# Research on Enterprise Supply Chain Risk Management under Digital Transformation: from the Perspective of Resilience Enhancement

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**Abstract**. In the context of rapid digital transformation, enterprises are facing increasingly complex supply chain risks, and enhancing supply chain resilience has become a key issue for sustainable development. This paper aims to explore the impact of digital transformation on enterprise supply chain risk management and the strategies to improve supply chain resilience. Based on the analysis of the theoretical basis of supply chain resilience and the current status of risk management under digital transformation, this study identifies the main risks and challenges faced by enterprises, such as supply chain disruption, information asymmetry, and operational inefficiency. Through in-depth research, it proposes a set of practical strategies, including building digital risk monitoring systems, promoting collaborative innovation with partners, and strengthening talent training. The study finds that digital transformation can significantly improve the ability of enterprises to identify, assess, and respond to supply chain risks, and enhancing supply chain resilience is crucial for enterprises to adapt to the volatile market environment. This research provides theoretical and practical guidance for enterprises to effectively manage supply chain risks and improve their resilience in the digital era.

**Keywords:** Digital transformation; Supply chain risk management; Supply chain resilience; Digital technologies; Risk strategy

## 1 Introduction

In the 21st century, the wave of digital transformation has swept across all industries, bringing about profound changes in the business environment. Enterprises are constantly seeking to leverage digital technologies to improve their operational efficiency, gain a competitive edge, and meet the changing needs of customers. However, along with the opportunities brought by digital transformation, enterprises are also facing more complex and unpredictable supply chain risks. The supply chain has become more interconnected and globalized, making it vulnerable to various internal and external factors, such as natural disasters, political conflicts, economic fluctuations, and technological disruptions.[1]


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Supply chain resilience refers to the ability of a supply chain to absorb disruptions, maintain its functions, and quickly recover and adapt to changing circumstances. In the context of digital transformation, enhancing supply chain resilience has become an urgent need for enterprises. Digital technologies, such as the Internet of Things (IoT), big data, artificial intelligence (AI), and blockchain, have the potential to transform supply chain management, but they also introduce new risks. For example, the increased reliance on digital systems makes enterprises more vulnerable to cyberattacks, and the complexity of data analysis requires enterprises to have stronger capabilities in data management and risk assessment.

At present, although there are some studies on supply chain risk management and resilience, the research on the specific impact of digital transformation on supply chain resilience and the corresponding management strategies is still relatively limited. Therefore, this study aims to fill this research gap by exploring the relationship between digital transformation and enterprise supply chain risk management from the perspective of resilience enhancement. The purpose of this paper is to provide enterprises with a comprehensive understanding of the risks they face in the digital era and to propose effective strategies to improve their supply chain resilience, so as to help enterprises maintain their competitive advantage and achieve sustainable development.[2-6]

## 2 Theoretical Basis of Supply Chain Resilience under Digital Transformation

### 2.1 Concept of Supply Chain Resilience

Supply chain resilience, in the contemporary business landscape, represents a complex and multi - faceted construct that extends far beyond mere operational continuity. It is a dynamic capability that empowers organizations to endure, adapt, and thrive amidst an array of disruptions, whether they stem from natural disasters, geopolitical upheavals, or technological shocks. At its core, this concept encapsulates three intertwined dimensions: the capacity to withstand initial disruptions without succumbing to complete breakdown, the ability to rapidly recover normal operations post - disruption, and the aptitude to adapt to new and often unforeseen circumstances.

The physical elements of a supply chain, such as inventory levels, production facilities, and transportation networks, form the tangible foundation upon which resilience is built. For instance, maintaining strategic stockpiles of critical components can act as a buffer during sudden supply shortages, as demonstrated by automotive manufacturers that faced semiconductor shortages in recent years. However, supply chain resilience is not confined to these physical assets. The informational aspect is equally vital, as accurate and timely data sharing across the supply chain enables stakeholders to anticipate risks and make informed decisions. Organizational factors, including leadership, culture, and decision - making structures, also play a significant role. A supply chain with a culture of innovation and flexibility is better equipped to respond to disruptions. Relational elements, such as the strength of partnerships between suppliers, manufacturers, and distributors, can either enhance or hinder resilience. Trusted relationships allow for more seamless cooperation during times of crisis, such as when sharing excess inventory or collaborating on alternative sourcing strategies.[7-10]

