

Research on the Construction Path of Organizational Resilience for Small and Medium-sized Enterprises under the Background of Digital Transformation

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Abstract. In the context of digital transformation, this study focuses on the path for small and medium-sized enterprises (smes) to build organizational resilience, because with the rapid development of digital technologies and the increasingly uncertain external environment, smes are facing unprecedented challenges and opportunities, and organizational resilience is a key capability for their sustainable development. Based on the theories of organizational resilience and digital transformation, this paper systematically explores the mechanisms by which digital transformation affects the formation of organizational resilience in small and medium-sized enterprises using methods such as literature analysis, case study, and questionnaire survey. The results show that digital transformation affects the construction of organizational resilience through three paths: technology empowerment, organizational restructuring, and business model innovation. Specifically, small and medium-sized enterprises can approach six aspects: improving digital infrastructure, establishing data-driven decision-making mechanisms, designing agile organizational structures, cultivating digital talents, building cross-boundary collaborative networks, and innovating business models to create a closed-loop system of "predictive - response - adaptation - learning" for organizational resilience. The study further proposes a strategic framework for building differentiated resilience based on the development stage and digital maturity of enterprises, and provides policy recommendations in light of the actual situation of Chinese smes. The findings enrich the application of organizational resilience theory in the digital economy and provide theoretical guidance and practical approaches for smes to enhance organizational resilience during digital transformation. It has significant theoretical and practical implications for promoting high-quality development of small and medium-sized enterprises.

Keywords: Digital transformation; Organizational resilience; Small and medium-sized enterprises; Build paths; Digital capabil.

1. Introduction

The main theme of global economic development today is digital transformation, and this transformation is an important driving force for China's high-quality economic development. With the rapid development of digital technologies such as 5G, big data, cloud computing and artificial intelligence, enterprises are facing unprecedented pressure and opportunities for digital transformation. And due to the increasingly complex and volatile global economic environment and the continuous impact of the COVID-19 pandemic, building organizational resilience has become very important for small and medium-sized enterprises, which are the "capillaries" of the Chinese economy, to survive and develop in the wave of digital transformation. [1]

Data from China's Ministry of Industry and Information Technology shows that by the end of 2022, the number of small and medium-sized enterprises in China exceeded 48 million, accounting for 99.8% of the total number of enterprises. They contributed more than 60% of the country's GDP, more than 50% of tax revenue, more than 80% of urban employment, and more than 70% of technological innovation. However, the situation of small and medium-sized enterprises (smes) is not ideal, especially in terms of digital transformation, where there are many difficulties, according to the "Report on the Digital Development of smes" released by the China Academy of Information and Communications Technology in 2023, only 32.4% of smes have clearly formulated digital strategies, and the overall maturity of digital transformation is 36.7%. It is much lower than the 58.9 percent of large enterprises, and most small and medium-sized enterprises have problems such as limited funds,

shortage of talents, poor technology and inflexible organizational structure, so they lack resilience and adaptability in the face of external shocks.

The ability of enterprises to withstand, recover and develop crises is closely related to the systemic ability of organizational resilience. Research shows that compared with ordinary enterprises, those with high organizational resilience can recover to pre-crisis operational levels 40% faster in the face of emergencies and are more likely to seize opportunities and achieve growth during crises. Digital transformation is closely linked to organizational resilience. Digital technology can be an important support for building organizational resilience, and the successful digital transformation of enterprises cannot do without the important guarantee of organizational resilience. However, there are not many systematic studies at home and abroad on the relationship between digital transformation and organizational resilience, and even fewer such studies for small and medium-sized enterprises.

