

Article

How Does Digital Transformation Improve Organizational Resilience?—Findings from PLS-SEM and fsQCA

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Abstract: Digital transformation has become a critical path for enterprises to improve organizational resilience, and has been widely considered by both academia and business practice. However, the extant literature focuses on the concepts and antecedents of digital transformation and the outcomes of digital transformation, lacking of exploring the effect mechanism of digital transformation of enterprises on organizational resilience. Based on the perspective of dynamic capacity and the theoretical path of “digital transformation—ambidextrous innovation—organizational resilience”, this study constructs a theoretical model to explore a path where digital transformation affects both exploitative innovation and exploratory innovation, and further affects the organizational resilience of enterprises. By performing a questionnaire investigation with 339 Chinese enterprises, this study adopted both a fuzzy-set qualitative comparative analysis (fsQCA) and structural equation modeling (SEM) to explore the relationships among digital transformation, ambidextrous innovation, and organizational resilience. The results show that the digital transformation of enterprises helps to improve organizational resilience. Additionally, digital transformation has a positive impact on the organizational resilience of enterprises mediated by both exploitative innovation and exploratory innovation. Finally, both exploitative innovation and exploratory innovation of enterprises have a positive impact on organizational resilience, and there is a complementary relationship between exploitative innovation and exploratory innovation. Further qualitative comparative analysis also shows that there are three types of configurations for achieving organizational resilience: digital transformation and exploitative innovation, digital transformation and exploratory innovation, and exploitative innovation and exploratory innovation. The paper is concluded by highlighting the importance of the practical significance for enterprises to effectively carry out digital transformation and further achieve organizational resilience.

Keywords: digital transformation; exploitative innovation; exploratory innovation; organizational resilience; sustainability



Citation: Zhang, J.; Long, J.; von Schaewen, A.M.E. How Does Digital Transformation Improve Organizational Resilience?—Findings from PLS-SEM and fsQCA. *Sustainability* **2021**, *13*, 11487. <https://doi.org/10.3390/su132011487>

Academic Editor: Uwe Riss

Received: 28 September 2021

Accepted: 14 October 2021

Published: 18 October 2021

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1. Introduction

The rapid development of digital technologies, such as artificial intelligence, big data, cloud computing, blockchain, and the industrial internet, is transforming the traditional economy into the digital economy and intelligent economy, and digital transformation has become an integral mechanism for enterprises to achieve breakthrough innovation and sustainable development [1]. As shown in a recent International Data Corporation survey (“IDC FutureScape: Global Digital Transformation Forecast in 2021”, <http://www.idc.com>, accessed on 13 September 2021), it is estimated that direct investment in digital transformation will exceed USD 6.8 trillion from 2020 to 2023. With the impact of global COVID-19, efficiency improvement, social coordination, and resource allocation brought about by digitization have been particularly significant to the recovery and rebound of organizations. One of the most prominent and consensual views is that digitalization is an effective

way for organizations to achieve organizational resilience [2]. Organizational resilience refers to a firm's ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organization survival [3,4]. Entrepreneurs, however, are uncomfortable with digital transformation in reality. In recent years, the slogan "waiting for death without transformation or dying faster from transformation" has become the common understanding of digital transformation. On the one hand, companies desire to maximize their existing innovation capabilities to achieve organizational resilience; on the other hand, companies are also worried about the effects of digital transformation, which could disrupt existing processes and structures. Given the complexity and uncertainty of digital transformation, it is difficult for entrepreneurs to appreciate the genesis and consequences of digital transformation. In this context, it is becoming increasingly important to address the contradictions in the digital transformation process, and then improve the organizational resilience of businesses.

Nevertheless, to the best of our knowledge, there is still no empirical work within the management literature analyzing the influence of digital transformation on organizational resilience. Researchers have, however, provided two different perspectives on the issue of the impact of digital transformation. According to the functional school, digitalization is an effective way for enterprises to resist risks [5] and facilitates the enterprise's ability to comprehend and adapt to changing environmental contexts. For instance, big data form the basis for the analysis and processing of data [6]. In addition, AI and other digital technologies are able to assist enterprises to form intelligent decisions in a crisis and promote enterprise supply chain resilience [7] and platform ecosystem resilience [8]. In their research, Leong [9] discovered that social media technology can enable communities to improve their resistance to adverse events. Nevertheless, dysfunctional schools contemplate digital transformation as a threat to enterprises, and they believe it will lead to destructive consequences.

Digital transformation is a process in which the "digital world" merges with the "physical world" [10], forcing companies to cope with radical change and shocks of uncertainty. Scholz [11] scrutinized the impact of uncertainty risks on organizational vulnerability and the need to enhance organizational vulnerability assessment and resilience management during transition. Matt [12] discovered that more than half of the enterprises adopting the digital transformation strategy are not as good as before the transformation, and some may still face the risk of bankruptcy. Recently, Rialti [13] and Scuotto [14] discovered that in the process of digital transformation, enterprises will reconstruct the original organizational capability, form the organizational ambidextrous capability (i.e., dynamic capability), and can effectively handle the dilemma faced in the process of digital transformation. According to the dynamic capability theory, digital transformation is a trigger for the creation of dynamic capability [15] and represents an innovation process of enterprise integration, reconstructing internal and external resources, processes, and structures. Organizational ambidextrous capability includes exploitative innovation and exploratory innovation.

Exploitative innovation alludes to the enhancement of the organization's existing resources and capabilities; exploratory innovation alludes to the reconfiguration of the organization's existing assets. Through adaptive innovation, existing assets and capabilities can be effectively utilized while building new capabilities and resources that are compatible with past development paths. "Ambidexterity" refers to a dynamic capability that describes a firm's ability to explore and exploit simultaneously and adapt over time [16]. Consequently, the dynamic capability theory offers insight into the relationship between digital transformation and organizational resilience.

Based on the dynamic capability theory, by taking enterprises in China as research objects, this study explores influence mechanisms among digital transformation, ambidextrous innovation, and organizational resilience based on the literature related to digital business strategies, innovation management, and organizational resilience. This study analyzed the data through the use of the fuzzy-set qualitative comparative analysis (fsQCA)

and structural equation modeling (SEM) for determining both sets of relations and statistical associations. This research found that the digital transformation of enterprises helps to improve organizational resilience. Additionally, digital transformation has a positive impact on the organizational resilience of enterprises mediated by both exploitative innovation and exploratory innovation. Both exploitative innovation and exploratory innovation of enterprises have a positive impact on organizational resilience, and there is a complementary relationship between exploitative innovation and exploratory innovation. This study is beneficial to deepening the knowledge and understanding of enterprises as they strive to realize organizational resilience through digital transformation, and provides management and policy suggestions for management practices of enterprises.

The next section presents our theoretical background and the research hypotheses. Section 3 describes the sample, analyzes the measurement scales' validity, and introduces the methodology used in this study. Section 4 presents the results obtained. Section 5 discusses our findings in terms of theoretical and managerial implications and also highlights the main limitations of our research and some possible future research directions. The concluding section summarizes the main contributions of this study.

2. Theoretical Background and Hypotheses

2.1. Dynamic Capability View

Teece [17] proposed the definition of dynamic capabilities and its theoretical framework, describing dynamic capabilities as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments”. The dynamic capability view extends the resource-based view of the firm (RBV) to include the ability of firms to alter their resource base in order to adapt to their environment and ensure survival. Three main mechanisms [18] enable firms to innovate and adapt to changes in their environment: sensing, seizing, and transforming. Seizing alludes to mobilizing resources to improve response to needs and opportunities and gain value from them; transforming describes the ability of an enterprise to continuously update and configure resources so that firms are able to seize opportunities strategically and respond to threats.