In the digital age, the concept of supply chain resilience has undergone a profound evolution. Digital technologies have introduced new possibilities for enhancing visibility, agility, and collaboration. Visibility, once limited by manual tracking and sporadic reporting, can now be achieved in real - time through the deployment of IoT sensors, blockchain - based ledgers, and cloud - based platforms. This real - time visibility not only enables the early detection of potential disruptions but also allows for a more accurate assessment of their impact. Agility, too, has been redefined, with digital tools enabling organizations to quickly adjust production schedules, reroute shipments, and reallocate resources in response to changing market conditions. Collaboration has been elevated to new heights, as digital platforms facilitate seamless communication and data sharing among partners, regardless of geographical location. For example, a global fashion brand can use digital platforms to coordinate with suppliers in different countries, ensuring that production schedules align with rapidly changing consumer trends and minimizing the risk of overstocking or understocking.

## 2.2 Digital Transformation and Supply Chain Management

The advent of digital transformation has ushered in a new era of supply chain management, fundamentally altering the way organizations plan, execute, and optimize their supply chain operations. Digital technologies have disrupted traditional supply chain models, replacing manual, siloed processes with integrated, data - driven systems that offer unprecedented levels of efficiency and responsiveness.

At the heart of this transformation lies the ability to collect and analyze vast amounts of data in real - time. IoT sensors, for example, have become ubiquitous in modern supply chains, embedded in everything from raw materials and finished products to transportation vehicles and storage facilities. These sensors continuously generate data on location, temperature, humidity, vibration, and other critical parameters, providing a detailed and dynamic picture of the supply chain's health. In the food industry, IoT - enabled sensors in refrigerated trucks can monitor the temperature of perishable goods during transit, ensuring compliance with strict food safety standards and preventing spoilage. This data, when combined with other sources such as customer transactions, market trends, and supplier performance metrics, forms the basis for advanced analytics.

Big data analytics, powered by artificial intelligence and machine learning algorithms, has emerged as a game - changer in supply chain management. It enables organizations to identify hidden patterns, correlations, and trends in the data, providing valuable insights that can inform strategic decision - making. For example, by analyzing historical sales data, social media sentiment, and weather forecasts, a consumer goods company can predict demand for its products with greater accuracy, allowing for more precise inventory planning and production scheduling. This not only reduces the cost of carrying excess inventory but also minimizes the risk of stockouts, improving customer satisfaction.

Digital transformation has also revolutionized the way organizations interact with their suppliers and customers. E - procurement platforms have streamlined the purchasing process, reducing paperwork, improving transparency, and enabling faster supplier selection and negotiation. Customer relationship management (CRM) systems, integrated with supply chain data, allow organizations to gain a deeper understanding of customer needs and preferences, enabling personalized marketing and sales strategies. In addition, digital platforms have enabled the development of new business models, such as direct - to - consumer (DTC) and on - demand manufacturing, which are disrupting traditional supply chain structures and challenging established players to adapt.

## 2.3 The Relationship between Digital Transformation and Supply Chain Resilience

Digital transformation and supply chain resilience are intricately intertwined, with digital technologies serving as both enablers and drivers of resilience. The enhanced visibility provided by digital tools is a cornerstone of resilient supply chain management. By having real - time access to data on inventory levels, production status, and transportation routes, organizations can proactively identify potential risks, such as supplier delays, port congestion, or sudden changes in demand. For example, a global electronics manufacturer can use IoT sensors and blockchain technology to track the movement of components from suppliers in different countries. If a delay is detected in the shipment of a critical component, the manufacturer can immediately activate contingency plans, such as sourcing from an alternative supplier or adjusting the production schedule of downstream products.

Agility, another key dimension of supply chain resilience, is significantly enhanced by digital transformation. Digital technologies enable organizations to quickly adapt to changing circumstances by automating processes, optimizing workflows, and leveraging data - driven insights. For instance, in the face of a sudden increase in demand for a particular product, a manufacturer can use AI - powered algorithms to reallocate production resources, prioritize orders, and adjust production schedules in real - time. This not only ensures that the manufacturer can meet customer demand but also minimizes the impact on other products and operations within the supply chain.

