

Analysis of the Current Status, Challenges, and Countermeasures of Supply Chain Management in Chinese Enterprises

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Abstract

This article analyses the current state and challenges of supply chain management in China, highlighting the insufficient penetration of digital technology, the need to improve safety and sustainability, the difficulty of internal collaboration within enterprises, and the opportunities and challenges posed by the application of artificial intelligence. Data heterogeneity, information security risks, partner credit shortages and technological management lag are hindering supply chain efficiency. While artificial intelligence is driving transformation, it is also disrupting traditional management. The article proposes countermeasures to overcome data and technology bottlenecks, strengthen information security, build trust and cooperation, promote green supply chains, and encourage the rational application of artificial intelligence. These strategies will help enterprises achieve digitalisation, intelligence and green transformation, enhance their competitiveness in the global market, and provide theoretical and practical guidance for management innovation and efficiency improvement.

Keywords

Current Status; Challenges; Countermeasures; Supply chain

1. Introduction

China's supply chain management is at a critical stage of systematic change and strategic leap, showing unique competitive advantages. Relying on the world's most complete industrial system, enterprises have built a closed loop of the whole chain, and improved the controllability of supply chain through vertical integration. Digital transformation has been further promoted: the Internet of Things optimizes inventory turnover, big data improves the accuracy of demand forecasting, blockchain realizes the visualization and monitoring of the whole process, and digital twin technology builds a risk warning system, which significantly enhances the flexibility of the supply chain. Green transformation has become a strategic breakthrough: the circular economy model promotes the reduction of energy consumption, blockchain

traceability technology helps to connect to international green standards, and constructs a first-mover advantage in the ESG field[1]. The management connotation has evolved to an ecological network, forming a multi-dimensional balance of customer satisfaction, delivery reliability, and innovation response speed, and breaking down hierarchical barriers to build an agile collaboration mechanism. Facing the challenges of digital transformation, enterprises need to balance efficiency and risk prevention and control, safeguard data sovereignty through the industrial Internet security system, and enhance geopolitical risk resilience with multi-source supply networks. Omni-channel retail change forces the integration of online and offline resources, and promotes the transformation of the supply chain into a value creation platform[2]. In the future, we need to make breakthroughs in the three dimensions of digital sovereignty, resilience mechanism and global governance innovation, reconfigure the rules of international competition with an autonomous and controllable technology system, and realize the strategic leap from scale expansion to value cultivation. This article will systematically analyze the current situation and challenges from multiple dimensions, and put forward countermeasures in combination with domestic and international practices to help enterprises enhance supply chain resilience and competitiveness and realize high-quality development.

2. Challenges in Enterprise Supply Chain Management

China's enterprise supply chain management is currently undergoing a critical period of digital transformation and facing a series of profound challenges, including technological penetration, security management, sustainability, and innovation in cooperation models. This article aims to explore these challenges and their root causes in depth, providing strategic guidance for Chinese enterprises to build efficient, secure, and green supply chain management systems.

2.1. Data Governance and Technical Penetration Bottlenecks

2.1.1. Data Heterogeneity and Processing Challenges

Supply chain data contains a large amount of unstructured information (such as text, user comments, etc.), which traditional technologies struggle to convert into business intelligence. The information systems and standards of various participating parties are not unified, creating information silos that hinder data integration and the deep penetration of digital technologies, thereby constraining supply chain collaboration efficiency.

2.1.2. Information Sharing and Security Conflicts

Global supply chains require real-time information exchange across organizations, but differences in data regulations among countries, geopolitical risks, and cyberattacks (such as data breaches and tampering) pose security risks, leaving businesses facing dual challenges of balancing collaboration efficiency and data protection.

2.2. Security Resilience and Sustainability Pressures

2.2.1. Supply chain security vulnerabilities

Global supply chain volatility (natural disasters, epidemics, geopolitical conflicts) exposes systemic vulnerability, regionalization and uneven distribution of economic welfare exacerbate uncertainty; insufficient protection of sensitive information in cross-border data flows, and cooperation risks in supply chain restructuring further threaten operational stability.

2.2.2. Collaborative Barriers to Green Transformation

Enterprises have insufficient knowledge of green supply chain, high cost of technology application, and lack of motivation for transformation; greening requires whole-chain synergy (purchasing, production, logistics, etc.), but asymmetric information of upstream and downstream, conflict of interest, and lack of policy incentives lead to a slow process of green supply chain construction.

2.3. Shortcomings in internal coordination and management mechanism

2.3.1. Credit crisis of trading partners

Some enterprises stick to the zero-sum game thinking and lack of win-win concepts, and credit deficiencies are common in suppliers' performance, customers' payment and logistics services, which increase the transaction costs, undermine the continuity of the supply chain, and restrict the improvement of the overall efficiency.

2.3.2. Lagging technology and management level

The enterprise digital system is outdated, the supply chain transparency is low, and the market response is slow; the traditional management mode leads to low asset turnover, inventory backlog, and it is difficult to realize the optimal allocation of resources and weaken the market competitiveness.

2.4. Structural disadvantages of traditional supply chain

2.4.1. Credit crisis of trading partners

The low level of informationization leads to the failure of demand forecasting, and the "bullwhip effect" exacerbates the inventory backlog and overproduction; the upstream and downstream information silos and lack of trust lead to the failure of supply chain coordination, and reduce the overall risk-resistant ability.

2.4.2. Supply structure imbalance and local optimization trap

Each link pursues its own interest maximization, ignoring the overall optimization of the supply chain, resulting in mismatch between supply and demand (e.g., upstream overproduction, downstream inventory shortage), resource waste and conflict of interest constraints on system efficiency.