Dynamic capability theory has become one of the most active research perspectives in the strategic management literature, because it explains how companies respond to rapid changes in technology and markets [19]. The dynamic capability view represents a suitable framework for investigating whether digital transformation could be leveraged to facilitate organizational resilience and exploring the possible mediation of ambidextrous innovation. In the managerial literature, scholars have indeed used the dynamic capability view as a theoretical perspective to examine all these constructs [15,16].

2.2. Digital Transformation

An enterprise’s digital transformation involves integrating internal and external resources through information, computing, communication, and connectivity technologies in order to reshape its corporate vision, strategy, organizational structure, processes, capabilities, and culture to adapt to the changing digital world [1]. According to the IS literature, Nwankpa and Roumani [20] first developed a new scale to capture digital transformation. Items included the following: “our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile and social media platform”; “our firm is integrating digital technologies such as social media, big data, analytics, cloud and mobile technologies to drive change”; and “our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile and social media platform”. According to research into digital business strategies, Chu [21] improved the scale of Nwankpa and Roumani [20] based on the digital transformation of China’s manufacturing industry. Three items focus on the use of digital technology in commercial activities, business process, and communication of commercial information. The above measurement provides a feasible path for the subsequent digital transformation research. Early research has largely focused on technology applications, proposing that

digital transformation alludes to the application of digital technology to business operations. The relationship between digital technology and organizational performance has been scrutinized by scholars [19]. Researchers typically discuss digital transformation from the perspective of technological change, and they also discuss the impact of digital transformation on organizational vulnerability [11] and business model transformation [22]. With a deep understanding of digital transformation and the dynamics of the external environment, scholars have begun calling for the adoption of digital transformation practices to assist firms in achieving sustainable goals [23].

Digital transformation has been viewed as a facilitator of organizational dynamic capabilities such as ambidexterity [14,15], which need to be continuously updated to remain competitive in dynamic environments. In alignment with previous research [15], we contemplate digital transformation to be a trigger for dynamic capabilities, which can generate value both directly and indirectly [14].

2.3. Ambidextrous Innovation

The concept of “exploitation and exploration” was introduced by March [24] and has been widely utilized since then in the field of organizational learning and strategic management. Exploitation is the process of improving performance by refining and extending an enterprise’s existing capabilities, processes, and technologies to achieve a predictable outcome. In addition to this definition, it is defined as disengaging from the current task and seeking alternative solutions. Various experimental methods are used with uncertain results to find new solutions. A subsequent study by Benner and Tushman [25] extended the concept of “exploitation and exploration” to innovation and argued that developing and maintaining sustainable competitive advantage requires ambidextrous innovation. Exploitative innovation suggests that enterprises continuously expand existing technologies and knowledge, expand existing products and services, and improve existing process efficiency and the sales rate of existing products through continuous improvement of quality. Innovative behavior responds to customer and market demands. The term exploratory innovation alludes to new knowledge development, product development, and service development by enterprises in the continuous pursuit of new knowledge. Innovation addresses the needs of potential or emerging customers and market demands, which is related to search, discovery, autonomy, innovation, and embracing variation [16]. Ambidextrous innovation involves doing both [16].

The literature has outlined the significant impact of ambidextrous innovation on organizational growth and adaptation [26]. Ambidextrous innovation is characterized by characteristics such as listening to changing markets, learning and experimenting, and rearranging resources and capacities as part of the innovation process [27].

2.4. Organizational Resilience

Resilience derives from “resilire” and “resilio”, which mean “bounce back” or “jump back” in Latin [4]. Over time, resilience has been studied in a number of disciplines, including psychology, organization sciences, engineering, and ecology. Meyer [28] introduced resilience into the research field of organizational management, opening the door to research on organizational resilience. Despite the fact that scholars have yet to reach a consensus on organizational resilience, most scholars believe it is a firm capability related to the ability to successfully absorb, adapt to, and eventually capitalize on disruptive surprises that may threaten survival [4]. It consists of three basic characteristics (see Table 1).

Table 1. Basic characteristics of organizational resilience.

Basic Characteristic	Content
Perception	Organizational resilience is the ability of enterprises to strive to perceive adaptation to environmental changes, and enterprises with higher organizational resilience are good at timely discovering early warning signals in a crisis.

Table 1. Cont.

Basic Characteristic	Content
Integration and coordination	Organizational resilience can promote corporate flexibility to mobilize internal and external resources to resist external crises.
Reorganization	Organizational resilience enables firms to reconfigure resources and capabilities and complete the necessary internal and external transformations.

The dynamic characteristics of these theoretical approaches are a suitable frame to analyze organizational resilience as it can be considered an organizational capacity that may be dynamically reinvented [29]. Following this approach, several scholars consider organizational resilience to represent natural outputs of dynamic capabilities. Therefore, the dynamic capability view represents a theoretical perspective through which organizational resilience can be appropriately examined.

2.5. Hypotheses

2.5.1. Digital Transformation and Organizational Resilience

An organization's resilience can be explained by the entire response process that it perceives, adapts to, and recovers from a crisis. First, digital transformation improves the perception of businesses. Digital technology can be used as a part of the transformation process due to its ability to capture changes in the internal and external environments immediately [30]. Digital technology can also help organizations quickly link internal and external sources of information, expand the breadth and depth of information, speed up the decision-making process, and drastically reduce response times. For instance, intelligent products and services can implement automated algorithmic decisions by embedding AI programs [1]. Dubey [7] confirmed that big data analysis has a significant impact on supply chain resilience; Li [31] demonstrated that digital technology can enhance information processing capabilities and organizational agility.

Second, digital transformation allows enterprises to become more integrated and coordinated. Resource constraints, as well as limited resources, play a crucial role in the formation of organizational resilience [4]. The most significant impact of destructive events on the enterprise is the disruption of the "orderly" connection mode already established and operated within the organization. The existing connection between people is fragmented, and activating organizational resilience requires efficiently connecting resources. By adjusting cross-level and cross-departmental interaction rules, digital technology connects business modules and management units that are divided within an organization. Velu [2] proposed that it is essential to maintain collective mobility (e.g., commitment, interaction, and communication) in the face of increasing external disturbances, and that information systems can help enhance organizational resilience through their integration and coordination capabilities. Leong [9], based on an in-depth case study of the 2011 Thailand flooding, discovered that social media technology can be useful for resource integration in community response to natural disasters, as well as for coordinating internal and external resources.

Finally, digital transformation enhances the ability of enterprises to rebuild. In addition, digital resources and capabilities provide the organization with three dimensions of empowerment (structural, psychological, and resource empowerment) [9], release psychological capital in employees [32], and promote creative ability in employees after a crisis. Meanwhile, digital transformation breaks the original business logic of enterprises, creates new value propositions, enables business model innovation [22], and stimulates the restructuring and transformation capabilities of enterprises. In summary, being digitally transformed improves the enterprise's ability to perceive, integrate, and coordinate, as well as rebuild itself. Consequently, we propose the following hypotheses:

Hypothesis 1 (H1). *Digital transformation has a positive and direct impact on organizational resilience.*

2.5.2. Digital Transformation and Ambidextrous Innovation

The dynamic capability perspective states that in the process of digital transformation, the original organizational capacity will become ambidextrous, including exploitative innovation and exploratory innovation, to solve the contradiction between opportunities and challenges brought about by digital transformation [16]. Using information systems, Dubey and Gunasekaran [7] suggested balancing the exploration and exploitation needs of activities and promoting ambidextrous capabilities. In the fashion industry, Scuotto [14] discovered that digital transformations will endow enterprises with ambidextrous innovation orientations.

