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Research on Logistics Management of Supply Chain Collaboration based on Informatization

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Abstract

With the increasing complexity of global supply chains and intensified market competition, information-based logistics management of supply chain collaboration has become a key way to improve the efficiency and competitiveness of supply chains. This paper analyzes the value and difficulties of information technology application in the logistics management of supply chain collaboration, as well as corresponding strategies. It also discusses the significant advantages of information technology in improving the transparency of supply chain, enhancing the efficiency of collaboration and its resilience. However, the promotion of informatization faces challenges such as insufficient data standardization, high cost, complexity and cultural management barriers. Therefore, strategies such as promoting data standardization and information sharing, reducing application costs, and strengthening organizational culture construction are proposed to help enterprises realize efficient supply chain collaboration in the informatization transformation.

Keywords

Informationization; Supply Chain; Logistics Management; Collaborative Strategy.

1. Introduction:

In the context that globalization and digitalization is in accelerated development, supply chains are becoming increasingly complex, and companies are facing tremendous challenges in improving efficiency, reducing costs, and responding quickly to market changes. Logistics management of supply chain collaboration, as an important way to enhance the overall competitiveness of the supply chain, relies on efficient collaboration and information sharing in multiple links. The rapid development of information technologies, such as the Internet of Things, big data, artificial intelligence and blockchain, is providing new opportunities and means for supply chain management. However, although information technology has shown significant advantages in supply chain collaboration, its application still faces a series of challenges, including interoperability issues between systems, high initial investment, complex technology application and management issues. Therefore, it is of great practical significance and theoretical value to conduct in-depth research on the application value and difficulties of informatization in the logistics management of supply chain collaboration and propose corresponding solutions.

2. The Value of Information Technology Application in the Logistics Management Supply Chain Collaboration

2.1. It is Conducive to Improving the Visibility and Transparency of the Supply Chain

The application of information technology in supply chain management can greatly improve the visibility and transparency of the supply chain. The integrated management of each link

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enables all parties in the supply chain to obtain and share data in real time, thereby improving the efficiency and reliability of the entire logistics process. The widespread application of Internet of Things (IoT) technology can also lay the foundation for the transparency of the supply chain. With the help of sensors and smart devices installed on goods, warehouses and transportation vehicles, companies can monitor the status of goods in real time, including temperature, location, inventory levels and some other important information. This real-time monitoring can not only improve the visibility of the logistics process, but also help companies take corrective measures in a timely manner when abnormal situations occur. For example, when the temperature of cold chain transportation is abnormal or the location of the goods deviates from the planned route, the route can be adjusted in time, thereby reducing the risks in the logistics process. In addition, the application of cloud computing technology has greatly enhanced data sharing and storage capabilities. Participants at different nodes in the supply chain, whether manufacturers, suppliers or logistics service providers, can access and analyze relevant data in real time through the cloud platform. This real-time data sharing ensures that all parties in the supply chain have symmetrical information when making decisions, reduces the risk of information lags and errors, and thus improves the overall responsiveness and flexibility of the supply chain. In addition, cloud computing also allows companies to manage supply chains across regions on a global scale, enabling information to be seamlessly transmitted and collaborated between multiple regions or countries, thereby achieving real-time collaboration in global supply chain management [1].

2.2. It is Conducive to Enhancing the Flexibility and Adaptability of the Supply Chain

Information technology can significantly improve the management efficiency in the supply chain collaboration and effectively reduce operating costs. Through the efficient communication and collaboration platform provided by information technology, all supply chain participants can exchange data and integrate resources more smoothly, thereby optimizing the overall resource allocation, reducing the inefficiency and errors in manual operations, and improving the operating efficiency of the supply chain. The introduction of the Electronic Data Interchange (EDI) system can greatly simplify the data transmission process between enterprises and suppliers and logistics service providers in the supply chain. EDI realizes the automatic exchange of information by adopting standardized data formats and communication protocols, avoiding data errors and delays in traditional manual processing. This automated data exchange method not only improves the accuracy and timeliness of data transmission, but also reduces a large number of manual operations, thereby reducing labor costs and operational risks. At the same time, the enterprise resource planning (ERP) system plays an important role in supply chain management. The ERP system integrates and manages all aspects of the supply chain, including procurement, production, inventory, transportation and other resources, and realizes the automation of planning and scheduling. In addition to reducing redundant operations between links, this centralized resource management greatly improves the response speed of the supply chain.

