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Research on the operation mode of enterprise supply chain management under the background of digital economy

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Abstract: *In the context of the rapid rise of the digital economy, my country's enterprise supply chain management is facing an unprecedented challenge of change. With the rapid progress of digital technology and its wide application field expansion, the Internet of Things technology, artificial intelligence research hotspots, and big data analysis technology frontiers, the structure and operation mode of the supply chain have entered a new stage of comprehensive reconstruction, which has greatly promoted the improvement of work efficiency and information transparency. New problems are emerging in an endless stream, especially in the fields of information asymmetry, supply chain collaborative operation and risk control. The existence of asymmetric information may induce misjudgment in the decision-making process, slow down the response speed and adaptability of the supply chain to market changes; the low efficiency of supply chain collaboration directly leads to the rise of operating costs, which has a significant effect on the overall operating efficiency; if there are defects in enterprise risk management, it may face a significant high risk exposure to emergencies. These problems have a significant restrictive effect on the optimization of supply chain management and the improvement of enterprise competitiveness. The focus of this study is to deeply explore the cultural connotations of these problems, and then form corresponding response methods to promote enterprises to achieve optimization and upgrading of supply chain management in the context of digital economy, and continuously optimize and consolidate their competitive strength in market competition.*

Keywords: *supply chain management, digital economy, risk management*

1. Introduction

Today, with the booming digital economy and the wave of globalization, the supply chain management of Chinese enterprises is facing unprecedented challenges and opportunities. The popularization of digital technology has greatly transformed the architecture and operation process of the traditional supply chain. The system has achieved a significant leap in transparency and efficiency. In view of the rapid changes in the business environment and the continuous innovation in the field of technology, enterprises are facing a series of complex challenges in the supply chain operation link, such as the obstruction of real-time information flow, low efficiency of team collaboration, and slow response to emergencies. These problems have seriously restricted the overall efficiency and market response speed of the supply chain system. This paper conducts an in-depth analysis of the innovative path of the enterprise supply chain management operation model in the digital environment, conducts an in-depth study of the main problems that appear at the key nodes of the digital transformation of the supply chain, and explores and reveals the root causes of these problems. This research project has developed a series of practical methods to systematically optimize and improve the supply chain based on modern technology and management methods. By adopting these strategies, it is expected that the flexibility and responsiveness of the supply chain will be greatly promoted, thereby effectively enhancing the overall operational efficiency of the supply chain and the core position of the core competitiveness of the enterprise. This paper discusses the optimization path of existing digital technology and resource integration, and adopts advanced technology implementation paths to actively respond to the challenges facing the current supply chain [1] .

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2. Application and challenges of digital technology in enterprise supply chain

2.1 Current Application of Digital Technology in Supply Chain Management

In the current supply chain management field, with the help of digital technology, information flow has been strengthened, decision-making processes have been optimized, and operational efficiency has been improved, which has significantly innovated the existing supply chain operation system. Based on the application of Internet of Things technology, equipment and goods can achieve instant connection and information exchange. Enterprises can track and record the real-time status of goods and logistics conditions in real time, such as climate parameters such as temperature and humidity, thereby achieving a simultaneous leap in product quality and transportation efficiency. Enterprises use Internet of Things technology to achieve real-time tracking and positioning of asset locations, innovate inventory management concepts, reduce the periodicity of overstocking and supply shortages, and use data-based decision-making systems. Artificial intelligence and machine learning technologies occupy a core position, and systematically sort out and explore detailed historical data archives. Artificial intelligence shows predictive capabilities in market trend forecasting and consumer behavior analysis, helping enterprises to achieve refined demand forecasting and inventory management. Walmart, a global retail giant, uses machine learning technology to implement intelligent upgrades to inventory management. It relies on regional prediction models of consumer purchasing behavior to predict and analyze market trends, dynamically adjusts the scale of commodity inventory and distribution system, and significantly reduces inventory costs. Customer satisfaction has also been significantly improved. In the field of supply chain management, big data analysis technology has become a core tool for accurately mining the huge data resources generated by various links in the supply chain, helping companies analyze and eliminate inefficient bottlenecks, identify and evaluate potential cost reduction opportunities, and perform systematic mining of suppliers' operational performance data. Optimizing supplier selection and procurement strategies are key links for companies to achieve modern supply chain management. By improving the procurement mechanism, efficiency and cost optimization can be achieved [2] .