This study focuses on the construction path of organizational resilience in small and medium-sized enterprises in the context of digital transformation, aiming to explore the mechanism by which digital transformation affects the formation of organizational resilience in small and medium-sized enterprises and provide targeted strategies for building organizational resilience. The study will start from both theoretical and practical aspects to clarify the connotations of digital transformation and organizational resilience and the relationship between them in theory. In practice, analyze the current situation and challenges of organizational resilience in small and medium-sized enterprises (smes) and provide construction paths in combination with typical cases, hoping to provide theoretical guidance and practical references for smes to enhance organizational resilience in the digital age to facilitate high-quality development of smes.

2. Digital Transformation and the theoretical basis of Organizational resilience in smes

2.1 The connotation and characteristics of digital transformation

In the face of changing business environments and market demands, enterprises undergo digital transformation, which involves using digital technologies to comprehensively and deeply transform business models, organizational structures, operational processes, and corporate cultures. This transformation is not just an update and iteration of technology, but a systematic change involving strategy, business, organization, and culture. In essence, it is a process of rethinking the way value is created and realized, relying on digital technology to achieve business innovation and organizational reshaping, and it has notable features: first, it is an evolving process rather than a project completed in a short period of time. Second, it focuses on being customer-centric and making decisions based on data. Third, break down organizational boundaries to enable cross-departmental collaboration. Fourth, build an open and agile organizational culture and learning mechanism[2]. According to Deloitte Consulting's 2022 study, companies that successfully undergo digital transformation have an average revenue growth of 25 percent and a profitability improvement of 23 percent, but with a failure rate as high as 70 percent, highlighting the complexity and challenges of digital transformation.

2.2 Definition and Dimensions of Organizational Resilience

Organizational resilience is the dynamic ability of an organization to predict, respond, adapt, recover and turn the situation around in the face of uncertainty and change. This concept was first proposed by Wildavsky in 1988, and the theory has evolved from passive recovery to active adaptation and from static traits to dynamic capabilities. Contemporary theory of organizational resilience holds that organizational resilience is not only the ability to withstand crises and recover from setbacks, but also the systemic ability of continuous learning, self-adjustment, and innovative development. Organizational resilience generally includes four core dimensions, among which predictive resilience is the ability of organizations to identify potential risks and opportunities, and absorptive resilience is the ability of organizations to maintain core functions when impacted. Adaptive resilience is the ability to adjust itself to adapt to new environments, and transformational resilience is the ability to learn from crises to achieve self-renewal. These four dimensions together

form a dynamic cycle system of organizational resilience, enabling organizations to maintain competitive advantages and sustainable development in uncertain environments.

2.3 Relationship between Digital Transformation and Organizational resilience

There is a close mutually reinforcing relationship between organizational resilience and digital transformation because digital transformation can enhance organizational resilience. Specifically, digital technologies can improve organizations' perception of the environment, enabling enterprises to detect market changes and risk signals more quickly, and data analysis can make decisions more scientific and agile, thereby improving crisis response efficiency. In addition, technologies like cloud computing enhance the resilience of systems to ensure business continuity, and digital platforms drive resource integration and knowledge sharing to enhance the organization's adaptability. In turn, organizational resilience plays a crucial role in ensuring the success of digital transformation, as resilience thinking enables enterprises to face challenges with a positive mindset during digital transformation, learning mechanisms ensure that enterprises continuously acquire and apply digital knowledge, and adaptability enables enterprises to constantly adjust digital strategies and paths. Resilience, on the other hand, enables enterprises to quickly recover and learn from the setbacks of digital transformation, thus forming a mutually reinforcing positive cycle, that is, the improvement of digital capabilities enhances organizational resilience, and the enhancement of organizational resilience promotes the deepening[3] of digital transformation.