2.3. It is Conducive to Enhancing the Flexibility and Adaptability of the Supply Chain

The application of information technology enables the supply chain to be more flexible and adaptable in the face of market changes and emergencies, thereby enhancing its overall resilience. Artificial intelligence (AI) and machine learning has been widely used in the supply chain. It helps companies predict future market demand more accurately by analyzing large amounts of historical data, market trends and environmental changes. This predictive capability enables companies to adjust production and inventory management strategies in advance, optimize logistics routes, and then reduce the negative impact of demand fluctuations

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or supply chain disruptions [2]. For example, AI algorithms can predict product demand peaks based on sales data and formulate corresponding inventory replenishment plans, thereby avoiding inventory backlogs or stock-outs. In addition, machine learning can also help optimize logistics distribution routes, reduce transportation costs, and improve distribution efficiency. The supply chain simulation and application of optimization tools provides enterprises with a simulation experimental environment, helping them simulate and test various supply chain scenarios before implementing decisions. Through data modeling and simulation technology, companies can identify potential bottlenecks and risks in the supply chain in a virtual environment and then take preventive measures before problems occur. This not only improves the resilience of the supply chain, but also ensures its stability in a complex and changing market environment.

3. Dilemma in the Application of Information Technology in the Logistics Management of Supply Chain Collaboration

3.1. Data Standardization and Interoperability Issues

Data standardization and interoperability in supply chain management are important obstacles affecting the efficiency of supply chain collaboration. The supply chain involves multiple links and different participants, including suppliers, manufacturers, logistics companies and retailers, etc. These participants often use different information systems and technical standards, resulting in problems with data formats, communication protocols and system compatibility. First, isolated data islands are a significant challenge. Different enterprises generally use their own independent information systems. Due to the lack of unified standards and interfaces, information between different links cannot be effectively shared, resulting in interruptions in the information flow of each node in the supply chain and the formation of "isolated data islands". This kind of information asymmetry and incoherence greatly reduces the overall collaboration efficiency of the supply chain and increases communication costs and the risk of decision-making delays. At the same time, the inconsistency of informationization levels and technical standards among enterprises further exacerbates this problem. In the supply chain, different enterprises may be at different stages of information development. Some of them may have adopted advanced automation systems and technologies, while others still rely on traditional manual operations or inefficient systems, which makes it impossible for data between systems to be interoperable and compatible.

3.2. High Cost and Complexity of Information Technology Applications

The application of information technology has brought significant efficiency improvements and competitive advantages to supply chain management. However, its high cost and complexity have become the main obstacles faced by many companies in the process of promoting informatization, especially to SMEs, because the informatization of supply chains is usually accompanied by high initial investment costs. In order to achieve informatization, enterprises need to purchase a large amount of hardware and software equipment, establish data centers, and develop or purchase customized software systems; especially when it comes to cutting-edge technologies such as IoT, automated equipment and big data analysis, the initial investment is particularly huge [3]. For example, the implementation of IoT technology requires a large number of sensors, network infrastructure and related data processing platforms, and the cost of these devices and technologies is far beyond the affordability of many SMEs. In addition, enterprises also need to deal with various requirements such as data storage, processing and security, which invisibly increases construction costs. The maintenance and upgrade costs of information systems are also an important expense in the long-term operations of an enterprise.

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3.3. Cultural and Management Barriers

The promotion of information technology is not only a technical challenge, but also a transformation process deeply rooted in the organizational culture and management model. When promoting supply chain information collaboration, many companies face cultural and management barriers, and internal resistance in the organization is a common problem in the information transformation. Many enterprises, especially those that have long relied on traditional management methods, may feel uncomfortable when faced with information transformation. Employees lack confidence or skills in the use of new technologies. They may resist the introduction of new systems for fear of being unable to adapt to technological changes, limiting the effectiveness of information management. In addition, some management teams are cautious about information technology reforms, and their concerns about the disruption of existing management processes may slow down the pace of information technology reforms. The resistance to change has severely undermined the potential of information technology in supply chain management, resulting in slow progress in change and difficulty in achieving the expected efficient operations.

4. Logistics Management Strategy of Supply Chain Collaboration based on Informatization

4.1. Promote Data Standardization and Information Sharing

To effectively overcome the problems caused by isolated data islands and interoperability in the supply chain, promoting data standardization and information sharing has become a key strategy to achieve efficient supply chain collaboration. All participants must make joint efforts at the industry level to develop and implement unified standards. By establishing a globally unified electronic data interchange (EDI) standard, barcode standard or Internet of Things protocol, it can be ensured that different enterprises follow the same rules when exchanging information, thereby simplifying the data transmission process and improving the smoothness of information flow. This standardization can not only help to reduce misunderstandings and errors caused by incompatible data formats, but also effectively improve the efficiency of supply chain collaboration and enable information to flow seamlessly between various links. Establishing a unified platform for supply chain collaboration is an important means to achieve information sharing. By building a cloud-based supply chain management platform, participants can share and query data in real time on the same platform [4]. This integrated platform breaks down the information barriers between enterprises and achieves the synchronization of information flow, logistics and capital flow. This platform not only provides real-time data visualization, but also enables all parties to respond quickly to market changes, improving the flexibility and collaboration of the entire supply chain. Through such a platform, participants in all links can communicate and collaborate more efficiently, optimize their resource allocation, reduce inventory costs, and ultimately improve customer services. In addition, data security and privacy protection is another important consideration in promoting information sharing. With the increase of data and transmission of sensitive information, the use of technologies such as blockchain can ensure the security and immutability of data while enhancing information transparency. This technology can ensure the security of data during transmission, resolve the security concerns that may arise among all parties when sharing information, promoting the trusted sharing of information. The decentralized nature of blockchain can enhance trust among participants and help to build a more stable and efficient supply chain ecosystem. Through the comprehensive use of unified standards, collaborative platforms and security technologies, all participants of a supply chain can effectively improve the efficiency and security of information sharing, which can further promote the efficient collaboration and development of the supply chain.