2.2 Main challenges faced by enterprise supply chains

Data security protection and personal privacy confidentiality have become one of the key problems in the core challenges currently faced. With the rapid growth of data in the supply chain, companies must act quickly to explore how to build a data security defense system to protect these data resources from infringement. In 2017, Maersk, a well-known global logistics company, recently suffered malicious damage from ransomware, which caused a large-scale shutdown of the global information system. The challenges posed by cybersecurity threats to the supply chain system reveal the weak links in its structure. With the continuous expansion of the global business field, the complexity of the supply chain has also shown a significant upward trend. The integration of cross-border supply chains is the cornerstone for companies to achieve efficient operations. In response to the analysis of strategies for dealing with legal systems and market fluctuations in different countries, companies should show strong flexibility and adjustability. The outbreak of the new coronavirus in early 2020 caused disruptions to the global supply chain. Many companies have been overly dependent on suppliers in specific countries, and their production activities have stagnated. Supply chain transparency is a major challenge faced by enterprises. In a complex supply chain system, it is a very challenging task to ensure accurate and timely transmission and receipt of information in each link. Opacity may lead to a decline in organizational operating efficiency and a weakening of trust between partners. In my country's apparel industry, given that the supply chain spans multiple countries, all steps in the entire chain from raw material procurement to finished product sales require a high degree of coordination and information sharing mechanism. Information lags or errors may lead to rising costs and delayed supply.

2.3 Analysis of successful cases of advanced enterprises

Looking at the innovation-driven digital transformation of supply chain management, many excellent companies have significantly improved their performance through the effective combination of innovative strategies and technologies. Amazon has refined and optimized inventory management and logistics processes with the help of a highly automated distribution network combined with advanced algorithms. Amazon's logistics distribution center has adopted robotics technology to achieve automated management of warehouse operations, reduce manual errors and enhance operational execution efficiency. The company uses big data analysis and forecasting technology to accurately predict

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consumer demand trends, achieve the goal of optimizing inventory geographic layout, and shorten product delivery time. P&G has adopted a comprehensive supply chain integration model, and the optimization effect of global supply chain transparency and efficiency is obvious. P&G uses SAP's planning and optimization tools to automate corporate business processes and achieve comprehensive integration of various supply chain nodes, from raw material procurement to finished product production and distribution. The entire production operation chain. Nike actively promotes supply chain management, focuses on implementing a sustainable development strategy, and implements methods to use recyclable materials and optimize production processes to reduce environmental pressure. Nike has adopted advanced environmental management systems and strict supplier audit processes in its supply chain management, and the product production process has achieved sustainability assurance. Digital tracking technology helps to achieve dual guarantees of supply chain transparency and compliance.