First, digital transformation requires exploitative innovation based on existing skills and business processes. Due to emerging technologies, enterprises will gradually strengthen their learning and experience the accumulation of digital knowledge. In addition, they will combine digital technology with existing resources and capabilities for deep learning and development to optimize existing business processes, products, and services. Andrae [33] argued that companies should not adopt emerging technologies and disruptive technologies (virtual reality and machine learning), but instead should adopt digital technologies already widely utilized (mobile phones, apps, etc.). This is because existing technologies are often more likely to generate revenue than emerging technologies with higher uncertainty. Carugati [34] pointed out that enterprises can improve their efficiency and familiarity with a new technology when they are using new technologies. According to Li [35], digital transformation can also be achieved in a gradual manner, emphasizing the cumulative nature of the process.

Second, some scholars believe that digital transformation requires enterprises to undergo multifaceted transformations and upgrades. With intelligent tools to design, produce, and support products and services in the whole enterprise and its value chain by exploratory innovation, enterprises can manage survival and competitive value creation (including business models, operation processes, and customer experience) [35]. Digital technology changes organizational boundaries, not only providing firms with new combinations of capabilities, but also expanding the source of resources. As an example, cloud computing provides organizations with on-demand, resilient resources that no longer need to be provided, managed, or maintained by traditional IT personnel. Consequently, we propose the following two hypotheses:

Hypothesis 2a (H2a). *Digital transformation has a positive and direct impact on exploitative innovation.*

Hypothesis 2b (H2b). *Digital transformation has a positive and direct impact on exploratory innovation.*

2.5.3. Ambidextrous Innovation and Organizational Resilience

In order to achieve organizational resilience, it is necessary to innovate when it comes to organizational values, processes, and behaviors that favor perpetuation over innovation [29]. Ambidextrous innovation has shown a significant direction for the allocation and application of resources and capabilities of enterprises and is instrumental in mobilizing and stimulating resources and capabilities flexibly in the face of a destructive crisis. Scholars have demonstrated the ability to pursue two dissimilar tasks simultaneously. That is to say, the factors that determine an organization's success and survival are manufacturing efficiency, flexibility, differentiation, and low-cost strategic positioning, as well as global integration and local responsiveness.

The purpose of strategic innovation is to improve existing technology capabilities and knowledge, to improve existing product design and functionality, to expand existing

operational skills and knowledge, to improve existing distribution channels, and to provide better services and more abundant value to existing customers [13]. Exploitative innovation is primarily designed to improve the current operating efficiency, increase the current performance level, and increase the stability of the organization. Conversely, exploratory innovation requires acquiring and developing new technical capabilities and knowledge, as well as devising new distribution channels, adopting new promotion methods, and delivering valuable products and services in the new market [13]. A key objective of exploratory innovation is to maximize future returns, enhance long-term competitiveness, and gain continuous competitive advantage in the market. This is conducive to increasing enterprise flexibility. According to Carugati [34], exploitative innovation can take advantage of new technology to ensure the continuity and stability of original business processes. The exploratory innovation of information technology helps enterprises escape the crisis, realizing the normalization of enterprise operations to the crisis institutionalization stage, by breaking path dependence, and mining new practices to promote strategic renewal and resilience. We propose the following two hypotheses:

Hypothesis 3a (H3a). *Exploitative innovation has a positive and direct impact on organizational resilience.*

Hypothesis 3b (H3b). *Exploratory innovation has a positive and direct impact on organizational resilience.*

2.5.4. The Mediating Role of Ambidextrous Innovation

With the new model, it is difficult to make digital transformation without transforming the old model in a comprehensive manner, but if the change is too aggressive, the organization may lose its resilience. During the process of breaking through mode inertia, how can enterprises effectively control the risk of mode variation and improve organizational resilience? According to research, enterprises typically use both exploitative and exploratory methods [36]. In their article, Warner and Wager [15] noted that the purpose of building digital capabilities is to balance internal and external collaboration, design flexible and stable governance structures, and improve employees' digital skills. Specifically, Piccinini [37] discovered that organizational ambidexterity is significant for tackling emerging challenges due to the convergence of the physical and digital worlds. Ambidextrous innovation is a process for solving "paradoxes" and "contradictions" in the enterprise digital transformation. It is also a powerful means to help enterprises shape their organizational resilience.

A gradual or drastic transformation of existing knowledge resources or management is part of the process. Exploitative innovation continues to extend existing technology and knowledge to expand existing products and services, and its essence is to help firms gain resilience by improving their ability to coordinate and integrate into rapidly shifting environments. By constantly acquiring new knowledge and developing new products and services by letting go of the over-reliance on existing organizational processes, the aim of exploratory innovation is to help enterprises gain resilience by improving their dynamic ability to restructure and transform in shifting environmental contexts. In a case study of medical organizations, Gasaldi [38] discovered that flexibility and ambidextrous innovation can increase the probability of successful digital transformation. Limnios [39] confirmed that ambidextrous organizations can continue to scan their operating environment and identify opportunities for change in a crisis, as well as maintain and develop key capabilities that are strategic and defensive in balance.

By leveraging exploitative innovation and exploratory innovation, digital transformation can improve the organizational resilience of enterprises. Accordingly, we propose the following hypotheses:

Hypothesis 4a (H4a). *Exploitative innovation mediates the positive effect of digital transformation on organizational resilience.*

Hypothesis 4b (H4b). *Exploratory innovation mediates the positive effect of digital transformation on organizational resilience.*

2.5.5. The Interaction Effect of Exploitative Innovation and Exploratory Innovation

Exploratory innovation and exploitative innovation can have a paradoxical relationship. Nevertheless, the two patterns are often achieved simultaneously so that they complement each other or are balanced [16,26]. March [24] said that maintaining a balance between exploration and exploitation is crucial to a firm's survival and prosperity, especially in dynamic environments [40]. Existing literature has not addressed ambidextrous innovation for organizational resilience. We suggest that exploratory and exploitative innovation can be utilized together to achieve high levels of organizational resilience. Companies can achieve standardized and streamlined processes for a rapid response, as well as abundant knowledge and tighter integration for a long-run recovery. The main reasons are as follows:

First, Sanders [41] divided the IT application paradigm into two complementary constructs, namely, IT applications for exploitation and IT applications for exploration. Similarly, exploitation innovation and exploratory innovation are aspects of ambidextrous innovation, with one focusing on the present and the other on the future. Companies need to use digital transformation to improve organizational resilience, which does not mean that they should abandon their previous resources and knowledge, but they should enhance their adaptability to the new environment based on the assumption that they will retain their original advantages [42]. Through an in-depth study of Volvo Cars' digital transformation, Svahn [42] discovered that Volvo has achieved organizational stability and flexibility by implementing exploitative innovation and exploratory innovation to balance the new and the old innovation capacities.

Second, companies can carry out exploitation and exploration activities across different business units or at different times. For instance, an enterprise may take an exploratory innovation approach to radically change modules it can control, but an exploitation innovation approach to modules that cannot be changed in one step and have difficulty controlling. Through the integrated innovation model of "exploitative and exploratory", while creating qualitative changes in the necessary links, it also ensures that the pace and scope of change are within the enterprise's control, thereby effectively controlling the risks associated with digital transformation.

Last but not least, if a company develops mainly exploratory innovation, it will make its return cycle longer and could easily fall into a continuous exploration cycle. Although exploitation of innovation will increase short-term financial performance, the company's ability to respond to environmental changes will be weak, which is not conducive to long-term sustainable development. Traditional businesses that are interested in digital transformation need to explore digitalization, but they must rely on their original business activities to obtain profit. Otherwise, it will not only lead to the failure of the transformation, but also affect the overall operation of the company. Taking into account the above arguments, we suggest the following hypothesis:

Hypothesis 5 (H5). *Exploitative innovation and exploratory innovation are complementary in improving organizational resilience.*

The research model is shown in Figure 1, which maps the hypothesized associations among digital transformation, ambidextrous innovation (i.e., exploitative innovation and exploratory innovation), the interaction of exploitative innovation and exploratory innovation, and organizational resilience.

