduct an empirical study on the relationship between strategic orientation (which includes customer orientation and technology orientation) and operational performance, through the digital transformation capability of an enterprise in the digital environment, measuring the impact of strategic orientation on operational performance. To test the hypotheses, a questionnaire was used to collect data from Chinese manufacturing enterprises.

From the resource-based view, core competence theory and dynamic capability theory of existing theoretical research, the variables cover strategic orientation including customer orientation (CUO) developed by Lu et al. [1] and technology orientation (TO) developed by Yu and Moon [8]. Based on the original dynamic capability [9,10,17], a digital transformation capability (sensing, organizing, and restructuring) in the new digital environment was developed to explain the mechanism of digital transformation. Moreover, operational performance (OPP) was developed by Hong et al. [30]. The operational definitions and measurements are shown in Table 1.

Table 1. Operational Definitions and Measurements.

Factor	Operational Definition	Measurement
Customer Orientation	The extent to which the enterprise has sufficient understanding of its target customers to continuously create superior value for them.	1. Competitive advantage is based on understanding customers' needs. 2. Business objectives are driven primarily by customer satisfaction. 3. Measure customer satisfaction frequently and systematically. 4. Pay close attention to after-sales service for customer satisfaction. 5. Continuously try to discover additional customer needs that they are unaware of.
Technology Orientation	The extent to which the enterprise is inclined to introduce or use new digital manufacturing technologies in the transformation process.	1. Proactively develop new technologies. 2. Use sophisticated technologies in new product development. 3. New products are always at the state of the art in the level of the technology. 4. Technological innovation is readily accepted in our program/project management. 5. Based on the results of technological innovation, it has been accepted by our organization.
Sensing	The organizational capability to monitor changes, identify opportunities and formulate a digital strategy.	1. Monitor changes and trends in the marketplace. 2. Scan for opportunities and threats in the environment. 3. Identify inefficiencies in existing business processes. 4. Identify opportunities for organizational change based on market conditions. 5. Foresee a wide range of actionable options based on the surroundings. 6. Seek new opportunities for strategic uses of IT. 7. Determine the needs for a digital transformation strategy. 8. Formulate the digital transformation strategy.
Organizing	The organizational capability to align digital resources with business needs, sources digital resources, then fully combines available digital resources.	1. Align the digital transformation strategy with business goals and strategies. 2. Try to allocate management resources for digital transformation. 3. Implement active interactions between other functions such as manufacturing, marketing and services. 4. Integrate internal resources and competency for digital transformation. 5. Integrate external resources such as expert skills and knowledge for digital transformation. 6. Combine internal and external resources for digital transformation. 7. Emphasize the strategic role of the sourcing function for digital transformation. 8. Prioritize digital transformation investments by the expected impact on business performance.
Restructuring	The organizational capability to innovate digital resources, coordinate organizational structures and facilitate sustainable development of a digital transformation.	1. Seek new ways to do something. 2. Frequently try to innovate new products and services. 3. Continually develop and produce new products or services. 4. Try to maintain time to market with new products and services. 5. Try to reconfigure the resources for new products and services. 6. Try to apply knowledge resources to new products and services. 7. Try to fit business processes into integrated resources. 8. Cooperate with each other to solve conflicts. 9. Facilitate a sustainable effort to implement a digital transformation strategy.
Operational Performance	The achievements and contributions made in product quality, the production process, costs, and other aspects through the digital transformation.	1. Raise the quality of products and services. 2. Increase process improvements. 3. Reduce total costs. 4. Attract more customers. 5. Easily modify products to a specific customer need.

4.2. Data Collection

Based on a research method at the organizational level, the questionnaire was distributed through random sampling, and executives (CEOs, CMOs, CFOs, CIOs), senior managers, and department managers were the participants. Because the questionnaire's analysis hierarchy was a relationship of organizational variables, it was distributed to the enterprise's overall operational managers responsible for digital transformation to represent enterprise-level data. Due to the COVID-19 pandemic, the questionnaire was distributed by e-mail and web page. In total, 162 valid responses were collected for this study by December 2021. We used SPSS software to analyze the data results. Statistics on the respondents are shown in Table 2 Demographic Statistics.

Table 2. Demographic Statistics.