3. Information asymmetry and coordination barriers in the supply chain

3.1 Supply Chain Information Asymmetry

In the current field of actual operation of enterprise supply chain management, asymmetric information has a direct impact on the improvement of decision-making efficiency and the overall assessment of operational risks. The inadequacy of information sharing among the participants in the supply chain and the lag in information transmission are the main sources of information asymmetry. This phenomenon is particularly prominent in many industrial sectors. In the sector of my country's apparel industry, in supply chain management, retail companies often face the problem of not being able to grasp the inventory and production progress of suppliers in real time, which in turn leads to the extension of order processing time and the formation of inventory backlogs. This reduces the response efficiency of the supply chain, the unpredictability of market operations has increased, and the inventory cost and potential loss risk level have increased accordingly. In China 's high-tech industry branches, especially in the field of semiconductor manufacturing technology, information asymmetry can easily lead to a shortage of key components, which in turn leads to a complete interruption of the operation of the entire production line, and the business continuity of enterprises faces a major threat. In the automotive production and assembly industry sector, if the warning of delayed parts supply is not transmitted to the relevant departments in a timely manner, the production process may face the risk of suspension, which will have a significant positive effect on the company's economic output and may damage the company's market image. Optimizing supply chain operations, reducing operational risks and improving market competitiveness all rely on the effective management of information flow. To propose solutions to the information asymmetry phenomenon in the supply chain, it is necessary to create an efficient and transparent information exchange framework to ensure the immediate and accurate transmission of key information between each link in the supply chain.

3.2 Low efficiency of supply chain collaboration

In the supply chain network structure under the background of globalization, improving the collaborative efficiency of the supply chain is the core element for enterprises to respond to market dynamics in an agile manner. In the process of supply chain integration, various obstacles are frequently encountered. If there are communication barriers, incoordination of processes or incompatibility between technical platforms, there will be significant obstacles to achieving the highest operational efficiency. In the complex automotive manufacturing supply chain, from the selection of raw materials to the manufacturing process of parts and components, and then to the final assembly stage of the whole vehicle, if the coordination effect between supplier levels is not ideal, the entire production process may face time delays, which will lead to cost increases and delivery delays. When the efficiency of collaborative operations is poor, among many problems, resource abuse is common, and repeated links and unnecessary time delays in the logistics process are analyzed. Such conditions will weaken the overall operational efficiency of the supply chain and slow down the timeliness of market response. In the face of rapid changes in consumer demand, the electronic technology industry needs to pursue an organic combination of flexibility and efficiency in the supply chain system. If there is a compatibility mismatch between information systems, there is a possibility of delay in the transmission of key data, so the inventory management mechanism is paralyzed, increasing the risk probability of oversupply and shortage [3] . In the process of maintaining regulatory compliance, medical device manufacturers need to take into account the resilience of the supply chain. Any negligence in the collaboration process may cause production stoppages and deterioration of product quality.

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3.3 Inadequacies in risk management and response mechanisms

In the field of supply chain management, risk sources present multi-angle and multi-level diversity, involving natural disasters, political turmoil, market demand fluctuations and technical failures. Successful risk management practices require accurate identification of relevant risks and the development of practical and feasible response measures. In the new year of 2020, when the new coronavirus epidemic first emerged, the international supply chain encountered a major shock wave. Many companies failed to successfully diversify their supplier networks or optimize and adjust their inventory management strategies, and failed to effectively respond to the complex situation of supply chain disruptions. There are obvious loopholes in the risk assessment and control links. If the potential hidden dangers in the supply chain are not quickly discovered and effectively responded to, the scale of losses will often be aggravated, which will have a major impact on the company's long-term strategic layout and market position. In my country's pharmaceutical industry sector, if the supply of raw materials is blocked, the production of key drugs may stagnate. This behavior has caused significant shocks to the company's financial situation, and this situation still has the possibility of causing damage to public health. Such enterprises should build a comprehensive risk management framework, adopt diversified procurement channels and backup production plans to reduce the risks caused by dependence on a single supplier. In my country's high-tech industry, technical system failures or data security risks may spread rapidly, posing a major impact on the supply chain as a whole. Such enterprises urgently need to implement large-scale capital investment in the field of technology, strive to ensure the security and stability of information systems, and ensure uninterrupted operations.