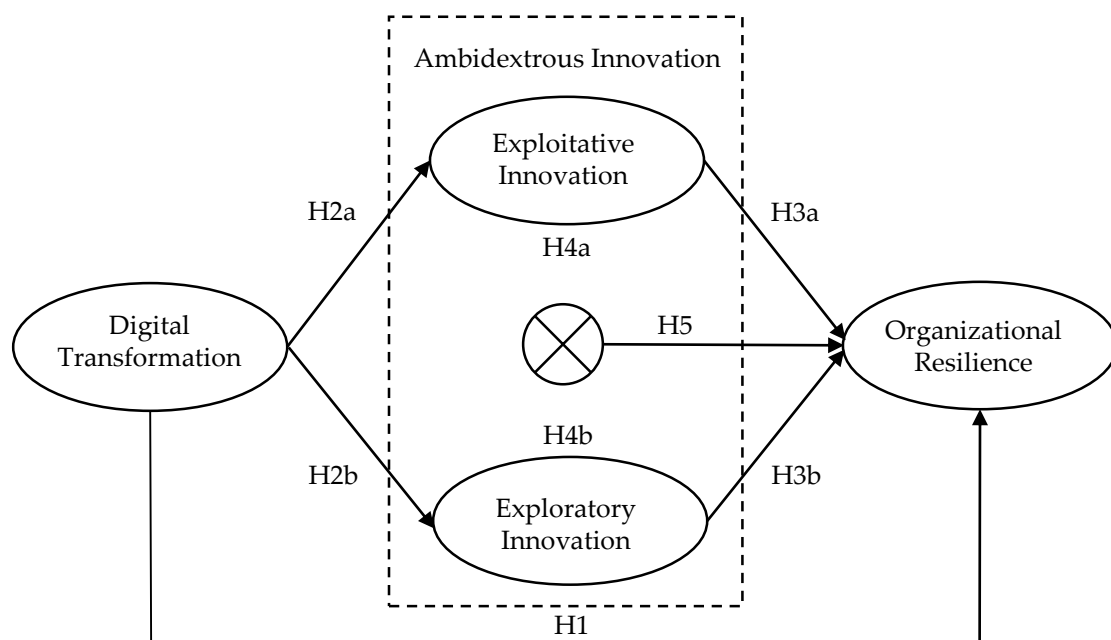


Figure 1. Research model. Note: “⊗” represents the interaction between exploitative innovation and exploratory innovation.

3. Research Methodology

3.1. Data

To test the research hypotheses, we employed a survey approach to collect data from top and middle-level managers because participants needed to have adequate knowledge to answer questions about the impact of digital transformation on organizational resilience. To control for the potential impact of culture, the nature of the position, and tasks, survey participants were limited to managers in China. With the help of a national market research firm, which helps researchers obtain the views of panel specialists, the survey was sent through email to 500 individuals. Using a market research firm to collect data has many advantages, especially generalizability [43].

The sample selection criteria include: (1) Based on research findings [44], an IS or IT strategy generally has a time lag of “4–36” months on organizational resilience. As a screening criterion, the questionnaire for this research includes the question “The number of years for your company to establish a digitalization/IT department or full-time digitalization/IT supervisor”. There are four options: “none”, “less than half a year”, “half a year–1 year”, “1 year–2 years”, and “more than 2 years”. The options “none” and “less than half a year” were eliminated. (2) To ensure that participants had sufficient knowledge of the effects of digital transformation on organizational resilience, we asked them about the extent of their knowledge of digital transformation in their firms. Participants who were unfamiliar with the study were excluded. Many studies have utilized this approach [43]. In addition, we removed responses that (1) were completed in less than 5 min (since the survey should take about 5–10 min), (2) were incomplete, (3) were terminated at the beginning of the survey, or (4) had the same answer to all questions. A total of 339 usable responses were received, representing a response rate of 67.8%. The demographic characteristics of the sample are presented in Table 2.

Table 2. Sample characteristics.

Variables	Category	Number (N)	Percentage (%)
Gender	Male	186	54.867
	Female	153	45.133

Table 2. Cont.

Variables	Category	Number (N)	Percentage (%)
Age	25	1	0.295
	26–30	48	14.159
	31–35	159	46.903
	36–40	78	23.009
	>41	53	15.634
Role	Top manager	136	40.118
	Middle-level manager	203	59.882
	College diploma	13	3.835
Education	Bachelor's degree	230	67.847
	Master's degree	85	25.074
	Ph.D. degree	11	3.244
	<5	28	8.260
Firm age	5–10	64	18.879
	11–20	128	37.758
	>20	119	35.103
Firm size (Asset)	<CNY 10 million	40	11.799
	CNY 10–50 million	85	25.074
	CNY 50–100 million	82	24.189
	>CNY 100 million	132	38.938
Firm state	State-owned enterprise	66	19.469
	Private enterprise	273	80.531
Industry type	Manufacturing	138	40.708
	Services	60	17.699
	Wholesale and retail trade	20	5.900
	Else	121	35.693
Location	East	32	9.440
	Midland	41	12.094
	West	266	78.466

The results of our study are based on a sample of 339 respondents whose characteristics are listed in Table 2. Among them, 54.9% are male and 45.1% are female. The majority of employees are under 36 years of age (61.4%), have bachelor's degrees (96.2%), and hold top management positions (59.9% hold middle-level management positions). Additionally, 36.9% of the sampled firms have revenues of less than CNY 50 million. Companies operating in manufacturing (40.7%), services (17.7%), wholesale and retail (5.9%), and other industries (35.7%) responded.

3.2. Variable Definition and Measurement

Previously validated scales were used for all the constructs. Respondents rated the items on a 5-point Likert scale.

3.2.1. Digital Transformation

We measured digital transformation as a first-order reflective construct consisting of a 5-item scale according to Nwankpa and Roumani [20] and Chu [21]. Typical entries for each dimension include “our firm is driving new business processes built on technologies such as big data, analytics, cloud, mobile and social media platform”; “our firm is integrating digital technologies such as social media, big data, analytics, cloud and mobile technologies to drive change”; “our business operations are shifting toward making use of digital technologies such as big data, analytics, cloud, mobile and social media platform”; “our firm is developing digital products and services”; and “our firm is willing to vigorously promote and publicize digital skills and management knowledge”.

3.2.2. Exploitative Innovation

We measured exploitative innovation as a first-order reflective construct consisting of a 6-item scale from Jansen [45]. Items included the following: “we frequently refine the

provision of existing products and services”; “we regularly implement small adaptations to existing products and services”; “we introduce improved, but existing products and services for our local market”; “we improve our provision’s efficiency of products and services”; “we increase economies of scales in existing markets”; and “our unit expands services for existing clients”.

3.2.3. Exploratory Innovation

We measured exploratory innovation as a first-order reflective construct consisting of a 5-item scale from Jansen [45]. Items included the following: “our unit accepts demands that go beyond existing products and services”, “we invent new products and services”, “we experiment with new products and services in our local market”, “we commercialize products and services that are completely new to our unit”, and “we frequently utilize new opportunities in new markets”.

3.2.4. Organizational Resilience

Finally, organizational resilience was measured as a first-order reflective construct consisting of a 4-item scale from Parker and Ameen [46]. Items included the following: “we are able to cope with changes in our business brought on by external crises”, “we are able to easily adapt our business operations to external crises”, “we are able to provide a quick response to the negative effects of external crises on our business”, and “we are able to maintain high situational awareness at all times”.