2.5. Transformation Challenges under the Impact of Artificial Intelligence

2.5.1. Failure of experience management mode

Artificial intelligence realizes low-cost and efficient operation through machine learning and automated processes, subverting the traditional experience curve theory, forcing labor-intensive industries to accelerate transformation, and enterprises need to reconstruct their management model to adapt to the new trend of highlighting the value of knowledge labor.

2.5.2. Retail Channel Integration Problems

Multi-channel and cross-channel retailing has the problems of information silos and operational inefficiency. Although AI technology (such as consumer behavior analysis and virtual fitting) promotes the integration of online and offline, channel synergy and experience consistency still need to break through the technical and process barriers.

2.5.3. Adaptability Pressure of Intelligent Transformation

Although AI technology improves the efficiency of demand forecasting, inventory control and logistics optimization, traditional enterprises have insufficient ability to apply intelligent algorithms, and need to simultaneously upgrade their organizational structure and talent system to meet the challenges of rapid response and personalized demand in the market.

3. Research on Supply Chain Management Countermeasures for Chinese Enterprises

3.1. Technology-enabled system: digital twin supply chain driven by new infrastructure

Facing the dual changes of global industrial chain reconstruction and digital technology revolution, Chinese enterprises' supply chain management needs to build a "three-in-one" optimization system. At the level of technological empowerment, enterprises should be guided by the strategy of "new infrastructure", deepen the integration and application of cloud computing, Internet of Things (IoT) and industrial Internet, and build an all-factor interconnected digital twin system through the deployment of intelligent sensors and edge computing nodes[3]. It is recommended to establish a collaborative innovation mechanism of "industry, academia, research and application" to break through the bottleneck of digital twin modeling, real-time data analysis and other key technologies, and form a supply chain technology system with independent intellectual property rights. Data governance needs to establish a three-tier security system, improve data classification and management, use blockchain technology to build a tamper-proof data authentication chain, and formulate data interaction standards covering the whole process of supply chain.

3.2. Security protection mechanism: dynamic security model and government, industry, academia and research collaboration

The construction of security protection system should follow the dynamic security model of “defense-detection-response-recovery”. Enterprises need to establish a regular supply chain security audit mechanism, use AI threat detection system to realize 24/7 monitoring, and deploy zero-trust architecture to strengthen access control[4]. It is recommended to build a security ecosystem of “government, industry, academia, research and utilization”, participate in the development of national standards for supply chain security, and establish an industry-level security vulnerability sharing platform. In terms of talent cultivation, we should implement the “digital artisan” cultivation program, set up supply chain digital twin engineering majors in colleges and universities, and set up practical network security attack and defense laboratories in enterprises.

3.3. Eco-coordination mechanism: double-cycle driven industrial Internet platform

Eco-coordinated innovation requires the construction of a “double-cycle” development pattern. Vertical dimension to create a “chain of main enterprises + specialization, specialization and new” pattern of geese, through the API open platform to achieve real-time synergies in demand forecasting, capacity sharing. Horizontally, we will establish an industrial Internet platform, use graph database technology to draw a supply chain knowledge map, and develop intelligent matching algorithms to optimize supplier combinations. It is recommended that the government set up a supply chain digital transformation fund, give tax credits to projects implementing cross-enterprise collaborative transformation, and pilot a whitelist system for cross-border secure flow of data in the Pilot Free Trade Zone.

3.4. Value Creation Transformation: Strategic Upgrade Driven by Three-Chain Integration

The transformation of the value creation model should realize “three-chain integration”. At the physical level, promote the “black light factory” and AGV cluster scheduling system, and utilize digital twin technology to improve the comprehensive efficiency of equipment. At the information level, we have constructed a dual center architecture of “data center + business center” to shorten the demand perception cycle. At the service level, supply chain financial technology is developed, federal learning technology is applied to realize credit assessment of SMEs, and dynamic discount financing products are developed to reduce capital consumption. It is recommended to establish a supply chain innovation application scenario lab, and provide first order support for successful solutions[5].

Through the above systematic changes, China's supply chain management will realize the strategic leap from “cost center” to “value hub”, shape China's model in the

global industrial chain restructuring, and provide solid support for the construction of a manufacturing powerhouse.

4. Conclusions

This paper systematically analyzes the current situation, challenges and optimization path of supply chain management in digital transformation of Chinese enterprises. The study finds that China's supply chain has formed a closed loop of the whole industrial chain, and has realized visualization and intelligent transformation through the integration of Internet of Things, big data and other technologies, and has gained a first-mover advantage in the construction of green supply chain[6]. However, the integration dilemma caused by data heterogeneity, the security threat caused by geopolitical risk, the lack of upstream and downstream synergy and the lagging behind of traditional management mode still constrain the development. Although the penetration of artificial intelligence brings efficiency breakthroughs, it also impacts the empirical management model and intensifies the pressure of channel integration.

In view of the challenges, this paper proposes four optimization directions: building digital twins and unified data standards to break through the bottleneck of technological penetration; establishing dynamic security models and government, industry, academia, and research collaborative mechanisms to strengthen the resilience of the supply chain; optimizing ecological synergy through the industrial Internet platform and geese formation mode; and promoting the "three-chain fusion" to realize the value of upgrading. The study emphasizes the need to balance efficiency and risk prevention and control, and reconstruct international competitiveness with autonomous and controllable technology system. In the future, China's supply chain management needs to be transformed into a value creation platform, shaping the "China model" in the reconstruction of the global industrial chain and providing key support for the strategy of a strong manufacturing country.

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