Analysis of the impact of digital economy on the reconfiguration of manufacturing supply chain

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Abstract. With the rapid development of science, and technology, the transformation and upgrading of the manufacturing supply chain in the era of the digital economy promotes the rapid development of the manufacturing industry., China's transformation is still in the embryonic stage so far. The transformation of the enterprise awareness is weak and lacking motivation. The digital core technology still needs to be researched and developed, so the digital transformation management mode still needs to be explored. However, the research of manufacturing supply chain reconstruction under the background of digital economy is of great practical significance. This paper first introduces the basic concepts and core definitions of global manufacturing supply chain reconstruction and digital transformation. The digital economy leads to the importance and inevitability of manufacturing supply chain transformation. After that, putting forward the risks and opportunities faced by the transformation for the general environment. Finally, this paper provides some suggestions for the restructuring of the manufacturing industry in the digital economy.

Keywords: Digital economy, manufacturing supply Chain, business innovation.

1. Introduction

With the progress of the innovation of technology and techniques in global supply chains has led to the rapid development of the global digital economy [1] [2]. Major corporations have implemented new strategies for industrialization and management models. In every respect, the widespread use of digital technology has quietly changed the production model and supply chain structure of global industries. The global digital supply chain model has become a new driving force for the development of the manufacturing industry. The traditional supply chain management system can no longer adapt to the profound changes brought about by the development of digitization, and the manufacturing industry is ushering in unprecedented drastic changes. Behind the development and growth of the digital economy is the rapid development and extensive use of modern information technology, and it is precisely because of the objective existence of cloud computing, the Internet of Things and big data and other digital means that more economic agents are able to participate in the process of socialized production, thus objectively breaking down the information barriers and economic segregation caused by the various factors in the traditional economic form.(3) Against the background described above, This paper first analyzes the opportunities and challenges faced by the digital economy in the reconstruction of the manufacturing supply chain. Afterwards, this paper puts forward the necessity and inevitability of digitalization in modern society, then this study introduces the way in companies realizes real-time transmission of supply chain information through the use of big data and IT technology. Finally, the authors introduce China's supply chain reconstruction and digital transformation ideas, such as using policies to implement upstream and downstream compensation mechanisms to attract more enterprises to reform and promote digital management. In summary, the study of manufacturing supply chain reconstruction based on the background of the digital economy has significant practical value and practical significance.

2. The concept and relationship between supply chain and digital economy

2.1. Connotation of Global Supply Chain

The earliest explorations of global supply chain (GSC) originated from multinational corporations (MNCs). MNCs need make business decisions to optimize results in different parts of a country. Hishleifer suggests that centralized decision-making is the best option, considering that a global supply chain is a series of business activities that expand revenues by reducing costs and that such a global supply chain possesses interconnections and decentralized characteristics across the globe [4]. In 2000, the United Nations Industrial Development Organization (UNIDO) defined a GSC as a globally networked supply chain with a combined supply chain implemented globally to meet the needs of consumers worldwide. Summarizing the above views, modern GSC can be understood as an integrated global supply network that expands the scope of GSC participants. GSC realizes the interaction between logistics and information flows by integrating and allocating global resources, and finally satisfies the expansion of global demand. Each company establishes a complete global supply chain system through "supply chain + ecosystem" to balance the interests of all stakeholders, so as to better undertake global social responsibilities. GSC has gradually transcended purely economic objectives, generalized and penetrated into the field of social activities. Only based on this foundation can we more deeply understand and grasp the theoretical logic of the reshaping and digital transformation of GSC in our manufacturing industry. However, the current research in this area is still relatively weak, lacking in systematicity and rationality.

2.2. Overview of the Meaning and Impact of the Digital Economy

Based on its history, the digital economy can be viewed as a higher stage of economic development. The digital economy is distinctly different from the agricultural and industrial economies of the past. Because the key production factors of the digital economy are digitized knowledge and information. Innovation in information technology is the core force driving the development of the digital economy, which realizes its growth through the medium of modern information networks. The importance of the digital economy lies in innovating the model of the traditional economy. Realize the digital transformation of traditional industries through the digital economy and generate new economic forms and government governance. Relying on the Internet and information technology, the digital economy is becoming a key driving force for changes in the quality, efficiency, and dynamics of the real economy. At the same time, the digital economy has become a new engine for revitalizing the real economy and promoting transformation and upgrading. Big data and artificial intelligence are having far-reaching impacts on all aspects of social production and even the entire economic operation mechanism. The ability to master and apply big data in the era of the digital economy will determine the level of economic and social development of a country or region. Globally, the integration of the digital economy and the real economy is highly competitive. Meanwhile, the integration has become an important symbol for measuring a country's comprehensive innovation strength.