3.2.5. Control Variables

The characteristics of managers, enterprises, and regions have a greater influence on the digital transformation and innovation methods of enterprises. Using individual-, enterprise-, and region-level data, this paper selected 9 control variables. First of all, the individual level includes the gender of the manager (male code is 1; female code is 0), age (more than 35 years old is coded as 1; less than 35 years old is coded as 0), position (high-level managers are coded as 1; middle-level managers are coded as 0), and education (code for master’s degree and above is 1; that for bachelor’s degree and below is 0). Second, the enterprise-level includes the age of the enterprise (more than 10 years is coded as 1; less than 10 years is coded as 0), the size of the enterprise (enterprises with a total asset of more than CNY 50 million are coded as 1; those with a total asset of less than CNY 50 million are coded as 0), the nature of the enterprise (state-owned enterprise code is 1; private enterprise code is 0), and the industry type (manufacturing code is 1; nonmanufacturing code is 0). Finally, the development levels of China’s middle-eastern and western regions are quite different; the regional level includes the location of the company (western region is coded as 1, central region is coded as 2, and eastern region is coded as 3).

3.3. Statistical Techniques

We used both partial least squares structural equation modelling (PLS-SEM) and fuzzy-set qualitative comparative analysis (fsQCA). These two statistical techniques are based on different principles and have different focuses [21]. SEM analyzes the net impact of the independent variable on the outcome as well as the competition among independent variables in explaining the dependent variable; furthermore, it is based on the rules of linearity, unifinality, and additive effects [21]. On the contrary, fsQCA explores combinatorial effects and assumes the existence of asymmetries between variables, equifinality (different routes can generate the same outcome), multifinality (identical elements can generate different outputs), and conjunctural causation [47]. In contrast to other QCA methods, in the case of fsQCA, the variables are on a fuzzy (continuous between 0 and 1) and not on a dichotomous (binary) scale. Furthermore, it seeks combinations (configurations) of causal conditions, leading to a specific outcome, rather than simple correlations between constructs [47].

3.4. Common Method and Nonresponse Bias

First, we reduce the errors caused by language expression ambiguity by making repeated corrections to show the most accurate language expression to the respondents. The second step is to make the study scale and its questions less predictable by changing the order of variables and having them filled in anonymously to reduce the deviation caused by the respondent's personality. Last but not least, the post hoc Harman's statistical test does not indicate a single factor simultaneously affecting all studied constructs. An exploratory principal components analysis of all indicators in the study reveals six principal components with eigenvalues exceeding 1 (the largest component accounting for 28% of the variance). Moreover, the maximum likelihood exploratory factor analysis demonstrates that the single-factor solution produces a significantly different correlation matrix ($\chi^2 (df = 189) = 1255.76, p < 0.001$), and accounts for only 25% of the set's variance.

3.5. Measurement Model

Three basic tests to ensure the convergent validity of the employed measures were used [48]. First, for latent constructs with multiple indicators, all hypothesized factor loadings are significant at the 0.05 level, and all standardized loading values highly exceed the recommended threshold of 0.5 (see Table A1). Second, all composite reliability (CR) indices turn out to be well above the stipulated cutoff point of 0.7, suggesting good reliability of the measured constructs. Third, the only construct that fails this test is exploitative innovation, with AVE = 0.462, very close to the recommended threshold of 0.5. The average variance extracted (AVE) indicators for other constructs are above the recommended minimum, suggesting an adequate convergence. Table 3 reports the results of CFA and chi-square difference tests. As shown in Table 3, the CFA results indicate that our hypothesized four-factor model (digital transformation, exploitative innovation, exploratory innovation, and organizational resilience) is a better fit to the data ($\chi^2 = 385.825$; CFI = 0.912; IFI = 0.913; RMSEA = 0.051; SRMR = 0.039) than other parsimonious models, given that the chi-square difference test results are all significant at the 0.001 level. Based on this analysis, the discriminant validity of the four key variables is good enough for subsequent research.

Table 3. Confirmatory factor analyses (CFA) and chi-square difference test results.

Model	χ^2	df	χ^2/df	RMSEA	SRMR	CFI	IFI
Four-factor	385.825	204	1.891	0.051	0.039	0.912	0.913
Three-factor	425.191	206	2.064	0.056	0.038	0.894	0.895
Two-factor	443.877	208	2.134	0.058	0.038	0.886	0.887
One-factor	504.401	209	2.413	0.065	0.040	0.857	0.859

Note: DT = digital transformation; EXPLOI = exploitative innovation; EXPLOR = exploratory innovation; OR = organizational resilience. Four-factor = DT, EXPLOI, EXPLOR, OR; three-factor = DT + EXPLOI, EXPLOR, OR; two-factor = DT + EXPLOI + EXPLOR, OR; one-factor = DT + EXPLOI + EXPLOR + OR.

4. Empirical Results

4.1. Correlation Analysis

Table 4 presents the descriptive statistics and correlation analysis. As shown in Table 4, there was a significant positive correlation between digital transformation and organizational resilience ($r = 0.476, p < 0.05$). Exploitative innovation and organizational resilience were significantly positively correlated ($r = 0.365, p < 0.001$). Exploratory innovation and organizational resilience were also significantly positively correlated ($r = 0.365, p < 0.001$). The confirmation of the correlation between these variables provided preliminary evidence for our hypotheses and laid a foundation for subsequent research. Further, the variance expansion factor of all independent variables shows an average VIF of 1.42 and a maximum of 2.70, much less than the threshold of 10, indicating that there is no serious multicollinearity problem with the independent variables in this paper.

Table 4. Descriptive statistics and correlation analysis.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Digital transformation	0.744												
2. Exploitative innovation	0.567 *	0.635											
3. Exploratory innovation	0.569 *	0.655 *	0.708										
4. Organizational resilience	0.476 *	0.592 *	0.587 *	0.738									
5. Gender	0.045	0.008	−0.025	−0.050	1.000								
6. Age	−0.020	0.015	−0.046	0.048	0.182 *	1.000							
7. Role	0.137 *	0.202 *	0.200 *	0.132 *	0.317 *	0.165 *	1.000						
8. Education	0.113 *	0.034	0.104 *	0.048	0.042	0.078	0.059	1.000					
9. Firm age	−0.065	−0.046	−0.072	0.028	−0.016	0.064	−0.025	−0.064	1.000				
10. Firm size	0.034	−0.008	−0.027	0.081	0.052	0.013	0.049	0.017	0.228 *	1.000			
11. Firm state	−0.068	−0.182 *	−0.182 *	−0.063	−0.110 *	−0.024	−0.237 *	0.021	0.041	0.174 *	1.000		
12. Industry type	0.014	0.059	0.040	0.048	−0.039	0.027	0.074	−0.158 *	0.012	0.196 *	−0.062	1.000	
13. Location	0.018	0.061	0.065	0.083	−0.063	−0.002	−0.028	0.093 *	−0.005	0.018	−0.114 *	−0.065	1.000
Mean	4.087	4.001	3.287	4.129	0.549	0.386	0.401	0.283	0.847	0.633	0.198	0.425	2.879
Standard deviation	0.623	0.556	0.536	0.537	0.498	0.488	0.491	0.451	0.361	0.483	0.399	0.495	0.327
Composite reliability	0.861	0.800	0.833	0.827	-	-	-	-	-	-	-	-	-
Cronbach's alpha	0.799	0.702	0.751	0.721	-	-	-	-	-	-	-	-	-

Note: * $p < 0.05$.