Collaboration, facilitated by digital platforms, is essential for building a resilient supply chain. In a digital - enabled supply chain, partners can share information, resources, and expertise more effectively, enabling them to jointly respond to disruptions. For example, during the COVID - 19 pandemic, many organizations used digital platforms to collaborate with suppliers and logistics providers to ensure the continuous flow of essential goods. By sharing real - time data on inventory levels, transportation capacity, and demand, they were able to coordinate their efforts, find alternative routes and suppliers, and maintain the integrity of the supply chain.

Moreover, digital transformation enables organizations to continuously learn and improve their supply chain operations. Through the analysis of historical data and the application of machine learning algorithms, organizations can identify areas for improvement, predict future risks, and develop strategies to enhance resilience over time.

For example, by analyzing data on past disruptions, an organization can identify common causes and develop preventive measures to reduce the likelihood of similar disruptions occurring in the future. In this way, digital transformation not only helps organizations to respond to current disruptions but also to build long - term resilience into their supply chain operations.

# 3 Current Status of Enterprise Supply Chain Risk Management under Digital Transformation

## 3.1 Main Types of Supply Chain Risks

Under the background of digital transformation, enterprises face a variety of supply chain risks. Supply-side risks include disruptions in the supply of raw materials, components, and services due to factors such as supplier bankruptcies, natural disasters, and trade barriers. Demand-side risks are mainly caused by changes in customer demand, such as sudden fluctuations in market demand, the emergence of new competitors, and the rapid development of new technologies. Operational risks involve issues within the enterprise's own operations, such as production failures, quality problems, and logistics delays. Technological risks are associated with the adoption and application of digital technologies, such as cyberattacks, system failures, and data security issues.

## 3.2 Challenges in Supply Chain Resilience Enhancement

Although digital transformation provides opportunities for enhancing supply chain resilience, enterprises also face many challenges. Information asymmetry still exists among supply chain partners, despite the development of digital technologies. Some small and medium-sized enterprises (SMEs) may lack the resources and capabilities to implement advanced digital systems, resulting in a lack of real-time data sharing with larger partners. Cultural and organizational barriers can also hinder the adoption of digital technologies and the promotion of collaborative resilience. Enterprises may have different management styles, data standards, and information systems, making it difficult to integrate and share information effectively. Talent shortage is another important challenge. The digital transformation of supply chain management requires employees with both supply chain knowledge and digital skills, but there is currently a shortage of such talent in the market.

# 4 Strategies for Supply Chain Risk Management based on Resilience Enhancement

## 4.1 Building a Digital Risk Monitoring and Early Warning System

Enterprises should leverage digital technologies to build a comprehensive risk monitoring and early warning system. This system should integrate data from various sources, such as internal operations, suppliers, customers, and market environments, and use AI and machine learning algorithms to analyze and predict potential risks. For example, by monitoring real-time data on supplier performance, inventory levels, and logistics status, the system can identify early signs of supply chain disruptions and send alerts to relevant departments. Enterprises can then take proactive measures to mitigate the risks before they escalate.

### 4.2 Promoting Collaborative Innovation with Supply Chain Partners

Collaboration with supply chain partners is essential for building a resilient supply chain. Enterprises should establish strategic partnerships with key suppliers, customers, and logistics providers, and promote information sharing and collaborative decision-making. Digital platforms can be used to facilitate communication and collaboration among partners, enabling them to jointly develop risk management strategies and respond to disruptions more effectively. For example, through blockchain technology, enterprises can create a shared ledger of supply chain transactions, ensuring the transparency and traceability of data, which can help in identifying and resolving risks more quickly.

### 4.3 Strengthening Talent Training and Organizational Capability Building

To adapt to the digital transformation and enhance supply chain resilience, enterprises need to strengthen talent training and build organizational capabilities. They should invest in training programs to improve the digital skills of their employees, such as data analysis, digital system operation, and risk management using digital tools. At the same time, enterprises should establish a culture of innovation and continuous improvement, encouraging employees to embrace new technologies and ideas. Organizational structures should also be adjusted to support digital transformation, such as creating cross-functional teams to manage supply chain risks and promote collaboration across departments.