2.3. Digital Transformation

Digital transformation stems from the intersection of new technologies such as cloud computing, big data, the internet of things, and artificial intelligence, which have a decisive impact on every industry in today's society. At the moment, the concept of digitization has gone through three stages of development: digitization, digitalization, and digital transformation. Digitization, as defined by Gartner, is the transition from analog to digital, but it does not result in a qualitative change [5]. In other words, the digitization represented by digitization does not transform things as they are, but only transforms the form in which they exist or the way in which they are stored so that they can be managed by computers. For example, scanning a paper document into an electronic document, saving a photograph in electronic format, and saving business operation data into electronic data are all digial. Also, according to Gartner's definition, digitalization is the process of transforming an enterprise's

business model by using digitalization to create and realize new value for the enterprise. Also, digitalization is an important process of transforming a traditional enterprise into a digital enterprise. Digitization can change the organizational form or business processes of enterprises, such as freemium model, electronic payment, catechism, etc. Digital Transformation (DT) is a broad concept that refers to the transformation and innovation that occurs when a business, organization or society applies digital technologies to improve, enhance or replace traditional processes and strategies. Digital Transformation usually involves a variety of technologies such as Cloud Computing, Big Data, Internet of Things, Artificial Intelligence, etc.To summarize, the concept of digital transformation in this paper is defined as the use of new-generation information technology by an enterprise to change the way it makes decisions, manages operations, communicates, and produces. Enterprises use digital tools to fundamentally change the process of using information technology and cultural change to improve, optimize or upgrade existing resources. The essence of digitization is to use big data technology and related algorithms to build an intelligent closed-loop management and operation system, so that the whole process of production and operation of the enterprise can be measured, tracked, predicted, and inherited, so as to re-establish the core competitiveness of the enterprise's brand, product quality, production efficiency, and low cost.

3. Opportunities and Challenges of the Digital Economy for the Manufacturing Supply Chain

3.1. Opportunities for Manufacturing Supply Chains in the Digital Economy

3.1.1. Advantages of digital supply chain compared with traditional traditional supply chain

In this paper, by using literature analysis methods, the authors found that there are many shortcomings in traditional supply chain management. These deficiencies are mainly manifested in the untimely transfer of information in the decision-making chain, poor integration of the company structure, weak supply and demand synergy in the supply chain and unstable cooperation patterns among enterprises. However, the use of digital supply chain, which can dynamically reflect the changing environment. Digital supply chain has a highly integrated and information-acquisitive value network and can realize data sharing and end-to-end visualization services. Digital supply chain has significantly improved the responsiveness of the supply chain, which can make up for the shortcomings of the traditional supply chain. The impact of the digital supply chain is mainly manifested in the following dimensions. First, the information foundation of digitization is firmly established through the establishment of a data collection module, the internet of things, and a digital intelligent supply chain platform. Second, through the data processing module, the whole chain of supply chain information is opened up. The model can realize data sharing and achieve the purpose of intelligent, transparent and efficient supply chain. Third, it utilizes the analysis technology of an intelligent analysis module to improve the prediction and decision-making ability of the supply chain. Fourth, using blockchain technology to realize the trust mechanism of the supply chain can reduce transaction costs.

3.1.2. Digitization can drive the decision-making behavior of enterprises

Digital driven decision-making is the determination and main way for the manufacturing industry to reconfigure the traditional supply chain. Enterprises enjoy full judgment and interactivity through a variety of digital technologies. with key technologies relying on digital supply chains and the Internet of Things. Businesses can improve the accuracy of future forecasts by extending their network and sharing information. Enterprises can obtain more supply chain data through interconnection. Digitization provides data and technological support for enterprise decision-making [6]. Digitization makes full use of technologies such as cognitive and artificial intelligence to analyze data and apply digital technologies, which can support enterprises in obtaining direct demand information. And the full use of digital technology in enterprises can realize the optimization of internal innovation process and external innovation exchange. The introduction of digital technology

into the enterprise will effectively strengthen the enterprise's internal control and cost management ability, and thus reduce the internal innovation cost. [7] On the other hand, in the event of force majeure events, the use of the global supply chain layout to a certain extent can be evacuated from the risk.