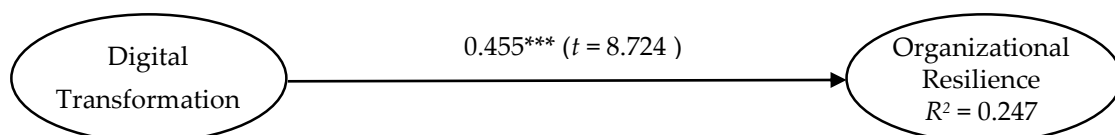
4.2. Hypothesis Testing

Hypothesis testing in this article includes full model testing, mediation effect testing, and interaction effect testing. First, we conduct a full model test. According to the practice of previous studies, we use two-stage partial least squares to estimate the structure model (full model). Second, in terms of mediation effect, the current mainstream bootstrapping program is used to test the mediation effect of exploitative innovation and exploratory innovation. Finally, we use a stepwise regression method to analyze the interaction effects of exploitative innovation and exploratory innovation.

4.2.1. Structural Model Results

Figure 2 synthesizes the structural model from PLS analysis by showing the standardized path coefficients (β) and their significance (t -values) as well as the explained variance of endogenous variables (R^2). We calculated t -values through a bootstrap approach based on 5000 random resamples. Results show that all of our hypotheses are supported. Digital transformation has a significant and positive impact on organizational resilience ($\beta = 0.455$, $t = 8.724$, $p < 0.001$; hypothesis 1 is confirmed). Exploitative innovation is significantly and positively influenced by digital transformation ($\beta = 0.280$, $t = 4.807$, $p < 0.001$; hypothesis 2a is confirmed). Exploratory innovation is significantly and positively influenced by digital transformation ($\beta = 0.573$, $t = 10.970$, $p < 0.001$; hypothesis 2b is confirmed). Organizational resilience presents a significant and positive direct effect from exploitative innovation ($\beta = 0.340$, $t = 3.320$, $p < 0.001$; hypothesis 3a is confirmed) and exploratory innovation ($\beta = 0.318$, $t = 3.538$, $p < 0.001$; hypothesis 3b is confirmed). The structural model explains a variance rate of 50% for exploitative innovation ($R^2 = 0.500$), 32.8% for exploratory innovation ($R^2 = 0.328$), and 43% for organizational resilience ($R^2 = 0.430$). These R^2 values indicate a predictive accuracy of the model between moderate and strong [48].

(A) Model with total effect

**Figure 2.** Cont.

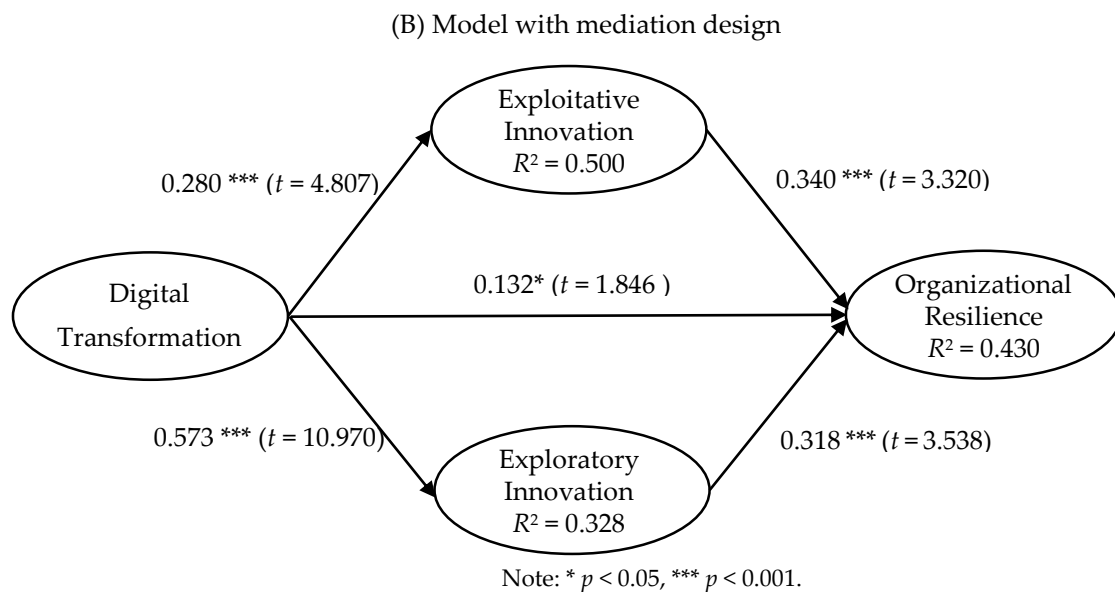


Figure 2. Estimated causal relationships of the structural model.

4.2.2. Mediation Results

In this paper, bootstrapping was used to test the mediating effect of exploitative innovation and exploratory innovation. The resampling times of bootstrapping were set to 5000, and the results of mediation analysis are shown in Table 5. The results show that exploitative innovation and exploratory innovation have a significant mediating effect on the impact of digital transformation on organizational resilience (the upper and lower limits of the confidence interval are not included in 0). Therefore, H4a and H4b are confirmed.

Table 5. Mediation results.

Model	Path	Coefficient	t-Value	95% CI
Model A Total effect	DT → OR	0.455 ***	8.724	(0.359, 0.532)
Model B Direct effect	DT → OR	0.132 *	1.846	(0.017, 0.253)
Model B Indirect effects	DT → EXPLOI → OR	0.182 ***	3.216	(0.048, 0.156)
	DT → EXPLOR → OR	0.095 ***	2.902	(0.094, 0.278)

Note: DT: digital transformation, EXPLOI: exploitative innovation, EXPLOR: exploratory innovation, OR: organizational resilience, 95% CI: bias corrected bootstrap 95% confidence interval. Bootstrapping 15% confidence interval based on 5000 samples. * $p < 0.05$, *** $p < 0.001$.

4.2.3. Interaction Results

We further adopt a stepwise regression method to consider the impact of the interaction of exploitative innovation and exploratory innovation on organizational resilience. In order to avoid the problem of multicollinearity caused by interaction terms and other variables, both exploitative innovation and exploratory innovation are centralized before analysis. The specific analysis steps are as follows (see Table 6): (1) model 1 is the basic model, including 9 control variables; (2) model 2 adds exploitative innovation on the basis of model 1. The results show that the positive effect of exploitative innovation on organizational resilience is significant ($\beta = 0.390$, $p < 0.001$); (3) model 3 adds exploratory innovation on the basis of model 1, and the results show that exploratory innovation also has a positive effect on organizational resilience ($\beta = 0.430$, $p < 0.001$); and (4) model 4 adds both exploitative innovation and exploratory innovation on the basis of model 1. The results show that exploitative innovation ($\beta = 0.222$, $p < 0.001$) and exploratory innovation ($\beta = 0.282$, $p < 0.001$) both have a positive effect on organizational resilience; (5) model 5

incorporates the interaction of exploitative innovation and exploratory innovation on the basis of model 4, and it turns out that the interaction has a significant positive effect on organizational resilience ($\beta = 0.017, p < 0.01$); namely, exploitative innovation and exploratory innovation have complementary effects in improving organizational resilience. Therefore, H5 is confirmed.

Table 6. The test of interaction between exploitative innovation and exploratory innovation.

