

# *Research on the Construction of Cross-Border E-Commerce Supply Chain Ecosystem from the Perspective of Industrial Belt*

Zongguang Wang<sup>a</sup>, Meng Gao<sup>b,\*</sup>

*School of Economics and Management, Lanzhou University of Technology, Lanzhou, Gansu, China*

*<sup>a</sup>1966544907@qq.com, <sup>b</sup>m18937766426@163.com*

*\*Corresponding author*

**Keywords:** Industrial Belt, Cross-Border E-Commerce, Supply Chain Ecosystem

**Abstract:** With the rapid development of information technology, the boundaries between industries have become more blurred, and different industries have achieved common development through resource integration. At present, with the implementation of policies such as "Internet plus", "the Belt and Road", and "Supply-side Reform", cross-border e-commerce has become an important force in promoting economic growth and industrial transformation. Many provinces are developing the "cross-border e-commerce + industrial belt" model in order to realize the upgrading and transformation of local characteristic industrial belts. Although the new model of "cross-border e-commerce + industrial belt" has made great progress, in the current complex economic, political and social environment, in order to realize the innovative development between industrial belt and cross-border e-commerce, the construction of industrial belt and The supply chain ecosystem of cross-border e-commerce is a better development direction. Therefore, the research of this paper hopes to construct the supply chain ecosystem of the industrial belt and cross-border e-commerce on the basis of analyzing the theory of the supply chain ecosystem of the industrial belt, study the mechanism of the stable operation of the supply chain ecosystem, and put forward countermeasures and suggestions for various problems.

## 1. Introduction

In recent years, affected by emergencies, the domestic traditional retail industry has been seriously hit and developed slowly, but cross-border e-commerce has developed rapidly in the same period. Relying on China's complete supply chain advantages, cross-border e-commerce has been in a rapid development stage in recent years. According to customs data, in 2021, the import and export volume of China's cross-border e-commerce will reach 198 million yuan, and the growth rate of cross-border e-commerce export will still exceed 20%, still in the middle high growth range.

The formation of industrial belt is a significant feature of regional economic development, where resources will be more effectively used and allocated. In the context of the current new normal of the economy, we should fully seize the opportunity of the rapid development of cross-border e-commerce, take advantage of China's cross-border e-commerce supply chain, develop new

channels, broaden markets, build international brands, promote the transformation and upgrading of the industrial belt, and promote the industry to move to the high-end of the value chain. This requires the formation of a benign cross-border e-commerce supply chain ecosystem within the industrial belt. The construction of a benign ecosystem can promote better cooperation among the internal systems of the industrial belt, enable the orderly and organized coordination and communication among various members of the circle, and promote the high-quality development of the industrial belt ecosystem.

## **2. Theoretical basis for the Construction of Cross-Border E-Commerce Supply Chain Ecosystem from the Perspective of Industrial Belt**

Ecosphere or Biosphere is a science that studies the interaction between organisms and the surrounding environment. In the early days, scholars only studied the ecosystem in the field of biology. As people continue to deepen their research on the ecosystem, scholars creatively connect it with other disciplines and fields and propose many new concepts, including cross-border e-commerce ecosystem. Based on the review of relevant literature, the theoretical basis of the industrial belt and cross-border e-commerce supply chain ecosystem is as follows.

### **2.1 Niche Theory**

Niche reflects the position of the population in the ecosystem in terms of time, space and function compared with other populations, and reflects the ability of species to use natural resources and adapt to the environment. Niche overlap refers to the phenomenon that two or more species in the same niche share or compete for common resources in the ecosystem. Because resources are limited, species with overlapping niches will inevitably occupy their own positions through fierce competition. In the industrial belt and cross-border e-commerce supply chain ecosystem, there are cooperation in business, resources, technology, etc. among various enterprises, but they inevitably compete for these resources. Such competition and cooperation relationship is similar to that in the ecological community. Therefore, it is feasible to use the niche theory when building the ecosystem.

### **2.2 Composite System Theory**

Two or more systems share information, resources and technology, and they are also constantly exchanging material and energy with the environment, so these systems constitute a composite system. In the industrial belt and cross-border e-commerce supply chain ecosystem, there are many composite systems, and there are various connections between the systems. These composite systems are also the basis for the construction of the supply chain ecosystem. The important role of the composite system is that it can coordinate the exchange and integration of elements among subsystems, so as to achieve a good operation of the composite system.