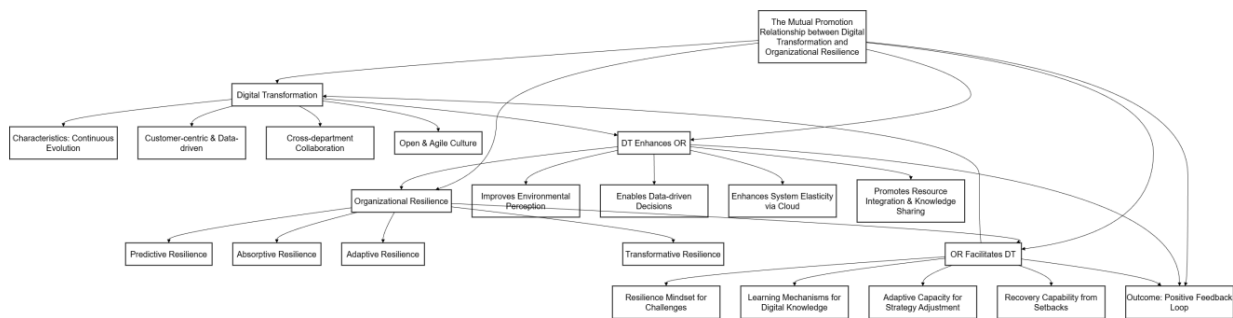


Figure 1. The mutually reinforcing relationship between digital transformation and organizational resilience

2.4 The necessity of Building Organizational Resilience for Small and Medium-sized Enterprises

There is a special and urgent need for small and medium-sized enterprises (smes) to build organizational resilience because they are in a more complex and volatile external environment, especially against the backdrop of increased global economic uncertainty in the post-pandemic era. For instance, in 2020, more than 4 million smes in China closed down due to a lack of resilience, and smes themselves have limited resource endowments and poor risk resistance capabilities. The average lifespan of large enterprises is typically 20 years, while that of small and medium-sized enterprises is 2.5 to 3 years. Moreover, the digital wave brings both opportunities and challenges to small and medium-sized enterprises. If small and medium-sized enterprises do not quickly build organizational resilience that is compatible with the digital economy, there is a risk of being eliminated from the market. In addition, smes have the important mission of "stabilizing employment, promoting innovation and boosting vitality" in the national economy. Therefore, building resilience for smes is related to the stability and vitality of the entire economic system, and in the context of globalized and digitalized industrial chains, smes are a key part of the industrial chain. Their organizational resilience affects not only their own development but also the security and efficiency of the entire industrial chain. Therefore, building organizational resilience that matches digital transformation has become an inevitable choice for smes to achieve sustainable development.

3. The current situation and Challenges of Organizational resilience in smes in the context of digital Transformation

3.1 Analysis of the current situation of Organizational resilience in Small and Medium-sized Enterprises

The overall situation of organizational resilience among small and medium-sized enterprises (smes) in China is "unbalanced and inadequate". According to a 2022 survey by the China Enterprise Development Institute, the comprehensive index of organizational resilience of smes in China, out of 100, is only 62.7, while that of large enterprises is 78.3. By dimension, the predictive resilience of smes is the worst, with a score of 56.4, indicating a lack of environmental perception and risk warning mechanisms. The adaptive resilience score is 64.2, reflecting a relatively rigid organizational structure and poor business adjustment capabilities. The absorptive resilience score is 68.3, reflecting the need for improvement in emergency response mechanisms. The transformational resilience score is 61.9. It indicates insufficient drive for innovation and transformation. In terms of industry distribution, the resilience index of small enterprises in highly digitalized industries such as IT and fintech is generally higher than that in traditional manufacturing, wholesale and retail industries. In terms of geographical distribution, the resilience level of small and medium-sized enterprises in the eastern coastal areas is significantly higher[4] than that in the central and western regions. It should be noted that in the past two years, with the promotion of digital transformation, the organizational resilience of small and medium-sized enterprises has steadily improved, with an average annual growth of approximately 3.2 percentage points, indicating that digital transformation has a positive effect on enhancing organizational resilience.