Item	Category (N = 162)	Frequency	Percentage
Position	Department Manager	30	18.5
	Senior Manager	80	49.4
	Executive (CEO, CMO, CFO, CIO)	52	32.1
Years Since Established	Less than 5 years	13	8.0
	5–10 years	30	18.5
	10–15 years	76	46.9
	More than 15 years	42	26.5
Main Industry Type	Automobile	30	18.5
	Machine & Equipment	22	13.6
	Electronics	36	22.2
	Textile & Clothing	28	17.3
	Food & Beverage	20	12.3
	Medical & Medicine	17	10.5
	Other	9	5.6
Number of Employees	Less than 100	15	9.3
	100–300	23	14.2
	300–2000	50	30.9
	2000–10,000	39	24.1
	More than 10,000	35	21.6
Annual Sales	Less than RMB 30 million (US$4.3 million)	12	7.4
	RMB 30–100 million (US$4.3–14.3 million)	15	9.3
	RMB 100–500 million (US$14.3–71.5 million)	49	30.2
	RMB 500 million-1 billion (US$71.5–143 million)	54	33.3
	More than RMB 1 billion (US$143 million)	32	19.8
Digital Transformation Objectives(multiple choice)	To meet customer needs and customer satisfaction	108	67.7
	To speed up decision making and delivery	98	60.5
	To sustain competitive advantage	94	58.0
	To diminish production and process costs	95	58.6
	To enhance operational efficiency	100	61.7
	To facilitate new product development	84	51.9
	Other	25	15.4

The survey results showed that senior managers comprised the largest number of respondents: 80 (49.4%). In the distribution of the enterprise's established times of operation, the range 10–15 years was the most predominant: 76 (46.9%). From the perspective of main industry type, electronics was prominent: 36 (22.2%). Regarding the number of employees, the range 300–2000 was the highest proportion: 50 (30.9%). For annual sales, the range RMB 500 million to RMB 1 billion was the highest proportion: 54 (33.3%). Moreover, among the answers to the digital transformation objectives, the item chosen the most was to meet customer needs and customer satisfaction: 108 (67.7%).

5. Data Analysis

5.1. Tests of the Measurement Model

We used SPSS software to analyze reliability and validity. Among the results in Table 3, Cronbach's alpha, factor loadings, and composite reliability of all variables were

higher than 0.7, and AVE was higher than 0.5, which means both reliability and validity were achieved [36,37]. In all measurement items, there were three items in which cross-factor loading values are less than 0.7. One was sen6 (seeking new opportunities for strategic use of IT), which indicates the enterprise's main performance is sensing (after monitoring market changes and identifying opportunities): they do not seek opportunities, but directly formulate digital transformation strategies. The other two deleted items were res1 (seeks new ways to do something) and res4 (trying to maintain time to market with new products and services). This reflects the enterprise's main performance during restructuring: innovating new products and services, and cooperating with various departments to maintain continuous development of the digital transformation, rather than focusing on finding new ways and maintaining the time to market for products.

Table 3. Factor Loadings, AVE, CR, and Cronbach's Alpha Values.

Factor	Items	Loadings	AVE	CR	Cronbach's Alpha
Customer Orientation	cuo1	0.840	0.708	0.924	0.897
	cuo2	0.815			
	cuo3	0.837			
	cuo4	0.865			
	cuo5	0.850			
Technology Orientation	to1	0.853	0.706	0.923	0.896
	to2	0.865			
	to3	0.842			
	to4	0.854			
	to5	0.785			
Sensing	sen1	0.813	0.652	0.918	0.893
	sen2	0.834			
	sen3	0.813			
	sen4	0.797			
	sen7	0.841			
	sen8	0.745			
Organizing	org1	0.787	0.648	0.917	0.891
	org2	0.864			
	org3	0.804			
	org6	0.814			
	org7	0.761			
	org8	0.795			
Restructuring	res2	0.820	0.665	0.923	0.899
	res3	0.843			
	res6	0.819			
	res7	0.839			
	res8	0.770			
	res9	0.802			
Operational Performance	opp1	0.775	0.643	0.915	0.888
	opp2	0.808			
	opp3	0.871			
	opp4	0.788			
	opp5	0.811			
	opp6	0.751			

AVE = Average Variance Extracted; CR = Composite Reliability.