3.1.3. Real-time collaboration and visualization

Real-time collaboration as well as visualization provide technical support and ways for the link of supply chain reconstruction. Digital technology can help enterprises realize real-time writing and visualization of business data. Also, digital technology helps upstream and downstream manufacturing industries share resources with each other, as well as real-time display of key indicators in the supply chain, inventory levels, order status, delivery time and other important information. Through digital technology, the company can realize real-time monitoring and decision-making support. Not only that, but supply chain visualization can also help enterprises identify risks in the supply chain and take corresponding preventive and control measures. In addition, the digital supply chain can help enterprises identify bottlenecks in the supply chain and conduct efficiency and optimization analysis and promote collaboration and cooperation between parties inside and outside the supply chain.

3.1.4. Personalized and customized production

Personalization as well as customized production provide drivers and pathways for supply chain reconfiguration. With the development of digital technology, the manufacturing business model in the digital environment has gradually transitioned from an enterprise-centric to a consumer-driven network view. The new information technology helps enterprises to drive the modularization and flexibility of the production model. The new information technology also be able to produce products needed by consumers to better meet their individualized and diversified needs [8]. Relative to standardized products, products that meet consumers' individual needs can bring greater commercial value to users. Under this model, consumers are not just passive recipients of products, but participants in their production.

3.1.5. Enhancing the added value of services

With the development of the world, human science and technology continues to progress, which makes the product itself has become more and more complex, consumer demand is also more and more personalized [9]. Enterprises want to achieve a competitive position in the industry market must increase the added value of services. Therefore, companies want to dominate the market to not only provide customers with goods, but also layout of the online service market, to understand the potential needs of customers. Here the digital platform will help the long-term layout of the enterprise, the leadership can be based on the platform of customer personalized data to determine the future direction of the product.

3.2. Challenges Facing Manufacturing Supply Chains in the Digital Economy Era

3.2.1. Disadvantages of digital supply chains over traditional supply chains

Digital supply chains also have disadvantages. The first is that deviations and inaccuracies in the quality of digital supply chain data can cause a chain reaction of biased supply chain information. Second, the systems of each link in the supply chain network are independent, which requires complex system integration. Otherwise, it is easy to cause a blockage. Third, attacks on data will lead to the leakage of corporate information, directly threatening the operation and reputation of the company. Fourth, there is poor data visibility in the supply chain. A large amount of information asymmetry leads to a lack of sufficient trust between enterprises, making it difficult to analyze data and make decisions.

3.2.2. Security and privacy risk management

The data involved in the digital supply chain includes supplier and customer information, transaction records, and other sensitive data, so data leakage and theft can cause serious losses to enterprises. Therefore, enterprises need to take corresponding measures to ensure data security and privacy in the digital supply chain. Enterprises should establish a global digital governance system as soon as possible to ensure the security of supply chain digitization [10]. At the same time, enterprises need to strengthen the cultivation of information security awareness, increase the establishment of security networks and system investments to protect the security of enterprise data.

3.2.3. Innovation and complexity of management models

Digital transformation requires delivering products to a large group of potential consumers through multiple platforms, and constant innovation in supply chain management to maintain the stability of the system. However, manufacturing enterprises generally lack talents with dual backgrounds in business and digitalization, which increases the difficulty of managing the digital transformation of manufacturing enterprises. At the same time, digital transformation requires a large amount of capital investment, which invariably raises the threshold of enterprise digital transformation.

4. Conclusion

This paper shows the digital economy on manufacturing supply chain reconfiguration, which helps enterprises to realize the intelligence, transparency, and efficiency of the supply chain. At the same time, further research is needed to achieve higher-level optimization and collaboration through the digital economy to realize decentralized management of the supply chain through blockchain technology. Use the digital economy and blockchain technology to solve complex optimization problems in the supply chain. However, the potential of the digital economy goes far beyond this. As technology continues to advance, new technologies such as blockchain and quantum computing also bring new opportunities for supply chain development. And quantum computing technology is expected to provide new solutions to complex optimization problems in the supply chain. Overall, the digital economy brings great opportunities and challenges to the manufacturing supply chain. Only by keeping up with the pace of technological development and actively innovating and optimizing can companies take the lead in this competitive market.

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