3.2 The impact of digital Transformation on Organizational resilience of Small and medium-sized enterprises

The organizational resilience of small and medium-sized enterprises (smes) is being reshaped in multiple dimensions by digital transformation. In terms of positive impacts, first, digital technologies have enhanced the environmental awareness of smes. Statistics show that smes using big data analysis have improved the accuracy of predicting market changes by approximately 43%. Second, technologies such as cloud computing have reduced the cost of IT infrastructure. Digital platforms have enabled small and medium-sized enterprises (smes) to quickly obtain advanced technology support and increase resource resilience through "rent instead of build", and digital platforms have promoted collaboration between smes and upstream and downstream enterprises, thereby enhancing supply chain resilience. Smes using digital supply chain platforms have a 35% lower risk of supply chain disruptions during the pandemic compared to non-users. In addition, digital tools have made remote and flexible working possible, thereby enhancing operational resilience for organizations. However, digital transformation has brought new challenges. First, the contradiction between digital investment and short-term returns has increased the financial pressure on smes. Second, the complexity of digital transformation has raised higher requirements for the management capabilities of smes. Third, data security and cyber risks have become new sources of threat. In 2022, 46% of small and medium-sized enterprises suffered cyber attacks. Fourth, the digital divide effect may exacerbate polarization among small and medium-sized enterprises.

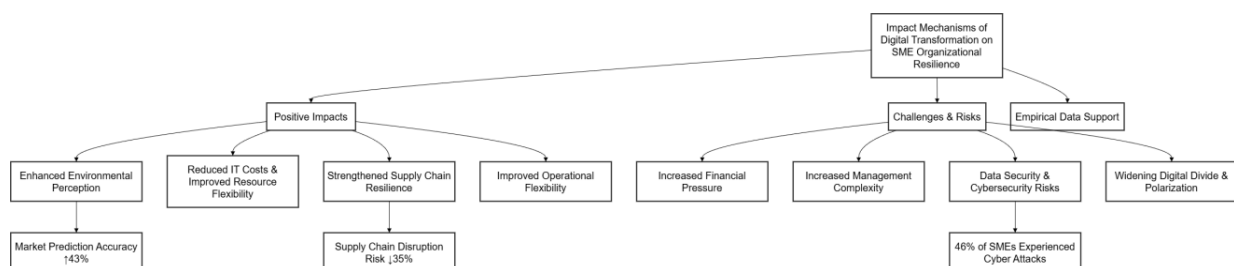


Figure 2. Mechanisms of the impact of digital transformation on organizational resilience in smes

3.3 Major challenges for building organizational resilience in small and medium-sized enterprises

Small and medium-sized enterprises (smes) will encounter many challenges when building organizational resilience. First of all, they have to face resource constraints because most smes are in the "three shortages" predicament, namely lack of funds, lack of talent, lack of technical support, statistics show, In 2022, more than 65% of smes identified a shortage of funds as the first hurdle in their digital transformation, and 78% of smes faced a shortage of digital talent. Secondly, there are cognitive obstacles. As 35% of SME managers fail to correctly understand the concept of organizational resilience and 42% of smes only apply digitalization as a tool rather than as a means of strategic transformation, there is a lack of systematic thinking[5]. Third, organizational structure also poses challenges. Traditional family-based management and functional organizational structures are difficult to meet the requirements for agility and collaboration in the digital environment. Fourth, there are deficiencies in capabilities. Most small and medium-sized enterprises are lacking in data analysis, business innovation, change management, etc. Only 27 per cent of small and medium-sized enterprises have basic data analysis capabilities. Fifth, the external environment also poses challenges. Due to increasingly fierce market competition, frequent policy adjustments, and an increasing number of black swan events, this adds more uncertainty to small and medium-sized enterprises. The sixth transformation path also poses challenges. The lack of a digital transformation framework and resilience building methodology that fit the characteristics of smes has left many of them to "feel their way across the river" during transformation, with low[6] efficiency.