At the same time, in order to perfect the model and improve the explanatory power of the factors, an exploratory factor analysis was carried out through SPSS. A dimensionality reduction factor analysis was conducted based on principal component extraction analysis method with a feature value greater than 1. In the digital transformation capability, except for sen5, sen6, org4, org5, res1, res4, and res5, all measurement items had values greater than 0.6. Sen5 is "foresees a wide range of actionable options based on the surroundings,"

which showed the enterprise's main performance during sensing: monitoring market changes after identifying opportunities, no longer foreseeing viable options, but directly formulating a digital transformation strategy. Org4 is "integrates internal resources and competency for digital transformation," and org5 is "integrates external resources such as expert skills and knowledge for digital transformation." This reflects the enterprise's main performance during organizing: aligning digital resources with business needs, sourcing digital resources, and then fully combining the available digital resources instead of separately integrating internal external resources. Res5 is "tries to reconfigure the resources for new products and services," which reflects the enterprise's main performance during restructuring and innovating new products and services, and cooperating with various departments to promote the continuous development of the digital transformation strategy, instead of focusing on reconfiguring resources. So, as a means of improving validity, a decision was made to delete inf6, sen5, sen6, org4, org5, res1, res4, and res5 to further improve the factor explanatory power.

In order to verify the necessity of the high-order model, we used SmartPLS 3 software to compare the first-order factors with the second-order factors. According to the research of Sarstedt et al. [38], second-order factor loading is higher than first-order factor loading, and structural model analysis using the second-order factor is appropriate. In this study, a digital transformation capability consists of sensing, organizing, and restructuring. Results are shown in Table 4. Second-order factor loading was higher than first-order factor loading. It is appropriate to use the second-order factor model for structural model analysis.

Table 4. Factor Loading Comparison of First-order Factors and Second-order Factors.

Construct	Items	2nd Order Factor Loading	Construct	Items	1st Order Factor Loading
Sensing	sen1	0.813	Digital Transformation Capability	sen1	0.650
	sen2	0.834		sen2	0.771
	sen3	0.813		sen3	0.733
	sen4	0.797		sen4	0.687
	sen7	0.841		sen7	0.711
	sen8	0.745		sen8	0.638
Organizing	org1	0.787		org1	0.699
	org2	0.864		org2	0.770
	org3	0.804		org3	0.728
	org6	0.814		org6	0.770
	org7	0.761		org7	0.700
	org8	0.795		org8	0.733
Restructuring	res2	0.820		res2	0.751
	res3	0.843		res3	0.738
	res6	0.819		res6	0.749
	res7	0.839		res7	0.734
	res8	0.770		res8	0.622
	res9	0.802		res9	0.720

Moreover, according to Hair et al. [36], by extracting the average variance of each potential factor and comparing the square root of the average variance with the correlation coefficient between the variables, if the square root of the average variance is higher than the correlation coefficient, it has discriminant validity. We used SmartPLS 3 software to analyze discriminant validity. Results of discriminant validity are shown in Table 5. The square root of the average variance was higher than the correlation coefficient, so it is safe to assume that discriminant validity is present.

Table 5. Discriminant Validity.

	CUO	TO	SEN	ORG	RES	OPP
CUO	0.842					
TO	0.658	0.840				
SEN	0.667	0.659	0.808			
ORG	0.682	0.701	0.697	0.805		
RES	0.604	0.606	0.622	0.729	0.816	
OPP	0.597	0.498	0.649	0.658	0.707	0.802

CUO = Customer Orientation; TO = Technology Orientation; SEN = Sensing; ORG = Organizing; RES = Restructuring; OPP = Operational Performance.

5.2. Test of the Structural Model

To verify the research hypotheses of the structural model, path coefficients were analyzed by using SmartPLS 3, and the path coefficients were estimated by using bootstrap resampling method [36]. The results are shown in Table 6 and Figure 3. In addition, all variance inflation factors (VIFs) were well below 5, which showed that multicollinearity is not an issue for this study [37].

Table 6. Hypothesis Testing Results.

