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Global Supply Chain Information Sharing Platforms: Challenges, Opportunities, and Trends

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Abstract: With the deepening process of globalization, the rapid development of information technology and the diversification of logistics methods, supply chain management faces increasingly complex challenges. This study explores the future development trends, challenges and opportunities of information sharing platforms in global supply chains. In global supply chains, information sharing platforms are of great significance. It facilitates real-time data exchange and collaboration among supply chain segments and help improve supply chain transparency, flexibility and efficiency. However, global supply chain information sharing faces many challenges, including problems in information security, technical standards, cultural differences, and laws and regulations. In response to these challenges, this paper proposes future directions for developing a global supply chain information sharing platform, including digitization, automation, cross-platform cross-border collaboration, data security and privacy protection, application of new technologies, and flexibility and adaptability. This study provides useful insights and guidance for future global supply chain management by exploring the global supply chain information sharing platform.

Keywords: Information Sharing, Supply Chain, Information Sharing Platform

1. Introduction

The advent of globalization, advances in information technology and diversification of logistics methods have led to a more complex landscape for supply chain management. Traditional supply chain management faces several challenges, including information asymmetry, logistics delays and inventory backlogs. The criticality of information in the supply chain is reflected in the interaction of the material, information and capital chains, whose smooth communication and management can maximize profits. Consequently, in-depth research on global supply chain coordination has identified information sharing as a key strategy for improving supply chain efficiency and flexibility [1].

In the early days of supply chain information sharing, the focus was on large enterprises and the operation of internal systems. However, as the complexity of supply chains increased, the need for inter-enterprise coordination became apparent. A supply chain information-sharing platform has emerged to enhance communication and collaboration. The platform integrates the information systems of each participant to facilitate real-time sharing and exchange of upstream and downstream information. This enables each supply chain participant, such as producers, suppliers, and logistics companies, to obtain accurate information promptly, optimize production planning, inventory

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management, logistics and transportation, and reduce costs and operational risks. The advancement of big data analysis and artificial intelligence technology has enabled the supply chain information-sharing platform to provide forecasting and decision-making support through big data analysis, further optimizing operational efficiency and cost control. Consequently, constructing a supply chain information-sharing platform represents a significant measure to address future supply chain management challenges and promote collaborative development and optimization.

2. Global Supply Chains and Information-Sharing Platforms

The term “supply chain” describes the entire process of a product, from the production of raw materials to the end user. This process involves multiple links and participants. An information-sharing platform based on current big data and information processing technologies facilitates information exchange and cooperation among participants [2].

In a global supply chain, an information-sharing platform can facilitate the sharing and analysis of real-time data between different regions, enterprises, and links in the supply chain. This enables participants to coordinate better and manage supply chain activities. The platform can also provide supply chain visualization, forecasting capability and inventory management. In other words, the information-sharing platform represents a crucial instrument for coordinating and optimizing global supply chains. Through its visualization and real-time information sharing, it enables the participants in each supply chain link to respond more effectively to market changes, reduce costs, and improve efficiency, thereby achieving supply chain optimization and collaborative development [3].

The origins of information-sharing research can be traced back to Srinivasan’s study on the role of EDI technology on suppliers' shipping performance in a just-in-time environment [4]. Lee et al. studied information distortion in supply chains and introduced the concept of the bullwhip effect [5, 6]. The practical application of information sharing and the bullwhip effect has led to information sharing as a key area of research in the global supply chain coordination field. Information sharing is a fundamental aspect of supply chain management, providing the foundation for implementing efficient and cost-effective supply chain management strategies. The availability of global supply chain information enables enterprises to respond to market changes more agilely, thereby maintaining their competitive advantage.

Enhance supply chain visibility and transparency. The real-time sharing of information on order status, inventory level, transport progress, and other relevant data can facilitate a more comprehensive understanding of the operation of the entire supply chain. This understanding can be beneficial in addressing the challenges associated with information asymmetry and information lag in information transmission. Furthermore, enhanced visibility and transparency within the supply chain can be achieved through real-time information sharing.