### 4.4 Diversifying Supply Chain Sources and Networks

To reduce the dependence on a single supplier or a single market, enterprises should diversify their supply chain sources and networks. This includes developing multiple suppliers for key materials and components, establishing local supply chains in different regions, and exploring new markets. Diversification can help enterprises mitigate the impact of supply-side disruptions, such as natural disasters or political conflicts in a particular region. In addition, by having a more diverse supply chain network, enterprises can be more flexible in adjusting their supply and demand strategies in response to market changes.

### 4.5 Case Analysis: Resilience Enhancement of a Manufacturing Enterprise's Supply Chain

Take a well-known manufacturing enterprise in the electronics industry as an example. Facing the challenges of digital transformation and increasing supply chain risks, the enterprise has taken a series of measures to enhance its supply chain resilience. Firstly, it has implemented an IoT-based real-time monitoring system for its production lines and logistics networks, which enables it to track the status of products and raw materials in real-time and identify potential risks early. Secondly, the enterprise has established a digital platform to collaborate with its suppliers and customers, sharing data on inventory levels, production plans, and market demand, which has improved the coordination and communication among supply chain partners. Thirdly, it has invested in training programs for its employees, focusing on digital skills and risk management, and has established a cross-functional risk management team to handle supply chain disruptions. As a result, the enterprise has significantly improved its ability to respond to risks, such as the recent global chip shortage, and has maintained its market share and profitability.

## 5 Conclusion

In the context of digital transformation, enterprise supply chain risk management faces both opportunities and challenges. Enhancing supply chain resilience is crucial for enterprises to adapt to the volatile market environment and achieve sustainable development. This paper has explored the theoretical basis of supply chain resilience under digital transformation, analyzed the current status of enterprise supply chain risk management, and proposed a set of strategies for resilience enhancement, including building digital risk monitoring systems, promoting collaborative innovation, strengthening talent training, and diversifying supply chain networks. Through case analysis, it has been shown that these strategies can effectively improve the resilience of enterprise supply chains.

Future research can further explore the impact of emerging digital technologies, such as 5G, edge computing, and digital twins, on supply chain resilience. In addition, more in-depth studies can be conducted on the supply chain risk management practices of SMEs, which may have different characteristics and challenges compared to large enterprises. It is hoped that this research can provide valuable insights for enterprises to better manage supply chain risks and enhance their resilience in the digital era.

## References


1. Li Zichen. Research on Enterprise Working Capital Management under the Background of Supply Chain Digital Transformation--Taking ZTE Corporation as an Example [D]. Hubei: Hubei University of Technology, 2024.
2. Song Yuanyuan. Research on Supply Chain Risk Management of Traditional Manufacturing Enterprises under the Background of Digital Economy [J]. Modern Shopping Mall, 2024(3):11-13.
3. Chen Yanhe. Research on Working Capital Management of Yantang Dairy under the Background of Digital Transformation [D]. Guangdong: Guangdong University of Technology, 2024.
4. Xie Jinyao. Research on Accounts Receivable Financing Model and Risk Management of Commercial Bank Supply Chain Finance under the Background of Internet —— Taking BC Bank's "e-communication" product as an example [D]. Chongqing: Chongqing University, 2021.
5. Ma Mingyue. Research on Working Capital Management of Enterprise Supply Chain Digitalization: A Case Study of Midea Group [D]. Shanghai: University of Finance and Economics, 2023.
6. Wang Di. Research on Cost Management of Enterprise Value Chain under the Background of Big Data —— Taking Bosideng as an example [D]. Jiangxi: Jiangxi University of Finance and Economics, 2022.
7. Lu Yilin. Research on Accounts receivable management of upstream enterprises under the background of manufacturing industry return--Taking E Group Electric Metallurgy Company as an example [D]. Beijing: Capital University of Economics and Trade, 2021.
8. Hu Dengyue. Research on Strategic Cost Management of DF Photovoltaic Company under the Background of "Dual Carbon" [D]. Xi 'an University of Technology, Shaanxi, 2024.
9. Liang Yan. Research on Working Capital Management under Digital Empowerment of Supply Chain--Taking Midea Group as an Example [D]. Wuhan Textile University, 2024.
10. Liang Xutong. Research on Risk Management of Supply Chain Management Information System Project in JS Company [D]. Dalian University of Technology, Liaoning, 2021.