Hypothesis	Path	Coefficient	*p*	T	Result
H1 (+)	Customer Orientation→Digital Transformation Capability	0.437	0.000 ***	7.925	Supported
H2 (+)	Technology Orientation→Digital Transformation Capability	0.451	0.000 ***	9.652	Supported
H3 (+)	Digital Transformation Capability→Operational Performance	0.757	0.000 ***	15.692	Supported

*** $p < 0.001$.

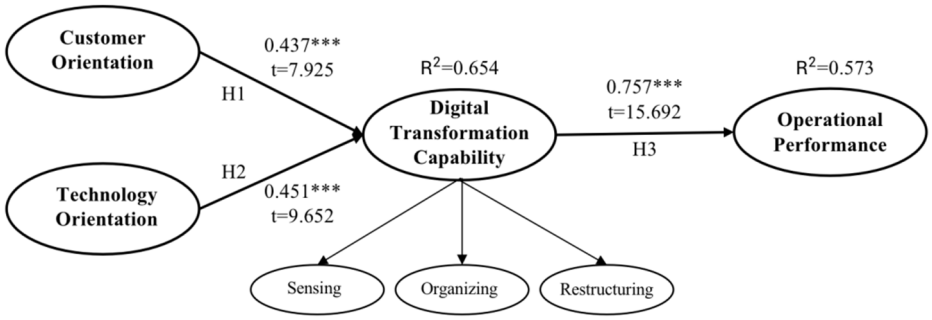

Figure 3. The Results of Data Analysis in the Research Model. *** $p < 0.001$.

To discern the relationship between customer orientation and the digital transformation capability, the results of path analysis showed that customer orientation (path coefficient = 0.437, *t* value = 7.925) had a 99% statistical significance on the digital transformation capability. Therefore, customer orientation had a positive (+) relationship between digital transformation capabilities; hence, H1 is supported.

To deduce the relationship between technology orientation and the digital transformation capability, the results of path analysis showed that technology orientation (path coefficient = 0.451, *t* value = 9.652) had a 99% statistical significance on the digital transformation capability. Therefore, technology orientation had a positive (+) relationship with the digital transformation capability, and H2 is supported. The explanatory power of customer orientation and technology orientation on the digital transformation capability was 65.4% (R^2 = 0.654). This means the variable selection of customer orientation and technology orientation and the relationship between strategic orientation and digital transformation capability have very high explanatory power.

To understand the relationship between digital transformation capability and the operational performance of the organization, the results of path analysis showed that the digital transformation capability (path coefficient = 0.757, *t* value = 15.692) had a 99%

statistical significance on operational performance (R^2 = 0.573). Therefore, the digital transformation capability had a positive (+) relationship with operational performance, and H3 is supported.

5.3. Test on Mediating Effects of the Digital Transformation Capability

In this study, there are two mediating effects (CUO→DTC→OPP, and TO→DTC→OPP). Hair et al. [37] proved that the strength of the mediator can be examined by using total effect and variance accounted for (VAF). Mediation analysis results are presented in Table 7. The VAF of path 1 (CUO→DTC→OPP) is 43.02%, indicating that a digital transformation capability has a partial mediation effect on the relationship between customer orientation and operational performance. At the same time, the VAF of path 2 (TO→DTC→OPP) is 43.13%, indicating that the digital transformation capability has a partial mediation effect on the relationship between technology orientation and operational performance.

Table 7. Mediation Effect of Digital Competence.

	Path	Direct Effect	Indirect Effect	Total Effect	VAF	Mediation Type Observed
1	Customer Orientation→Digital Transformation Capability→Operational Performance	0.437 (7.925)	0.330 (6.485)	0.767	43.02%	Partial Mediation
2	Technology Orientation→Digital Transformation Capability→Operational Performance	0.451 (9.652)	0.342 (8.051)	0.793	43.13%	Partial Mediation

VAF > 0.80 = full mediation, 0.20 ≤ VAF ≤ 0.80 = partial mediation, VAF < 0.20 = no mediation.

5.4. Additional Analysis

To find the specific relationship between digital transformation capability and operational performance, this study appended the analysis of the impact between first-order factor variables in Figure 4. Digital transformation capability consists of three factors: sensing, organizing, and restructuring. Therefore, the result of data analysis by converting the variable digital transformation capability into three secondary factors is presented. In the relationship between strategic orientation and digital transformation capability, the relationship between customer orientation and sensing was the highest. The relationship between restructuring and operational performance was highest between the three factors of digital transformation capability and operational performance of the organization.