3.4 Case Analysis of Typical Cases

There is a small and medium-sized intelligent manufacturing enterprise in Zhejiang that is quite typical and instructive. It was established in 2010 and its main business is industrial automation equipment. After embarking on digital transformation in 2019, its organizational resilience has been greatly enhanced. First, build a "transparent factory" based on the industrial Internet to achieve real-time monitoring and early warning of the production process, reducing the product defect rate by 40% and increasing the response speed to market demand by 55%. Then a cloud ERP system was introduced to achieve the goal of flexible adjustment of resource allocation, which increased inventory turnover by 30% and capital utilization efficiency by 25%. With the help of digital twin technology, a virtual simulation platform was created to shorten the product development cycle by 35% and accelerate[7] the launch of new products. Then use SaaS services to cut IT infrastructure investment and achieve "light asset" operation, reducing fixed costs by 32%. In addition, build supplier collaboration platforms and customer data centers to enhance supply chain resilience and customer responsiveness. Despite the pandemic shock in 2020, the company not only recovered quickly but also seized the opportunity of the growing demand for remote working equipment, with its business growing by 30% against the trend. This case shows that digital transformation can enhance the organizational resilience of small and medium-sized enterprises in many ways, and the key is to deeply integrate digital technology with business to form digital-driven agile organizational capabilities [8].

4. The path to Building Organizational Resilience for smes in the Context of Digital Transformation

4.1 Resilience Building paths at the strategic level

In the context of digital transformation, the strategic direction of small and medium-sized enterprises needs to be repositioned and strategic resilience needs to be enhanced. First, enterprises should establish a dynamic strategic planning mechanism and incorporate digital elements into the enterprise strategy, and adjust the strategic direction in a timely manner as the market environment changes. Data indicates that from 2019 to 2023, Small and medium-sized enterprises (smes) that use dynamic strategic planning have a 32% higher survival rate in the face of market fluctuations than

traditional enterprises. In addition, enterprises need to build the ability of scenario prediction, using digital technologies such as big data analysis and artificial intelligence to simulate various possible scenarios and formulate corresponding contingency plans, thereby identifying potential risks and opportunities in advance.

Small and medium-sized enterprises (smes) need to build a strategic agility management system that includes market perception, strategic decision-making speed, and resource allocation flexibility. The 2023 China smes Digital Transformation Survey Report shows that smes with strategic agility have an average business recovery rate 40% faster than their peers after the pandemic. Building a digital business ecosystem enables enterprises to form strategic partnerships with upstream and downstream enterprises, platform enterprises and even competitors, and form a complementary resource and risk-sharing mechanism. This networked strategic cooperation model is a key way to enhance the strategic resilience of small and medium-sized enterprises.

4.2 Pathways for building resilience at the organizational structure level

In order to enhance organizational resilience, small and medium-sized enterprises (smes) need to restructure their organizational structure for digital transformation, and the flat organizational structure has become the key to enhancing the resilience of smes. Data released by the China Association of Small and Medium Enterprises in 2021 showed that smes with flat management had 47% higher decision-making efficiency and 53% higher response speed to market changes. Small and medium-sized enterprises can reduce management levels and implement matrix or networked organizational structures. At the same time, they can establish cross-departmental collaboration mechanisms to break down information silos and improve overall organizational synergy efficiency, and build digital collaboration platforms to enable efficient information sharing and flow. This can solve the problems[9] of information transmission barriers in traditional organizational structures.

Small and medium-sized enterprises should establish flexible boundary management systems, as the 2023 survey shows that small and medium-sized enterprises with flexible organizational boundaries innovate 31% faster and have 25% higher market adaptability than those with traditional boundaries. The so-called flexible boundary means that the organization can flexibly mobilize internal and external resources, such as building on-demand partnerships with external professional service providers, using crowdsourcing models to handle specific problems, establishing internal entrepreneurship mechanisms, etc., and the enterprise can also flexibly adjust team composition and functional allocation based on business needs to achieve dynamic optimal allocation of organizational resources. In this way, the organization can make quick adjustments when the external environment changes to maintain its stability.