Variable	Organizational Resilience				
	1	2	3	4	5
Gender	−0.444	−0.285	−0.226	−0.211	−0.235
Age	0.132	0.153	0.326	0.271	0.291
Role	0.662 **	0.173	0.093	0.012	−0.025
Education	0.180	0.096	−0.106	−0.055	−0.070
Firm age	0.021	0.160	0.234	0.240	0.234
Firm size	0.500 *	0.475 **	0.540 **	0.512 **	0.486 **
Firm state	−0.274	0.191	0.194	0.297	0.241
Industry type	−0.000	−0.097	−0.088	−0.113	−0.095
Location	0.381 *	0.314 *	0.134	0.182	0.172
Exploitative innovation		0.390 ***		0.222 ***	0.242 ***
Exploratory innovation			0.430 ***	0.282 ***	0.291 ***
Exploitative innovation × exploratory innovation					0.017 **
R ²	0.049	0.326	0.349	0.402	0.411
Adj R ²	0.023	0.305	0.329	0.382	0.389
F	1.88 *	15.78 ***	17.52 ***	19.96 ***	18.89 ***

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.3. Fuzzy-Set Qualitative Comparative Analysis

4.3.1. Calibration

The purpose of fsQCA is to find out combinations of all causal conditions that may lead to a certain result. In our study, organizational resilience represents results, while causal conditions are a combination of digital transformation, exploitative innovation, and exploratory innovation. As reported by Ragin [47], fsQCA requires the raw data to be transformed into values ranging from 0 to 1, where 1 represents full membership, 0.5 represents crossover point, and 0 represents full nonmembership. In the research, one index is calculated for each of the constructs prior to the calibration of variables through averaging of corresponding indicators. Following prior literature [47], the quartiles method was used to define the three anchors to be used for calibrating the fuzzy sets. The calibration rules for each condition are shown in Table 7.

Table 7. Overview of the calibration rules.

Criteria	Digital Transformation	Exploitative Innovation	Exploratory Innovation	Organizational Resilience
Full membership	4.830	5.000	4.750	5.000
Crossover point	4.170	4.250	4.000	4.250
Full nonmembership	3.000	3.000	2.750	2.750

4.3.2. Analysis of Necessary Conditions

We applied fsQCA to verify whether any of the three antecedent conditions (digital transformation, exploitative innovation, and exploratory innovation) are always present (or absent) in all the cases where the outcome (organizational resilience) is present (or absent). Based on Ragin's [47] recommendation, to be considered "necessary", a condition should have consistency (the level to which the cases comply with the necessity rule) above 0.9. According to Table 8, the consistency of the three conditions is lower than 0.9, so there are no necessary conditions for organizational resilience.

Table 8. Analysis of necessary conditions.

Conditions Tested	Organizational Resilience	
	Consistency	Coverage
Digital transformation	0.805	0.751
~Digital transformation	0.499	0.561
Exploitative innovation	0.831	0.760
~Exploitative innovation	0.459	0.529
Exploratory innovation	0.821	0.773
~Exploratory innovation	0.490	0.546

Note: “~” represents the absence of conditions.

4.3.3. Analysis of Sufficient Conditions

Consistent with prior QCA studies [49], consistency and frequency thresholds need to be determined before performing a sufficient analysis. Consider three practice criteria before determining the threshold: (1) The frequency threshold for small samples can be set to 1, while the frequency threshold for large samples should be greater than 1. (2) The distribution of cases with 0 and 1 in the truth table should be covered and roughly balanced. (3) The number of observed cases should be not less than 75% of the total cases. The final determination of the consistency threshold is 0.84, and the frequency number threshold is 6. FsQCA produces three solutions: complex, intermediate, and parsimonious. This paper mainly reports intermediate solutions and combines with parsimonious solutions to distinguish between core conditions and peripheral conditions [49]. Table 9 shows the configuration for achieving a high level of organizational resilience.

Table 9. Configuration for achieving organizational resilience.

	High Level of Organizational Resilience		
	1a	2a	3a
Digital transformation	●	●	
Exploitative innovation		●	●
Exploratory innovation	●		●
Consistency	0.834	0.824	0.827
Raw coverage	0.725	0.727	0.756
Unique coverage	0.043	0.044	0.073
Overall solution consistency		0.775	
Overall solution coverage		0.842	

Note: ● = core condition present; blank spaces = condition may be either present or absent.

Our analysis produced three possible solutions leading to a high level of organizational resilience. The consistency of the overall solution is 0.842, and the coverage of the overall solution is 0.775, above the acceptable minimum standard of 0.75. All the solutions exhibited high consistency, which in turn indicates the reliability of the solutions, whereas the coverage denotes the extent to which a certain solution can explain all variations in the outcome, like R-square in regression and SEM.

Solution 1a, high levels of digital transformation and high levels of exploratory innovation, has the highest consistency (0.834) and a satisfactory coverage of 0.670. This result gives confirmation to the existence of an indirect effect of digital transformation on organizational resilience through the mediation of exploratory innovation (H3b and H4b). Solution 2a, namely, high levels of digital transformation and high levels of exploitative innovation, indicates the sufficiency of high levels of exploitative innovation for achieving high levels of organizational resilience, which is also coherent with our mediation hypotheses (H3a and H4a). Finally, solution 3a indicates that high levels of exploitative innovation and exploratory innovation are also sufficient to achieve high levels of organizational

resilience, thus supporting the existence of an interaction effect of exploitative innovation and exploratory innovation on organizational resilience (Hypothesis 5).

The robustness of these findings was verified across three different calibration choices (as shown in Table A2). First, the immediate approach to calibrate fuzzy sets was used on the basis of theoretical anchors. Therefore, a rating of 5 denotes full membership, 1 represents full nonmembership, and 3 represents crossover point. Identical results were obtained in the analysis. Second, the crossover point changed to mean value in the different analyses from 3, and three outcomes were analyzed again. Finally, we changed the threshold of case number from 6 to 8. The accordant results yielded over this analysis. The above results of multiple analyses verify the robustness of our findings.

5. Discussion

5.1. Implications for Theory and Research

This study offers several theoretical contributions to the field of academic management.

First, this study provides an overview of the impact of digital transformation. Most existing research has focused on the impact of digital transformation on organizational vulnerability [11] and business model innovation [22]. This study examines how digital transformation facilitates ambidextrous innovation and organizational resilience using the theory of dynamic capabilities. Researchers are currently exploring the impact of digital transformation on organizational resilience and sustainable development [50]. The study positively responds to this. This study uses the PLS structural equation model to discover the direct positive impact of digital transformation on organizational resilience. Through the qualitative comparison and analysis of fuzzy sets, it is also found that digital transformation is a significant antecedent condition of two high organizational resilience configurations (both are core conditions), which further explains that carrying out digital transformation is a significant guarantee for enterprises to achieve high organizational resilience [51]. This is an empirical study of how digital transformation drives exploitative and exploratory innovation. It provides plausible evidence that digital transformation plays a key role in driving innovation capability in response to previous literature.

Second, this article contributes to knowledge about organizational resilience. Existing literature has mainly emphasized digital transformation's impact on supply chain resilience [6] and platform ecosystem resilience [8]. Nevertheless, there is no empirical study analyzing the impact of digital transformation on organizational resilience in the management literature. The article integrates digitization into organizational resilience in an innovative way. In contrast, this article extends the research on the antecedents of organizational resilience. According to the research, digital transformation is a key factor in enterprises pursuing organizational resilience, and as a result, it provides new ideas and perspectives for further exploring the internal factors driving organizational resilience. Organizational resilience is a contextual variable. In order to cultivate and improve organizational resilience, the long-term impact of digital transformation is vital.

Third, our results demonstrate that ambidextrous innovation plays a crucial role in mediating the relationship between digital transformation and organizational resilience. Our study reveals that organizations' resilience can be affected by digital transformation through exploitative innovation. Additionally, we discovered that exploratory innovation contributes to organizational resilience through digital transformation. The two forms of innovation have a positive impact on organizational resilience during the process of digital transformation, and the two are complementary rather than competing. This relationship provides new empirical evidence of organizational ambidexterity, which is consistent with previous research. Digital transformation requires both the use of existing capabilities and the exploration of new ones [42]. Nonetheless, there is no empirical test of the relationship between exploitative innovation and exploratory innovation in the prior literature on digital transformation. Consequently, it echoes the call made by He and Wong [26] to test the ambidexterity hypothesis in other management research fields.