Summary of hypothesis testing results is presented in Table 8. The results of the path analysis showed that among the influences of customer orientation and technology orientation on digital transformation capability (sensing, organizing, restructuring), technology orientation had the second highest influence on sensing (path coefficient = 0.386, *t* value = 6.945), after the influence by customer orientation on sensing (path coefficient = 0.415, *t* value = 6.034). Therefore, the results show that both technology orientation and customer orientation have a positive impact on the development of a digital transformation capability. In particular, customer orientation and technology orientation had a greater impact on sensing in a digital transformation capability compared to customer orientation. Second, the results showed that customer orientation and technology orientation first promote sensing, and then organizing in the development of a digital transformation capability, but the impact on restructuring is relatively insignificant.

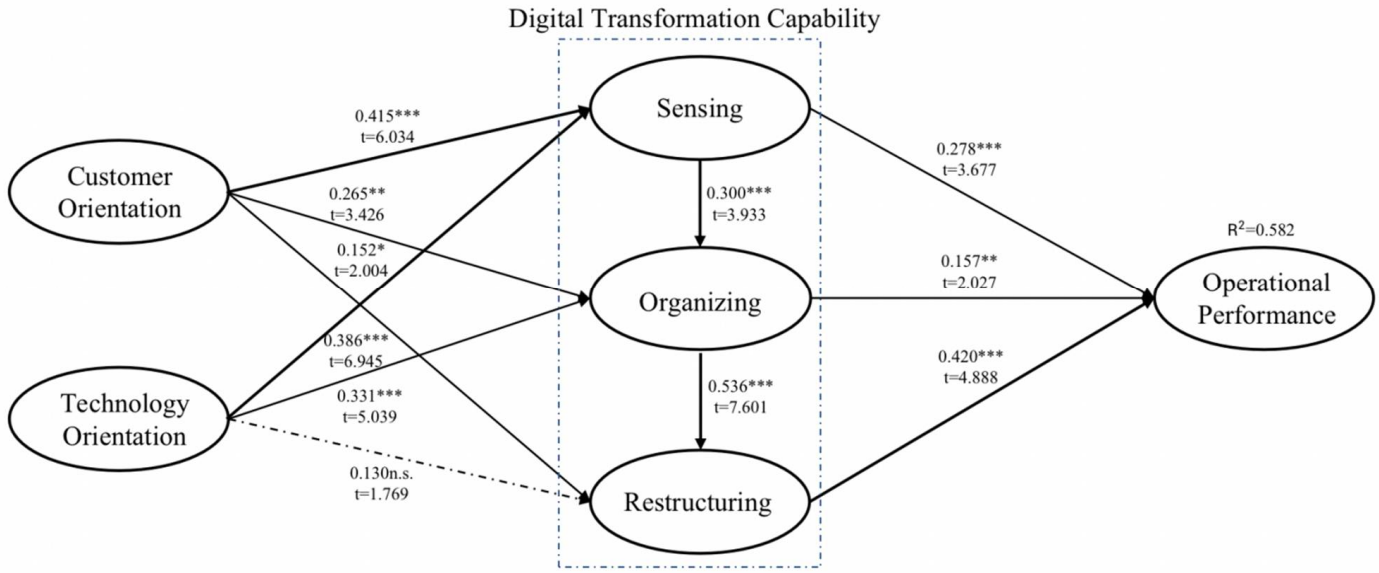

Figure 4. The Results of Second-order Data Analysis in the Research Model. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, n.s.-not significant.

Table 8. Summary of Hypothesis Testing Results.

Hypothesis	Path	Coefficient	*p*	T	Result
H1 (+)	Customer Orientation→Digital Transformation Capability	0.437	***	7.925	Supported
H1a (+)	Customer Orientation→Sensing	0.415	***	6.034	Supported
H1b (+)	Customer Orientation→Organizing	0.265	**	3.426	Supported
H1c (+)	Customer Orientation→Restructuring	0.152	*	2.004	Supported
H2 (+)	Technology Orientation→Digital Transformation Capability	0.451	***	9.652	Supported
H2a (+)	Technology Orientation→Sensing	0.386	***	6.945	Supported
H2b (+)	Technology Orientation→Organizing	0.331	***	5.039	Supported
H2c (+)	Technology Orientation→Restructuring	0.130	n.s.	1.769	Rejected
H3 (+)	Digital Transformation Capability→Operational Performance	0.757	***	15.692	Supported
H3a (+)	Sensing→Operational Performance	0.278	***	3.677	Supported
H3b (+)	Organizing→Operational Performance	0.157	**	2.027	Supported
H3c (+)	Restructuring→Operational Performance	0.420	***	4.888	Supported

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, n.s. = not significant.