### **2.3 Synergetics Theory**

Synergy theory reveals the mechanism, conditions and laws of various systems and phenomena from disorder to order, from low order to high order. Synergy theory points out that the key to the transformation of a system from disorder to order is that, under certain conditions, its subsystems can produce synergistic phenomena and coherent effects through nonlinear interaction, and this system can produce time structure, space structure or space-time structure on a macro level, form a functional self-organization structure, and show a new ordered state [1]. For the industrial belt and the cross-border e-commerce supply chain ecosystem, various complex systems within the

ecosystem are interconnected, and their connections are nonlinear. Therefore, there can be synergies between the systems, so as to promote the coordinated development of the main bodies of the ecosystem.

### **3. Research on the Construction of Cross-Border E-Commerce Supply Chain Ecosystem from the Perspective of Industrial Belt**

The cross-border e-commerce supply chain ecosystem from the perspective of industrial belt is a complex three-dimensional network structure composed of multiple elements. From the perspective of systematic development, it combines the elements in the industrial belt, cross-border e-commerce and various resources behind them through the supply chain, thus enriching the resources on the chain, improving the response speed of each link of the supply chain, and improving the overall performance of enterprises in the ecosystem. In addition to its internal construction, the ecosystem also needs to exchange material and energy with the external environment. The joint action of internal and external ecology ensures the good operation of the ecosystem [2].

#### **3.1 Member analysis of Supply Chain Ecosystem**

From the perspective of industrial belt, the cross-border e-commerce supply chain ecosystem consists of enterprises in the industrial belt, cross-border e-commerce enterprises, supporting service system and external environment. Among them, the service system mainly includes logistics services, financial services, technical services, government services, etc. They constitute the sub core circle in the supply chain ecosystem structure to support the development of the core circle. The external environment constitutes the external circle of the supply chain ecosystem, which mainly includes the production environment, legal environment, innovation environment, etc. The members of the circle and the external environment should be closely linked to achieve better overall development. Enterprises in the industrial belt and cross-border e-commerce enterprises form the core circle of the supply chain ecosystem, and their advantages complement each other, thus driving the circulation of all elements in the circle.

From the perspective of niche, each element in the circle is in a different niche, and there is competition for resources between the same niche, such as various means of competition between logistics service companies to win the dependence of customers. From the perspective of complex system theory, the entire supply chain ecosystem is a complex system, with many subsystems, such as production system, marketing system and service system, among which there are complex links. It can also be seen from the synergism that, under the nonlinear interaction, subsystems will have synergistic phenomena and coherent effects, which will enable the whole complex system to have a certain synergy ability and promote the collaborative development of the entire supply chain ecosystem.

#### **3.2 Construction Framework of Cross-Border E-Commerce Supply Chain Ecosystem from the Perspective of Industrial Belt**

Based on the above analysis of the theory and members of the supply chain ecosystem, we are now building a cross-border e-commerce supply chain ecosystem structure from the perspective of the industrial belt. As shown in the figure, the structure of the supply chain ecosystem is mainly composed of three parts. The following is a detailed analysis of each layer. (As shown in Figure 1).

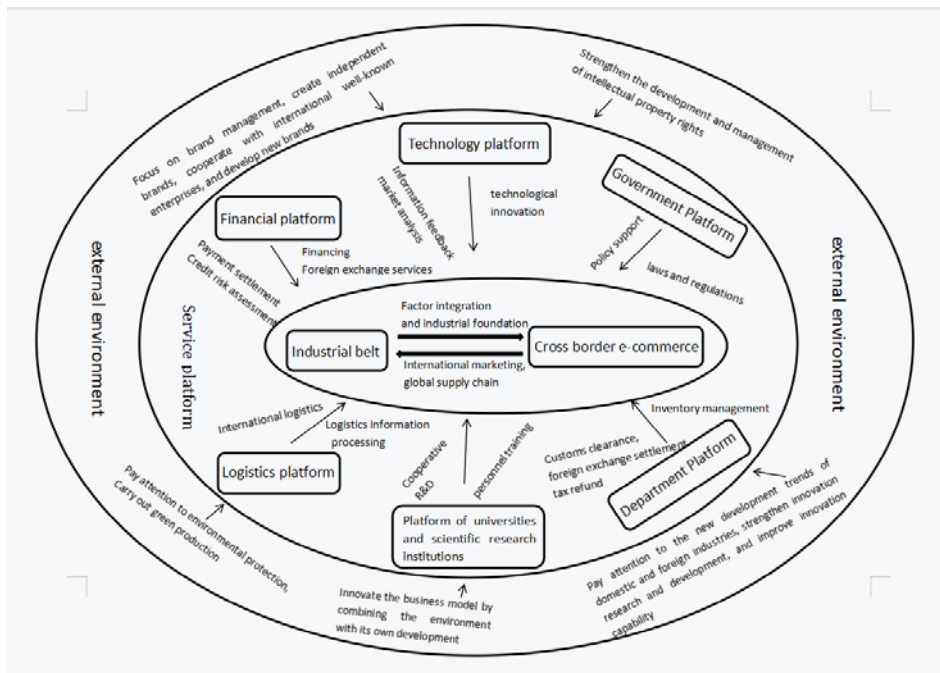


Figure 1: Framework of cross-border e-commerce supply chain ecosystem from the perspective of industrial belt