Finally, this paper extends the dynamic capability view literature to the digital economy. Most existing research on the dynamic capability development mechanism of enterprises ignores the applicable contexts and environmental changes of the dynamic capability development mechanism, focusing less on the data-driven dynamic capability development mechanism of enterprises. This study examines how digital transformation builds the dynamic capabilities of organizational resilience and provides a new theoretical perspective for future research in this area. As a result, we argue that contingency-based research can help theoretically and empirically integrate the dynamic capabilities field recommended by Peteraf [52] and Vial [1].

5.2. Managerial Implications

In summary, this article offers three main managerial implications:

First, enterprises should accelerate their digital transformation pace to become more resilient in the face of digitization. Transformation to digital technology is essentially an innovation process that helps organizations deal with uncertainty and change proactively and resist adversity. Due to the long-term impact that digitalization will have on enterprises, senior leaders, as the key to digital transformation decision making, need to have digital thinking capabilities and professional digital knowledge, as well as appreciate the organization's internal and external environments. They should analyze and appreciate the underlying logic of digital transformation of corporate growth; integrate and control internal and external human, material, and financial resources; and formulate a reasonable digital strategy.

In the future, networked business intelligence and real-time decision-making analysis and visualization tools will maximize the value of data, help companies discover problems more intuitively, predict market changes, and assist decisions so that they will be more flexible and resilient in their operations. Moreover, in the qualitative comparative analysis of fuzzy sets, we also discovered that another digital transformation with high organizational resilience is a new configuration (3a) absent from the core condition. This indicates that digital transformation is not a sufficient condition for organizational resilience, and companies without digital transformation may not have high levels of organizational resilience. As a result, companies need to develop digital transformation strategies based on their own resource endowments to improve organizational resilience.

In the second phase, digital transformation will enhance and improve organizational resilience by using exploitative innovation and exploratory innovation. Exploratory innovation and exploitative innovation activities are known to act as mediators between digital transformation and organizational resilience. Entrepreneurs should identify opportunities, share the latest industrial change information, and improve the ability of their organization to identify opportunities. At the same time, by regularly questioning the existing value system within the company, innovations that will bring profitability to the company are encouraged, and the existing activities within the company can be reformed and reconstructed to match the changes in the external environment. Companies can use digital transformation to improve existing capabilities through incremental changes and rebuild existing capabilities through creative destruction so as to continuously integrate and reconstruct organizational skills and resources to match the complex and changeable external environment.

Finally, the orderly management of paradoxes is achieved by matching exploitative and exploratory innovations. In the management field, there are many paradoxes, and companies must make optimal decisions in this seemingly paradoxical dilemma. The study finds that matching exploitative and exploratory innovations by enterprises promotes organizational resilience in a certain way. Consequently, in the process of digital transformation, companies can implement different types of innovations in different business units based on organizational design, such as dividing exploitative and exploratory activities within different organizational units. Accordingly, based on the organizational context, the internal design of the entire organization reflects both the consistency of internal business unit

activities and the adaptability for rapid restructuring of the internal business unit of the organization. A senior management team must be able to coordinate different cultures and structures, weigh the conflict between short-term efficiency and long-term adaptability, and continuously adjust its leadership style so that different types of managers can match their management activities. It is imperative that companies emphasize control and stability to achieve short-term stability through exploitative innovation, but also promote adventure and creativity to achieve long-term flexibility through exploratory innovation, and achieve organizational resilience through the balance of exploitative and exploratory innovations.

5.3. Limitations and Future Research Directions

This study has several limitations, which suggest meaningful future research directions. First, the fact that this study only looks at firms based in one country (China) limits the generalizability of the results obtained, as country-specific characteristics might influence how digital transformation has an impact on ambidextrous innovation and organizational resilience, as well as the size of these impacts. Future research should therefore perform cross-country analyses in order to verify whether our findings are also valid for other national economic settings. Second, this study analyzes the mechanism of digital transformation on organizational resilience based on the perspective of dynamic capability. However, the specific process (including sensing, seizing, and transforming) needs to be further explored through case studies in the future. Third, this study examined the research model using cross-sectional data. Future studies could examine the links in the model using panel data. Finally, when managers fill out the questionnaire, they may have a subjective bias regarding the company's digital transformation, ambidextrous innovation, and organizational resilience. This also displays an inevitable limitation of the questionnaire and research methods chosen within this publication. We suggest that future studies could use the secondhand data of listed companies to measure the variables in this article more objectively and test the robustness of the model.

6. Conclusions

The main objective of this study was to address a significant gap in the literature regarding the impacts of digital transformation on ambidextrous innovation (i.e., exploitative innovation and exploratory innovation), which eventually has an impact on organizational resilience. We used the dynamic capability view to explain how digital transformation can improve a firm's ambidextrous innovation capabilities, which can improve organizational resilience. This research deepens the theoretical understanding of the relationships of digital transformation, exploitative innovation, exploratory innovation, and organizational resilience, and provides relevant guidance for enterprises to achieve resilience through digital transformation.

Author Contributions: Conceptualization, J.Z. and J.L.; methodology, J.Z. and A.M.E.v.S.; software, J.Z.; investigation, J.Z. and J.L.; data curation, J.Z. and J.L.; writing—original draft preparation, J.Z. and A.M.E.v.S.; writing—review and editing, J.L. and A.M.E.v.S.; supervision, J.L. All authors have read and agreed to the published version of the manuscript.

Funding: This study was funded by the National Natural Science Foundation of China (grant numbers 71672080 and 72072086).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The dataset generated and analyzed in this study is not publicly available. Dataset is available from the corresponding author on reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Factor loading and cross loadings of reflective constructs.

	DT	EXPLOI	EXPLOR	OR
DT_1	0.807	0.475	0.452	0.347
DT_2	0.724	0.438	0.432	0.346
DT_3	0.746	0.420	0.476	0.371
DT_4	0.745	0.405	0.435	0.321
DT_5	0.698	0.389	0.317	0.326
EXPLOI_1	0.431	0.632	0.371	0.329
EXPLOI_2	0.316	0.508	0.279	0.205
EXPLOI_3	0.399	0.682	0.486	0.469
EXPLOI_4	0.380	0.663	0.477	0.403
EXPLOI_5	0.300	0.616	0.424	0.323
EXPLOI_6	0.349	0.688	0.471	0.357
EXPLOR_1	0.407	0.433	0.724	0.397
EXPLOR_2	0.381	0.502	0.725	0.380
EXPLOR_3	0.447	0.468	0.708	0.481
EXPLOR_4	0.404	0.471	0.704	0.433
EXPLOR_5	0.377	0.494	0.678	0.306
OR_1	0.345	0.416	0.396	0.767
OR_2	0.399	0.440	0.438	0.767
OR_3	0.346	0.456	0.450	0.758
OR_4	0.255	0.337	0.393	0.655

Appendix B

Table A2. The robustness test.

	1			2			3		
	1a	2a	3a	1a	2a	3a	1a	2a	3a
Digital transformation	●	●		●	●		●	●	
Exploitative innovation		●	●		●	●		●	●
Exploratory innovation	●		●	●		●	●		●
Consistency	0.966	0.963	0.972	0.923	0.924	0.929	0.834	0.824	0.827
Raw coverage	0.887	0.900	0.893	0.797	0.800	0.807	0.725	0.727	0.756
Unique coverage	0.017	0.030	0.023	0.033	0.037	0.044	0.043	0.044	0.073
Overall solution consistency		0.948			0.889			0.775	
Overall solution coverage		0.940			0.877			0.842	

Note: ● = core condition present, ● = peripheral condition present, blank spaces = condition may be either present or absent.

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