4. Information flow and collaborative efficiency issues in the supply chain

4.1 The impact of information asymmetry on supply chain efficiency

In the scope of supply chain management, information transparency is the basic guarantee for promoting the coordination of activities of all parties and optimizing resource allocation. If the information is not thorough, the inventory measurement, production efficiency and logistics operation status will be affected, and the company will be unable to implement the best decision. In the electronic consumer products industry sector, in the commodity circulation link, if retail practitioners fail to accurately collect the inventory and production data of suppliers, there is a risk of excess or shortage of order scale, which will lead to negative consequences of inventory backlog and supply shortage. Research on the mutual constraints between sales performance and customer satisfaction . Information asymmetry often leads to a slowdown in the speed of response behavior. In the fashion industry segment, facing the rapid changes in market trends, the supply chain urgently needs to show rapid adaptability. The time lag effect of information transmission may cause companies to miss market development opportunities and face the impact of economic losses.

4.2 Causes and impacts of low collaborative efficiency

The reduction of supply chain collaboration efficiency often stems from the interaction of multiple factors, including process inconsistency, incompatibility of technology platforms, and diversity of organizational culture. The occurrence of process inconsistency is often closely related to the inconsistency of implementation standards and management models of enterprises in the supply chain. Such differences make it difficult to achieve barrier-free integration of information flow and logistics. Manufacturing enterprises and parts suppliers show process mismatch in order processing. Production arrangements may face the challenge of delay or revision, production costs will increase, and market response speed will also be delayed. The lack of compatibility between systems has a significant impact on technological progress. If there are differences in the selection of information systems between suppliers and manufacturers, the obstruction of information exchange will constitute a major constraint on the improvement of collaboration efficiency, increase error rate and processing time. The phenomenon of corporate culture diversity cannot be ignored and needs to be analyzed in depth. The diversity of management methods and internal communication models between enterprises is a key constraint on the effectiveness of cross-organizational collaboration. The low efficiency of collaborative operations has a negative impact on the overall operational efficiency of the supply chain, reducing the timeliness of order fulfillment, reducing customer service quality and increasing overall operating costs, which in turn has a direct impact on the market position and profitability of enterprises in the fierce market competition situation [4] .

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4.3 Potential threats to enterprise supply chains from insufficient risk management

The risks that supply chains are exposed to include natural disasters, supply disruptions, demand fluctuations, and technical failures. The 2011 earthquake in Japan had a significant and lasting impact on the global automotive and electronics industries. Given that some suppliers of key components are located in the disaster-stricken areas, many of the world's top automotive and electronics manufacturers face major production disruption challenges. The effects of such natural disasters expose the limited risk resistance of enterprises in terms of geographical distribution and supplier diversification. Technical failures, such as data center disruptions or network attacks, may also cause the entire supply chain system to collapse. In 2017, Maersk Group's global supply chain system was temporarily closed due to a ransomware attack, causing huge economic losses and a significant reduction in customer trust. In the digital supply chain, such risks are particularly noteworthy. Information systems and network security are the core driving forces for the smooth operation of the supply chain. The phenomenon of demand fluctuations is an important risk factor that cannot be ignored, especially in the rapidly changing consumer goods market. If enterprises fail to accurately predict and grasp market consumer demand, the risks of overproduction and undersupply cannot be ignored, and the financial performance and market position of enterprises have been significantly impacted.

5. Optimize supply chain information flow and risk management

5.1 Establish an efficient information sharing platform

Establishing an efficient information sharing and interactive platform and building a support system for real-time data exchange must fully guarantee that the rights and interests of all participants in the supply chain, from raw material suppliers to finished product manufacturers, are reasonably maintained. Distributors and retailers can access the synchronized information of inventory, production progress and logistics information in real time. Cloud computing technology can form a centralized data resource library, and authorized supply chain participants can access updated data resources on demand. The adoption of blockchain technology can significantly enhance data transparency and security protection, build an unalterable and fully traceable data chain, and effectively reduce the potential threat level of information tampering. The implementation of this strategy can refer to the operation path of Walmart, a leading international retail company. Walmart and suppliers work together to share sales data, enhance the accuracy of suppliers' forecasts of demand, and then implement comprehensive optimization of inventory management and production plans. By adopting an efficient information exchange architecture, Walmart has achieved a significant leap in efficiency in inventory management, effectively controlled the frequency of overstocking and out-of-stock phenomena, and significantly enhanced customer satisfaction.