### 3.2.1 Core circle Analysis

The core circle is mainly composed of various enterprises, cross-border e-commerce and cross-border e-commerce platforms in the industrial belt. The core circle is relatively complex, and its specific structure can be simplified as shown in Figure 2. It can be seen from Figure 2 that there are a large number of manufacturers, producers and suppliers in the industrial belt, which can provide cross-border e-commerce with rich and high-quality products. Advantages such as industrial foundation and factor integration within the industrial belt provide a solid foundation for the development of the supply chain ecosystem [3]. As the midstream of the supply chain, cross-border e-commerce connects the suppliers above and the overseas consumers below, and its importance is self-evident. Cross border e-commerce has an international market, which enables the products provided by the industrial belt to directly connect with overseas consumers. It uses big data technology to accurately analyze customers' needs, and provides production suggestions to enterprises in the industrial belt, so as to provide satisfactory and high-quality products and services around consumers' needs.

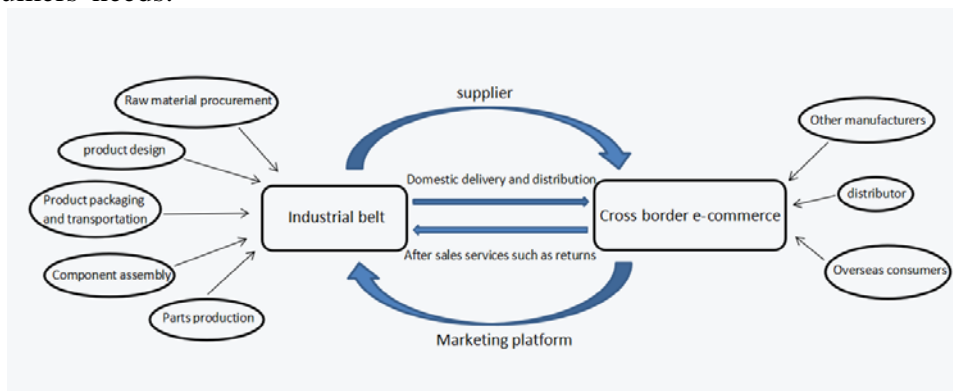


Figure 2: Specific Structure of Core Circle

### 3.2.2 Analysis of Sub Nuclear Sphere

The sub core sphere is mainly composed of various service entities, which support the development of the core sphere. Without these service entities, the supply chain ecosystem cannot operate normally. It can be seen from Figure 1 that the service subject is mainly composed of six aspects. In the supply chain ecosystem, the logistics platform not only provides traditional transportation modes such as road transportation, air transportation and sea transportation, but also new logistics services such as overseas warehouses and bonded areas; The financial platform provides payment and settlement, financing, credit evaluation and other services for various enterprises in the supply chain to maintain the stability of the capital flow in the supply chain ecosystem; The government platform is the institutional guarantee of the supply chain ecosystem, and its policy support and laws and regulations provide the institutional basis for the layout of the supply chain ecosystem [4]; The department platform is mainly the customs department, providing some customs clearance and foreign exchange settlement, inventory management and other services. The efficiency of departmental platform services directly affects the timeliness of cross-border e-commerce and the sustainable development of cross-border e-commerce supply chain ecosystem; The technology platform is an intelligent support for the development of the supply chain ecosystem [4]. Through the use of big data, cloud computing, blockchain and other technologies, the data of enterprises at each node of the supply chain can be summarized for analysis and processing, helping relevant enterprises in the circle make decisions, and thus improving the overall efficiency. Universities and scientific research institutions provide cooperative research and development, personnel training and other services. With the rapid development of cross-border e-commerce, there is a large gap of high-quality and complex talents. Therefore, enterprises in the industrial belt and cross-border e-commerce should pay attention to cooperation with local universities and research institutions to jointly cultivate complex talents and promote the development of the supply chain ecosystem.

### 3.2.3 Outer Circle

The external circle mainly includes production environment, legal environment, innovation environment, etc. Enterprises in the supply chain ecosystem will exchange materials and energy with the external environment at all times. In order to seek the stable development of the ecosystem, enterprises should always pay attention to the changes of the external environment. For example, when the external environment requires green production and environmental protection, enterprises in the circle should respond to the external demand, optimize the supply chain, and achieve green production.