The system facilitates coordination of all parties involved in the supply chain, thereby improving the efficiency of the supply chain. By sharing information, all parties in the supply chain can see the situation of other participants, thus enabling them to coordinate and cooperate more effectively. This, in turn, enhances the connection between each party, helps to adjust the production plan, inventory levels and logistics routes promptly, and enables them to respond to various changes quickly. This, in turn, improves the efficiency of the supply chain and reduces the wastage of resources and costs.

They are facilitating effective forecasting and accelerating the decision-making process. Information sharing enables decision-makers to judge market trends and demand based on real-time data, allowing enterprises to react faster to capture changes and market competition dynamics, make timely adjustments to cope with market changes and risks, and reduce risks and uncertainties.

Optimize inventory management. Information sharing can assist companies in more accurately forecasting demand and avoiding inventory backlogs or stock-outs. Furthermore, inventory planning

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can be optimized to minimize inventory costs and capital usage. This reduces inventory costs, reduces inventory risk, and improves inventory turnover.

Reduce supply chain risk. By sharing information, enterprises can make more informed decisions regarding the various risks in the supply chain. This includes supplier issues, logistics delays, and market fluctuations. By doing so, enterprises can reduce risks and improve the stability and reliability of the supply chain.

Enhance partnership. Information sharing can facilitate collaboration and communication between enterprises and their suppliers, customers, and partners. This can lead to closer partnerships, enabling enterprises to collectively address market challenges and seize opportunities.

3. Challenges in Implementation of Global Supply Chain Information Sharing Platforms

The primary challenge in contemporary global supply chain management stems from the information asymmetry that arises from globalization characteristics. This results in the critical information of each link being unable to flow through the chain promptly and effectively [7]. In practice, numerous enterprises have initiated efforts to construct their information-sharing platforms, such as the SMART system developed by Walmart [8]. Nevertheless, the self-constructed information sharing platform needs to be more distant from the entire industry, including advancing global supply chain information. Therefore, the biggest difficulties in the practice of global supply chain information sharing platforms are in two aspects: the acquisition of supply chain information and data analysis, as well as the differences in culture and law.

3.1. Acquisition and Analysis of Supply Chain Information

The construction of a shared information platform on a global scale will inevitably involve the transmission and storage of data between different countries. Consequently, there is a risk that data may be subject to unauthorized access, tampering or leakage during the transmission, storage and processing stages. Furthermore, there is a possibility that data may be misused or that personal privacy and sensitive information may be infringed.

Technical standards and operational interoperability. Different regions and enterprises' differing technical standards and systems present significant challenges to the effective coordination and operation of supply chain information-sharing platforms. The incompatibility of various systems hinders information sharing, as they need help communicating and exchanging data effectively. Furthermore, the differing data formats and standards among different participants further complicate the technical integration of these systems. The establishment of data standards is essential for the construction of the platform.

Furthermore, the active promotion of the adoption of unified data standards by all parties is crucial to ensure data consistency and interoperability. Additionally, using middleware, API integration and other technologies is vital for data exchange and integration between different systems. These processes present significant challenges.

Information quality is variable. Because of the involvement of multiple links and participants, the quality and accuracy of information will be affected. Furthermore, at the data and information uploading stage, the standard and content of information uploaded by each party are also uneven. Consequently, ensuring the accuracy and reliability of information is crucial to the operation of the supply chain. However, achieving this takes work.

3.2. The Existence of Differences in Cultural Laws

The nature of their competitive relationships influences the willingness of participants in the supply chain to cooperate. These relationships significantly impact participants' willingness to share

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information and upload data. Therefore, it is necessary to build mutual trust and cooperation and develop appropriate policies and mechanisms for information sharing.

