

Addressing the Reform of Corporate Supply Chain Based on Industry 4.0

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Abstract: With the advent of the Industry 4.0 era and the emergence of new equipment and technologies, many corporate supply chains are seeking the right and appropriate path to change in the Industry 4.0 environment. By analyzing the current state of research, this paper identifies how the right changes in corporate supply chains still need to be addressed under the influence of Industry 4.0 and examines the development of supply chains in recent years through a case study approach. The main objectives of this paper are to introduce the technologies associated with Industry 4.0; to analyze the impact of Industry 4.0 on corporate supply chains; to explore the prospects for supply chain development, to analyze how corporate management can be improved; and to make relevant recommendations.

Keywords: supply chain, industry 4.0, technologies

1. Introduction

With the advent of the Industry 4.0 era and the emergence of new equipment and technologies, many enterprise supply chains are looking for a correct and suitable path to adapt to the Industry 4.0 environment [1]. Based on the analysis of the current research situation, we know that we still need to address how to make the right changes in the enterprise supply chain under the influence of Industry 4.0. This paper will consider its practice model of it. Based on the above analysis, this paper uses a case study approach to examine the supply chain development in recent years. The main objectives of this paper are: to introduce the technologies related to Industry 4.0; the changes of Industry 4.0 on corporate supply chains; the prospects of supply chain development; to analyze how corporate management can be improved; and to make relevant recommendations.

2. Sources of Industry 4.0 and the New Technologies Brought by Industry 4.0

2.1. Origin of Industry 4.0

Industry 4.0 first appeared in Germany in 2013 at Hannover Messe. It was officially launched at the Hannover Messe in 2013, with the core purpose of improving the competitiveness of German industry and making Germany ready for a new round of the Industrial Revolution. The core purpose is to enhance the competitiveness of German industry and enable Germany to take the lead in the new industrial revolution. It is based on integrating traditional manufacturing, the Internet, the

Internet of Things, and smart factories. The aim is to achieve intelligent factory production and produce in an orderly manner in the face of different customers' requirements [2].

2.2. Industry 4.0 Related Technologies

RFID is an automatic identification technology. Based on the principle of non-contact, two-way data communication between reader and tag, it reads and writes recording media through radio frequency, thus realizing target identification and data exchange. RFID is widely used. Typical applications include animal chips, car chip anti-theft alarms, access control, parking control, production line automation, and material management [3].

Artificial Intelligence (AI) is a computer science division that aims to generate new intelligent machines that can understand the nature of intelligence and respond like human intelligence. Research in this field includes robotics, language recognition, image recognition, natural language processing, and expert systems. Since the birth of artificial intelligence, its theories and technologies have become increasingly mature, and its application areas have been broadened. It is conceivable that future technological products brought by AI will become the "container" of human intelligence [4].

3. The Impact of Industry 4.0 on China's Manufacturing Industry

For the highly competitive Chinese manufacturing industry, the arrival of Industry 4.0 has caused him to change dramatically. It varies according to market demand. Systems and products will be modular and have greater autonomy in the future, and the 4.0 industry will improve production efficiency across the board. "Industry 4.0" coincides with China's strategy to vigorously promote the integration of industrialization and informatization, a significant opportunity for Chinese industrialists and an essential opportunity for transforming China's manufacturing industry. Secondly, Industry 4.0 can stimulate some weak projects in China. At the same time, Industry 4.0 provides factories and more business opportunities for China. The role of China's manufacturing industry in driving the national economy is very important, and the efficiency of such an important industry can be further improved.

3.1. Product Manufacturing

Industry 4.0 digital economy provides new ideas for developing supply chain enterprises in the new era and empowers supply chain transformation and upgrading [5]. In terms of the industry 4.0 era, it gives new life and vitality to enterprises and drives the benign development of enterprises. Enterprises can use relevant technologies (cloud computing, big data, etc.) to improve production efficiency and product quality, thus enhancing competitiveness.

3.2. Collaborative Management and Information Transfer

Horizontal integration - multi-level sustainable supply chain management; vertical integration - intelligent, sustainable supply chain management, digital sustainable supply chain management [6].

Vertical integration is not a new topic, with the integration and development of information technology and industry. In other words, developing enterprise information technology involves an essential link between various sectors in integrating the enterprise's information capital flow and logistics. At which level, through integration at the production level (e.g., information integration in R&D and design), or links (e.g., integration of R&D and manufacturing) or the entire product life cycle (e.g., information integration in the whole life cycle from R&D, design, planning, process to

production and service). What Industry 4.0 requires is a seamless connection between all information links within the enterprise, which is the basis of any intelligence.

Gradually entering the mobile era, with the effective use of advanced network information technology and business big data technology, accelerates the transformation of the traditional supply chain model and the rapid development of the intelligent supply chain model [7].