At the same time, the path results of the digital transformation capability (sensing, organizing, restructuring) and operational performance showed that the effect of sensing on organizing (path coefficient = 0.300, *t* value = 3.933) was greater than on operational performance (path coefficient = 0.278, *t* value = 3.677). In particular, the effect of organizing on restructuring (path coefficient = 0.536, *t* value = 7.601) was greater than it was on operational performance (path coefficient = 0.157, *t* value = 2.027). That is, when building a digital transformation capability, enterprises see a positive impact on operational performance from organizing to restructuring based on sensing. Second, when comparing the effects of sensing, organizing, and restructuring on operational performance, the results showed that restructuring (path coefficient = 0.420, *t* value = 4.888) had a greater impact on operational performance; that is, restructuring is more important among digital transformation capabilities.

6. Discussion

6.1. Implications

This study has three main academic implications. First, it empirically proves that a digital transformation capability to improve operational performance in a digital environment is an important variable affecting implementation, and customer orientation

and technology orientation impact development of the digital transformation capability. Moreover, technology orientation (path = 0.451, t = 9.652) has a bit more of a positive impact on a digital transformation capability than customer orientation (path = 0.437, t = 7.925). Technology orientation is very important for enterprises wanting to develop a digital transformation capability. This is similar to the results of Pan et al. [33] and Lin and Kunnathur [34]. Pan et al. [33] examined the relationship between two important types of strategic orientation, such as technology orientation and customer orientation, on new product performance in the context of digital transformation. Moreover, as the new generation of digital technologies today facilitate rapid development of the digital economy, technology-oriented enterprises are more conducive to new product performance and are important drivers of superior corporate performance. Lin and Kunnathur [34] examined the relationship between a big data capability and strategic orientations (customer and technology). The result of their research showed whether a big data capability (integration of resources and strategy application) will emerge depending on insights into the business value of a new technology (a demonstration of technology orientation). Zhou et al. [21] examined how strategic orientation can help build a dynamic capability in China's emerging economy. The survey showed that strategic orientations are important drivers of dynamic capability. The effectiveness of strategic orientations depends on market dynamics. In particular, when market demand becomes increasingly uncertain, the impact of customer orientation is weak, whereas technology orientation has a stronger effect on an adaptive capability. As competition intensifies, technology orientation can build capability more effectively. Therefore, this study shows that strategic orientation plays an important role in the development of a digital transformation capability.

Second, under the dynamic capability theory, this study constructs the digital transformation capability framework considering the background of the digital economy era. A sensing capability to find problems and opportunities in the digital environment, an organizing capability to align an IT strategy with the business strategy and to integrate internal and external resources, and a restructuring capability to innovate new products and services and reconfigure organizational structures and resources, are important dimensions of constructing a digital transformation capability. This is similar to the results of Lin and Kunnathur [34]. They developed the big data capability concept to capture big data understandings and practices in enterprises. They emphasized that the conceptualization of big data as a dynamic capability helps to capture what is involved in big data practices and helps to integrate all these elements in a theoretical manner. Moreover, this study tested the mediation effect of a digital transformation capability on the relationship between strategic orientation and operational performance. This is similar to the results of Pan et al. [33]. They confirmed the mediating role of a digital capability between strategic orientation and new product performance. In addition, Day et al. [39] studied a supply management capability with four aspects: supply management integration, coordinated sourcing, collaboration management, and performance assessment. The results of their study showed that the supply management capability is formed of internally consistent routine bundles, which are significantly related to operational performance. In this study, the digital transformation capability had a 43.02% and a 43.13% partial mediation effect, respectively, on the relationship between customer orientation and operational performance, and on the relationship between technology orientation and operational performance. From the perspective of dynamic capability theory, and due to the dramatic changes in the business environment, this study indicates that the importance of a digital transformation capability is increasing.