Cultural and legal differences: The degree of consideration and openness of data security and the laws on data protection varies from country to country. Consequently, it is necessary to ensure legal compliance with the data-sharing process. Colleagues in GSCs involve multiple national cultures and languages. Effective communication and understanding are key factors affecting the smooth running of information sharing. Addressing these differences requires additional time and resources, which makes facilitating data sharing in GSCs even more complex.

4. Outlook for Global Supply Chain Information Sharing Platforms

The construction of a supply chain information-sharing platform is under continuous exploration, with various ideas being put forward. Some of these approaches are based on SOA theory and system guidance for constructing a sharing platform; some are based on multi-agent construction of information sharing [9].

The preceding observations can be seen in the construction of the trend, which involves the application of computers, information and, Internet of Things (IoT) technologies and other related technologies to the construction of the supply chain information-sharing platform. Based on the observations above, the future trend should be towards digitization, automation, sustainability and adaptability, advanced technology, and a cooperative model to build the sharing platform above. Platform among enterprises within the supply chain [10], some are based on NET technology design of equipment supply chain information sharing platform [11], and some are based on the Internet of Things (IoT) technology construction of a visual supply chain information sharing platform [12].

Digitalization and automation. The utilization of artificial intelligence, the Internet of Things, big data, and other technologies to facilitate real-time monitoring and management of the supply chain, the appropriate liberation of labor costs, and the capacity to make more intelligent choices.

Cross-border cooperation and the construction of an ecosystem of the supply chain. The sharing of supply chain information can facilitate cross-border cooperation. The financial system can facilitate decision-makers in extracting and judging financial market information more conveniently. The media system can facilitate market decision-makers in judging the direction of publicity and marketing. Meanwhile, with the cooperation of cross-border systems, a more open and flexible supply chain ecosystem can be built to achieve the sharing and optimal allocation of resources.

It is imperative to strengthen data security and privacy protection. As data leakage and privacy issues receive increasing attention, adopting advanced encryption and authentication technologies is inevitable to ensure data security. The utilization of big data analysis and forecasting technology, as well as the rapid processing of fundamental information and collation into a data report, has facilitated more accurate real-time decision-making support in the future. Upgrading information is necessary, as it can assist enterprises in responding to market changes and supply chain risks in a volatile market.

The application of blockchain technology will facilitate the improvement of transparency and traceability in the sharing of supply chain information, which can also result in a reduction of operating costs and an enhancement of supply chain trust. Furthermore, blockchain technology is emerging as a pivotal component of Industry 4 in the context of the evolving digital supply chain. The decentralized, verifiable, and immutable nature of blockchain technology, among other attributes, enables enhanced transparency, real-time information sharing, and supply chain coordination for enterprises. This, in turn, facilitates operational efficiency gains through anticipation and optimization [13].

To enhance flexibility and adaptability, it is necessary for the supply chain information sharing platform to be more flexible and adaptable, i.e., to be able to adjust to the ever-changing market and technological environment quickly. The supply chain strategy and structure must be capable of self-

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updating, and the system must be able to provide timely feedback on its own performance to meet the varying business needs and facilitate the updating and optimization of the system.

5. Conclusion

The integration of the market is leading to an increase in the diversity of logistics requirements, with a concomitant rise in the number of problems to be solved and aspects to be optimized in the operation and practice of the platform supply chain information sharing. This necessitates further advancements in the platform supply chain information sharing direction. Considering these considerations, this study have proposed a vision for the future supply chain information sharing platform, which would be more digital and automated, capable of cross-platform cross-border collaboration and establishing a supply chain ecosystem. It would also have more comprehensive information and privacy protection policies and technologies and utilize new technologies in the development of the supply chain, with greater flexibility and adaptability. Nevertheless, constructing a more convenient supply chain information sharing platform is confronted with two significant challenges: difficulty accessing information and the necessity of comprehending and cooperating about humanities and laws.

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