## 4. Research on the Mechanism of Stable Operation of Cross-Border E-Commerce Supply Chain Ecosystem from the Perspective of Industrial Belt

From the perspective of industrial belt, there are many different industries or organizations in the cross-border e-commerce supply chain ecosystem. Each industry or organization has its own strategic objectives, and is affected by different organizational cultures, representing different interest groups. The stable operation of the supply chain ecosystem requires the synergy of some mechanisms within the system. As shown in Figure 3, the technology flow, information flow, capital flow and logistics in the supply chain ecosystem are interconnected on each node enterprise. The flow of these information and resources makes all enterprises in the circle a unified whole. However, these alone cannot enable all enterprises to develop in harmony with each other. Therefore, the following three mechanisms are needed for the stable operation of the supply chain ecosystem.

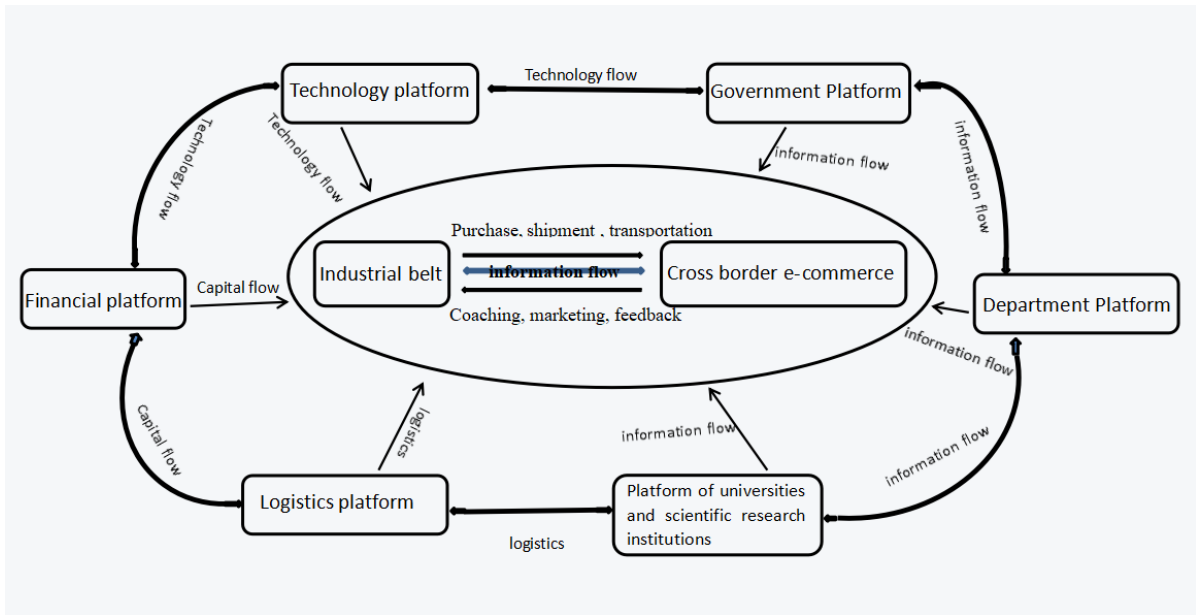


Figure 3: The construction logic of cross-border e-commerce supply chain ecosystem from the perspective of industrial belt

#### 4.1 Benefit Distribution Mechanism

Each enterprise in the supply chain ecosystem is an independent subject pursuing the maximization of its own interests. In order to maximize their own interests, there is bound to be fierce competition, endangering the operation of the supply chain ecosystem. Therefore, core enterprises must develop a reasonable benefit distribution mechanism, and an effective benefit distribution mechanism is a prerequisite for achieving common interests [5]. Under the operation of the benefit distribution mechanism, all enterprises in the supply chain ecosystem can understand their work and responsibilities, and assume corresponding obligations to pursue their legitimate interests. Through the benefit distribution mechanism, the balanced distribution of the income generated in the supply chain ecosystem can encourage all kinds of enterprises in the circle to work together for common interests, thus promoting the stable operation of the supply chain ecosystem.

#### 4.2 Information Sharing Mechanism

The "bullwhip effect" in economics refers to the phenomenon that when the information flow in the supply chain is transmitted from the final customer to the original supplier, the information distortion is amplified step by step because the information cannot be effectively shared. When there is a "bullwhip effect" in the supply chain ecosystem, it will seriously affect the decisions of enterprises and bring unpredictable consequences to enterprises. Therefore, enterprises in the supply chain ecosystem should form an operation collaboration based on information sharing. The information sharing mechanism requires core enterprises to keep in touch with other enterprises in market, technology and other aspects of information at all times, clearly understand the development of each enterprise, avoid waste of resources and loss of efficiency, so as to promote the stable operation of the supply chain ecosystem.