Third, this study tested how a digital transformation capability has a direct positive impact on operational performance. The results of path analysis showed that a digital transformation capability (path coefficient = 0.757, t value = 15.692) had a 99% statistical significance on operational performance. This is also similar to the results of Pan et al. [33]. They assessed the impact of a digital capability on new product development performance from an information systems perspective. Similarly, Li and Liu [40] showed that, in the

context of emerging economies similar to China, a dynamic capability is a firms' potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely decisions, and to implement strategic decisions and changes efficiently to ensure the right direction. In the digital environment, the enterprise's original technology resources alone are not enough to improve organizational performance. Therefore, this study shows that developing a digital transformation capability is the key determinant in adapting to the future requirements of the digital business environment.

At the same time, the practical implications of this study are as follows. First, digital transformation managers of the enterprise need to upgrade the digital transformation strategy suitable to the level of the business strategy. Pan et al. [33] claimed that digital-oriented enterprises are better able to identify data and capabilities generated in the digital environment and can organize them to make rational allocations. Similarly, research by Zhou et al. [21] showed that under the fierce pressures of a rapidly changing environment and owing to the characteristics of emerging economies, enterprises must develop a dynamic capability to survive the competition. The enterprise combines customer needs with the enterprise's goals and uses digital technology and digital management skills to gain insight into consumer dynamics.

Second, digital transformation managers need to focus on building their own digital transformation capability to create new value to attain sustainable competitiveness. The better the enterprise's digital transformation, the higher the operational performance [6,8,13]. Li and Liu [40] also found that a dynamic capability positively affects competitive advantage. Digitalization expands the range of internal or external resources available to enterprises. A digital transformation capability will encourage enterprises to integrate their business processes and routines through digital technology to achieve a sustainable competitive advantage. In other words, from the perspective of the manager, the enterprise can better adapt to the digital age and can create higher organizational performance by sensing digital opportunities, organizing digital resources, and reconstructing the digital capability. The enterprise continuously inserts digital resources into every link of the industrial chain in various forms for new digital added value.

6.2. Limitations and Future Research

Although this study empirically verified the correlation between strategy orientation, digital transformation capability, and operational performance, it has some limitations. First, the sample was only 162 enterprises. Future research can try to expand the sample or focus on a specific segment of an industry, such as electronics, automobiles, clothing, household appliances or food industries. Second, this study examined the mediating effect of a digital transformation capability. Future research can try to further explore the moderation effect of the digital transformation capability, or try to add different moderator variables, such as enterprise size and enterprise establishment age. Third, this study conceptualized the digital transformation capability from the perspective of enterprise processes, and then built the measurement items. Future research can try to measure the digital transformation capability from other non-process perspectives, such as the industrial digital chain and the digital platform.

7. Conclusions

This study provides empirical evidence for the positive impact of a digital transformation capability on operational performance. The research model was built from a resource-based view, core competency theory, dynamic capability theory and the digital transformation literature. We believe that strategic orientation consists of customer orientation and technology orientation, and that strategic orientation has a positive impact on a digital transformation capability, improving competitiveness. Digital transformation integrates sustainable development into the enterprise value chain and plays an irreplaceable role in helping enterprises achieve safe, intelligent and sustainable operation. By developing the digital transformation capabilities, enterprises can realize a quantifiable,

visible and implementable business model driven by data, build an internal coordination mechanism, complete better market decisions, and promote the scientific and sustainable development of enterprises.

Furthermore, we developed the construct of the digital transformation capability. A digital transformation capability not only composes a multi-dimensional structure, but also includes sensing, organizing, and restructuring constructs from the perspective of process theory. The results show that a digital transformation capability has a positive impact on operational performance. In addition, the digital transformation capability plays a mediating role between strategic orientation and operational performance. From the results of this study, most enterprises in the era of the 4th Industrial Revolution need to develop and implement digital transformation capabilities. In order to eliminate uncertainty and obtain sustainable competitiveness in a highly competitive environment, enterprises try to sense environmental changes and establish digital strategies, organize internal and external resources, and restructure them in connection with business processes within the organization. In conclusion, the development and execution of a digital transformation capability can lead to higher organizational operational performance that secures sustainable competitive advantage.

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