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4.2. Reduce the Cost and Complexity of Information Technology Applications

In view of the high cost and technical complexity faced by SMEs in the application of informatization, it is particularly important to adopt innovative solutions and business models to lower the threshold of informatization and enable more enterprises to participate in the management of supply chain collaboration. First, the promotion of cloud computing and Software as a Service (SaaS) model can provide enterprises with an efficient, flexible and economical option. By adopting a logistics management system based on cloud computing, enterprises can avoid the high server and infrastructure investments required for traditional local deployments, and use information systems on demand. In this way, they can not only significantly reduce initial investment, but also reduce subsequent maintenance costs, which is particularly suitable for SMEs with limited resources. Cloud service providers are usually responsible for system maintenance and upgrades, further reducing the operational burden on enterprises and allowing them to focus on their core business. At the same time, the design of modular information system provides enterprises with a flexible path for information implementation. They can gradually introduce the functions of each module according to their specific needs and development stage, avoiding the risk of one-time large-scale technology investment. This incremental implementation method allows enterprises to gradually improve their informationization capabilities at a lower cost. And then they can gradually increase the functions and complexity of the system as their business expands, thus reducing the technical obstacles and management pressure that they may face in the early stages of informationization. In addition, government and industry support also play an important role in promoting the application of information technology in SMEs. The government or industry organizations can help SMEs overcome the financial and technical difficulties in information technology applications by providing financial support, technical training and subsidy policies. Policies of such kind can not only reduce the information technology costs of SMEs, but also enhance the technical capabilities of enterprise employees through training, enabling them to better adapt to the application of new technologies.

4.3. Strengthen Organizational Culture Construction and Management Optimization

In addition to depending on advancement of technology, the success of information management also requires in-depth optimization of the internal management model and culture of the enterprise, so as to promote the active participation of all employees in information transformation. Strengthening the driving force of senior leaders is the key to achieving the management of information collaboration. Information transformation should be promoted from the strategic level of the enterprise, and meanwhile the participation and support of senior leaders are crucial. They need to develop a long-term information technology strategy and ensure that the strategy is effectively implemented at every level of the enterprise. The active participation of senior leaders can not only provide resources and support for information transformation, but also motivate employees to actively participate, thereby creating a good atmosphere for joint efforts by all employees. At the same time, enterprises must optimize business processes and management models in the process of promoting information-based supply chain management. Informatization is not only a change at the technological level, but also requires a comprehensive reorganization and optimization of the enterprise's existing business processes to adapt to the needs of informatization [5]. Through business process reengineering (BPR), enterprises can identify and eliminate redundant steps, simplify processes, and thus improve their operational efficiency. On top of improving the enterprises' ability to respond to market changes, this kind of optimization can also enhance the overall synergy of the supply chain and ensure the efficient operation of information flow, logistics and capital flow. In addition, enterprises need to focus on employee training and

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improving organizational adaptability to ensure the effective application of information technology. Enterprises should strengthen skill training of employees, so that they can master new information tools and systems, which can ensure the smooth implementation of technological transformation.

5. Conclusion

To sum up, the logistics management of supply chain collaboration based on information is not only an important trend in supply chain management, but also a key means to enhance the core competitiveness of enterprises. Through a comprehensive analysis of the application value, this article clarified the difficulties and strategies of information technology in supply chain collaboration, the potential of information technology in improving supply chain transparency, efficiency and flexibility. At the same time, practical challenges such as insufficient data standardization, high technology costs and organizational cultural barriers are also pointed out. In order to succeed in the information wave, enterprises must adopt active response strategies, promote data standardization and information sharing, reduce the implementation cost of informationization, and ensure the smooth progress of informationization transformation by optimizing organizational management and cultural construction. Only under the premise of collaboration among technology, management and culture can enterprises truly achieve efficient collaboration of the supply chain, enhance their overall competitiveness and adapt to the uncertain market environment in the future.

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