Horizontal integration refers to the integration of resources through the value chain and information network to achieve seamless cooperation among enterprises, provide real-time products and services, promote the seamless intersection of research, production, supply and demand, operation management, production control, business and whole financial processes among enterprises, and realize information sharing and business collaboration among different enterprises in product development, manufacturing, and operation management.

4. Case Study: Azera - Disrupting the Shift from B2C to C2B in Auto Manufacturing

With the accelerated integration of electronics, information, and communication technologies with the automotive industry, automobiles are transformed from mere vehicles into large mobile intelligent terminals, energy storage units, and digital spaces. Equipped with advanced on-board sensors, controllers, actuators, and other devices and fused with modern communication and network technologies, smart connected cars have been able to achieve information sharing and control collaboration with business processes such as automotive R&D and design, manufacturing, and external nodes (people, vehicles, roads, clouds, etc.), forming a closed-loop end-to-end integration.

NIO is a typical representative of the new force in car manufacturing. In July 2018, as the first intelligent connected car company listed on NASDAQ, it created a complete integrated system between all endpoints of the car, from R&D and design, parts supply, manufacturing, charging, and maintenance.

Product manufacturing and information sharing. The end-to-end integration makes the information flow between users and manufacturing companies transparent, bringing unprecedented changes to all nodes of the automotive industry, such as information sharing, information sharing, and information sharing in the automotive industry. In design and development, the user will be integrated into the Azure R&D system to create customized products based on user usage scenarios and pain points; in manufacturing, the entire manufacturing process will be shown to customers, from order placement to order, into the factory, off the line, and shipping, customers can track the progress of their orders in the Azure app. In terms of advertising and sales, the traditional separation of production and sales model will be broken, and a direct output and direct sales model will be adopted. This straightforward operation allows companies to grasp the information and needs of users promptly and take one-to-one personalized service to ensure that users have the best experience of the whole product life cycle; the user service will be based on the mobile Internet for all services and make the entire process of service transparent. The world's first electric energy service system, NIO Power, connects charging piles, switching stations, mobile charging vehicles, batteries, Azure cars, Azure commissioners, and users into an intelligent energy internet that can be refilled and repaired promptly with a single click.

End-to-end integration brings a big change to the whole industry chain in the automobile production and manufacturing industry, prompting the industry model to gradually shift from the traditional manufacturer-centered B2C model to the new Internet model - the C2B model, i.e., the user-driven business model. This transformation is reflected not only in the production and manufacturing methods but also in the service system and industrial ecology. The essence is to use high efficiency to integrate low efficiency, redistribute the core elements of the traditional industry,

reconstruct the production relationship, and thus improve the system efficiency. The industrial ecology will be rebuilt to high efficiency and low cost.

5. Problems Still Faced by Corporate Supply Chains

However, in the era of Industry 4.0, the public demand for intelligent Internet of Things (IoT) functions of industrial manufacturing products is higher. Manufacturing companies must invest in innovative research and development resources and simultaneously build specialized network services and technical service teams to meet user needs or provide technical support [8]. At this stage, China's enterprise supply chain is still facing many problems, such as lower levels of technology, lower product quality, and less experience in production. The status quo is that most enterprises can only partially achieve more proficient use of relevant technology to produce higher quality products, so companies have to spend much time, workforce, material resources, etc., to grind. To a certain extent, this has caused waste in the supply chain, including crew and materials. The famous bullwhip effect is somewhat in response to this phenomenon [9].

Lack of unified standards: Due to the lack of essential hardware and software support for nationally suitable measures, industrial software is often "tied" to platforms with different technical specifications. Since there are many connected things and services inside and outside the plant, it is necessary to establish a unified computing architecture for communication means and data formats and to develop a suitable standard and a unified reference architecture to describe these standards and to facilitate their implementation.

System management problem: Industry 4.0 will inject new vitality into supply chain management and put forward new requirements for supply chain management [10]. When the production system is connected with other systems, the management of the whole system becomes complex. Proper planning, description, and modularization can provide a basis for managing this complex system, so more modularization studies by professional engineers are needed to arrive at the optimal solution.

6. Conclusion

Industry 4.0 promotes the innovation and transformation of China's enterprise supply chain, and the digital economy is the main driving force behind the transformation of logistics and supply chains. With the new technology, the enterprise supply chain establishes an information platform for data resource sharing, builds a collaborative innovation network structure for each supply chain node, and realizes personalized, diversified, and multi-level digitalization to achieve an intelligent driving model. Although the vast majority of enterprises are still in the exploration stage, upgrading the enterprise supply chain is an unavoidable reform and innovation to meet the future market. At the same time, the enterprise supply chain is ushering in the best era.

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