5.2 Optimizing supply chain collaborative working mode

To achieve comprehensive improvement in supply chain collaboration, it is necessary to advance both process integration and technological innovation. Implementing standardized operating procedures is the cornerstone of improving collaborative efficiency. Enterprises need to work closely with all links in the supply chain to jointly develop a set of standardized operating specifications and processes, maintain information consistency and implement activities simultaneously, implement enterprise resource planning (ERP) systems, and promote the enterprise's informatization process and core competitiveness development. This system integrates the overall process of procurement, production, inventory management and sales, and implements comprehensive collaborative management of data and processes. Adopting efficient collaborative means such as the Collaborative Planning, Forecasting and Replenishment (CPFR) model, innovative exploration of collaborative models between various links in the supply chain, Cisco Systems has achieved collaborative optimization of demand and supply with its suppliers with the help of the CPFR model. This model adopts the sharing of forecast information and the integration of sales data to develop an optimized path for partners to formulate production and inventory strategies. This measure aims to reduce inventory backlogs and improve the agility of responding to market fluctuations [5] .

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5.3 Strengthen supply chain risk management and response strategies

In order to effectively deal with the risk challenges in supply chain operations and build a comprehensive risk management system, enterprises need to adopt a comprehensive risk management and response strategy, implement a comprehensive risk assessment project, and conduct periodic comprehensive reviews of all parts of the supply chain, covering supplier risk points, logistics operation risks, technology implementation risks, and market demand change risks. In this process stage, enterprises should use the risk matrix tool to identify and prioritize high-risk areas. Toyota, a world-renowned automobile company, has adopted a lean production management model to strictly monitor and track potential risks in the supply chain, thereby forming a stable supplier strategic alliance partner system and consolidating the stable production foundation of the production line. Enterprises should be wary of over-reliance on a single supplier and adopt a multi-channel supplier system to enhance the resilience and resilience of the supply chain. Apple corporate entities in the electronics manufacturing industry adopt a strategy of deploying suppliers around the world to achieve decentralized control of production risks, implement a stable supply guarantee project for key components, develop a comprehensive emergency response plan, develop a detailed response manual, spare production resources, alternative logistics routes and inventory buffer plans, and plan and implement emergency response plans. Enterprises should increase capital investment in cutting-edge technologies in information technology systems, implement technical implementation paths for real-time data monitoring and early warning systems, provide early warnings of potential risks, and then quickly take effective measures.

6. Conclusion

This paper systematically discusses the current status, main difficulties and countermeasures of enterprise supply chain management under the background of digital economy. Even though digital technology has been widely implemented in the field of supply chain management, significantly improving transparency and work efficiency, enterprises are currently facing multiple difficulties such as information asymmetry, low efficiency of collaborative operations and insufficient risk management. In order to effectively deal with such challenges, this paper proposes specific measures such as building an efficient information sharing platform, optimizing the supply chain collaborative operation mechanism, and strengthening risk management and response strategies in the fields of information sharing, supply chain collaborative operations and risk management. The use of these strategies will help to significantly improve the transparency of the supply chain and the efficiency of collaborative operations, implement the governance and mitigation of supply chain risks simultaneously, and enhance the flexibility of the supply chain system and the immediate response and rapid adjustment efficiency to market demand. Research review, progress, dynamics, trends, hot spots, frontiers and prospects of challenges and response strategies to cope with the challenges of digital economy. Only by constantly adjusting and innovating supply chain management strategies can enterprises stand out in the fierce market competition. Taking the continuous evolution of market demand and potential risks as the starting point, it has greatly promoted the improvement of supply chain management efficiency, ensured that enterprises continue to occupy the leading position in the industry in the fierce market competition, and implemented the strategy of sustainable development.

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