#### 4.3 Symbiotic Development Mechanism

The symbiotic development mechanism is proposed from the perspective of sustainable

development. The traditional supply chain only pays attention to the relationship between suppliers and final customers, ignoring the relationship between intermediate enterprises in the chain. The symbiotic development mechanism requires that, from the perspective of the whole system, it pays attention to the life cycle and social responsibility of each enterprise in the circulation link, pays attention to establishing a good and stable development relationship with each enterprise [6], emphasizes the overall sustainable development, and then promotes the stable operation of the supply chain ecosystem.

## **5. Countermeasures and Suggestions for Promoting the Construction of Cross-Border E-Commerce Supply Chain Ecosystem**

### **5.1 Build Strategic Alliance of Core Enterprise Supply Chain**

Core enterprises generally assume the roles of policy makers, system managers, relationship maintainers, etc., coordinate resource sharing and complementary advantages among different types of enterprises in the ecosystem, and play a vital role in the development of the ecosystem. The establishment of supply chain strategic alliances between core enterprises can improve the transparency of information, reduce circulation costs, and thus improve the operational efficiency of each node of the supply chain. At the same time, the establishment of this supply chain strategic alliance will urge enterprises to pay attention to supply chain management, promote the integration of technology sharing and strategic development ideas among enterprises, and form the competitive advantage of the supply chain ecosystem.

### **5.2 Improve the Informatization Application Level of Supply Chain Ecosystem**

Cross border e-commerce has high requirements on e-commerce, big data and information management. Therefore, it is difficult to conduct supply chain management without corresponding technical level and industry management experience. Therefore, it is imperative to improve the information application level of the supply chain ecosystem. Enterprises can cooperate with universities to jointly cultivate high-level information professionals; Enterprises can cooperate with technology companies to develop an information integration platform suitable for their own enterprises, combine advanced international technologies, solve technical problems encountered in the supply chain ecosystem, such as international settlement, information disclosure, data security, etc., and constantly improve the supply chain ecosystem's ability to cope with risks.

### **5.3 Use Big Data Technology to Improve Logistics Efficiency**

In the supply chain ecosystem, logistics covers every layer of the ecosystem. Logistics determines the timeliness of cross-border e-commerce and affects consumers' shopping experience [7]. Therefore, big data technology should be used to improve the efficiency of cross-border e-commerce logistics and achieve efficient information circulation. Specifically, it can process the after-sales and feedback information of consumers, clarify the product deficiencies and consumer preferences, and provide data support for the production decisions and marketing plans of enterprises. At the same time, using big data technology to analyze logistics information can scientifically select transportation routes, reduce logistics costs and improve the efficiency of logistics transportation.

## 5.4 Government Departments should create a Good Business Environment

The government should improve the industry credit system and regulatory system, and promote information sharing and policy mutual recognition among regulatory authorities. In addition, government departments can formulate preferential policies, such as providing tax incentives, industry subsidies, etc. to support the development of cross-border e-commerce industry. For issues such as brand rights protection, the government should set up corresponding service platforms to answer questions.

### References

- [1] Jiang Jundong, *Inspiration of Synergy Theory on Modern Management* [J]. *Science and Technology Management Research*, 2004, 24 (1): 2
- [2] Lu Boxiang, *Enterprise ecosystem of system construction* [J]. *Agricultural Economy*, 2020 (5): 3
- [3] Xu Huizhen, *Research on the mechanism and path of coordinated development of cross-border e-commerce and characteristic industrial clusters -- based on the case study of Shantou Chenghai Toys* [J]. *Foreign Trade and Economic Cooperation*, 2022 (1): 6
- [4] Cheng Weijie, Jiang Lili, *Four dimensions of cross-border e-commerce ecosystem construction* [J]. *Open Guide*, 2019 (6): 5
- [5] Chen Jinxiao, Chen Jian, *From Optimization to Remodeling--High Quality Development of Supply Chain in Great Changes* [J/OL]. *System Engineering Theory and Practice*, 2022, 42 (3): 14
- [6] Kang Manqi, *Research on ecological development of international logistics supply chain of agricultural products in 5G era* [J]. *Price Monthly*, 2022 (2): 5
- [7] Yang Jing, *Research on optimization of cross-border e-commerce logistics chain based on supply chain perspective* [J]. *China Storage and Transportation*, 2022 (3): 3