4.3 Resilience Building pathways at the technology application level

Small and medium-sized enterprises cannot build organizational resilience without the core support of technology application, so enterprises need to build modular and scalable digital infrastructure to prevent system rigidity and adaptability problems. According to data from the China Academy of Information and Communications Technology in 2022, small and medium-sized enterprises using cloud services have seen an average 65% reduction in IT system failure recovery time and 37% reduction in operating costs. Therefore, enterprises can prioritize technologies such as cloud computing and the Internet of Things to build digital platforms based on their own business scenarios to achieve real-time data collection, analysis and application. It is also necessary to establish data-driven early warning mechanisms and decision-making systems, and use artificial intelligence and machine learning technologies to analyze internal and external data of the enterprise to identify risk signals in advance and enhance the enterprise's predictive ability[10]. Industry research in 2023 shows that small and medium-sized enterprises that implement data-driven decision-making have seen their average decision-making accuracy increase by 42% and their response speed increase by 56% when encountering sudden market changes. These technological applications provide strong support for enterprises' ability to maintain operational continuity and recover quickly during crises.

4.4 Resilience Building pathways at the human resources level

The resilience of small and medium-sized enterprises cannot do without the key element of human resources. In the context of digital transformation, enterprises should focus on cultivating the digital skills and innovative thinking of their employees. Data shows that in the three years from 2021 to 2023, there was a shortage of more than 2 million digital talents in small and medium-sized enterprises. However, in those enterprises that implemented systematic digital talent development programs, the average employee turnover rate decreased by 23% and productivity increased by 27%. Companies can build hybrid learning systems that combine online training with practice exercises to enhance employees' ability to handle complex situations, and create flexible working mechanisms such as flexible working hours and remote work to increase the flexibility of human resource allocation. Enterprises should also establish a variety of incentives to stimulate the initiative and creativity of employees in the face of challenges, thereby creating an organizational culture that responds positively to changes. Research shows that small and medium-sized enterprises with a strong culture of innovation can recover their business 35 percent faster and shorten the new product development cycle 46 percent during market turmoil than traditional enterprises. These figures are sufficient to prove that human resource resilience is of great significance to the sustainable development of enterprises.

5. Conclusions

In the context of digital transformation, this study systematically explores various paths for small and medium-sized enterprises to build organizational resilience and finds that in the digital age, organizational resilience is a key capability for small and medium-sized enterprises to cope with the uncertainties of the external environment and achieve sustainable development, and in the process of digital transformation, Small and medium-sized enterprises can build their own organizational resilience from four dimensions: strategy, organizational structure, technology application, and human resources. In terms of strategy, enterprises need to establish a dynamic strategic planning and strategic agility management system to improve predictive ability and decision-making flexibility. In terms of organizational structure, Flat organizational structure and flexible boundary management are beneficial for improving the organization's response speed. In terms of technology application, modular digital infrastructure and data-driven decision-making systems can enhance the enterprise's ability to predict and respond to things. In terms of human resources, cultivating employees' digital skills and building flexible working mechanisms can help shape a resilient culture, and the research also found that Building organizational resilience is a systematic project, and all dimensions need to work together to form a "predictive - response - adaptation - learning" resilience closed-loop system.

Small and medium-sized enterprises should note that they should adopt different implementation paths based on their digital maturity and development stage. Enterprises in the initial stage should prioritize the construction of basic digital infrastructure and agile organizational structure, while those in the growth stage should focus on developing data analysis capabilities and cultivating digital talents. This study not only enriches the application of organizational resilience theory in the context of the digital economy, but also provides practical paths for smes to build resilience, which has important theoretical and practical guiding significance in promoting the digital transformation and high-quality development of smes in China. Future research could further explore differentiated strategies for building resilience among small and medium-sized enterprises in different industries, as well as mechanisms for the coordinated development of organizational resilience and enterprise innovation and internationalization capabilities.

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