

# Research on the Innovation Strategy of Regional Logistics Supply Chain System Under the Background of Digital Economy

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**Abstract:** Based on the continuous application and development of digital information technology, the digital economy has gradually become an important growth pole of China's economic development. Digital development has also provided new opportunities for the transformation and upgrading of logistics and supply chains, and the coordinated development of the digital economy and regional logistics supply chains has achieved remarkable results. However, in the process of promoting the development of the logistics supply chain, the digital economy has problems such as the imbalance in the digitization of the logistics supply chain system, the lag in the global response speed, and the lack of trust mechanism, so it is necessary to optimize the logistics supply chain management process, strengthen the information interaction and integration between the upstream and downstream node enterprises of the logistics supply chain, and connect up and down, strengthen the elasticity and resilience of the logistics supply chain, and establish and improve the trust mechanism of the logistics supply chain system, so as to accelerate the development of the digital economy and the logistics supply chain.

**Keywords:** Digital economy, regional logistics, Supply chain.

## 1. Introduction

The 20th National Congress of the Communist Party of China made important arrangements for accelerating the construction of the digital economy, proposing to "accelerate the development of the digital economy and promote the deep integration of the digital economy and the real economy". Different from the traditional economic form, the key element of the digital economy mainly lies in "data resources", and through the integration and application of data empowerment and modern information networks, it promotes a new economic form that is more unified with efficiency and fairness. During the "14th Five-Year Plan" period, the digital economy has become more and more extensive, and various new formats and models have competed to develop, gradually shifting to a new stage of deepening reference and wisdom sharing. In 2022, the scale of China's digital economy will reach 50 trillion yuan, accounting for 41.5% of GDP, which is enough to show that the digital economy has become an important growth pole of China's economic development.

At present, China is in a stage of high-quality development, and the traditional logistics supply chain system can no longer match the actual needs of development in the new era. The "14th Five-Year Plan for the Development of Modern Logistics" points out that it is necessary to accelerate the digital transformation of logistics and supply chain. By promoting the digital construction of logistics infrastructure and encouraging the digital transformation and upgrading of logistics and supply chain enterprises, we will improve the level of digitization and digital intelligence of logistics and supply chain. At this stage, China's logistics supply chain system is in the critical stage of enhancing its core competitiveness, and supply chain enterprises urgently need to break down the barriers of thinking, promote "digital" efficient logistics, and accelerate the development of digital

economy and logistics supply chain.

## 2. Analysis of the Development Status of Regional Logistics Supply Chain

Logistics is an important part of the supply chain, and it is also the most intuitive form of expression. Through efficient logistics management, companies in the industrial supply chain can better control inventory, reduce transportation and distribution costs, and achieve continuous value-added throughout the supply chain. Based on this, a relatively stable logistics supply chain model has been gradually developed. Its characteristics are mainly reflected in the following aspects:

First, the scale of logistics supply chain development continues to grow. According to the "China Trade Logistics Development Report (2022)", in 2022, China's total social logistics will reach 347.6 trillion yuan, a year-on-year increase of 3.4% at comparable prices. There is a high correlation between the total amount of social logistics and GDP changes, and the scale of logistics demand continues to grow steadily, supporting the improvement of the resilience of the industrial chain and supply chain. It is worth mentioning that according to the calculation of the China Federation of Logistics and Purchasing, the market size of the digital supply chain will exceed 32 trillion yuan in 2023, and the digital logistics supply chain will enter the fast lane.

Second, the transportation chain has begun to shift to the logistics chain and supply chain evolution. The development of logistics has gradually shifted from traditional cargo transportation to a new service model that provides integrated and full-chain solutions for industrial chain enterprises. Integrate logistics services into the entire industrial supply chain, and integrate internal and external logistics resources, so as to provide one-stop comprehensive services for the

logistics supply chain including procurement, production, distribution and terminal consumption. Based on this, the scope of service functions has been greatly broadened, which can better meet the logistics needs.

Third, the logistics supply chain system shows the characteristics of diversified development. Give full play to regional advantages, build a logistics supply chain system in line with the development of different regions and different industries, realize mutual cooperation and industrial integration between regions, improve the synergy of regional logistics supply chain, and ensure the steady operation of the logistics supply chain system through the synergy between enterprise groups, so as to realize the diversification of the logistics supply chain system.

### **3. Analysis of the Coordinated Development of Digital Economy and Regional Logistics Supply Chain**

#### **3.1. The digital transformation of the logistics supply chain has become an "arrow from the bow"**

From a policy perspective, there are corresponding policies and measures to promote the digital development of logistics and supply chains. Based on the national level, in July 2022, the State Council promulgated the "Letter on Agreeing to Establish an Inter-Ministerial Joint Conference System for the Development of the Digital Economy", marking that China is gradually forming a collaborative governance system dominated by the "digital economy", and strategically planning digital logistics and supply chains from multiple aspects such as systems, mechanisms and standards. At the local level, local governments at all levels have also launched a series of incentive policies to guide and support the digital transformation of the logistics supply chain. Taking Jiangsu, Zhejiang and Shanghai as an example, the focus is mainly on the supply chain logistics support system, strengthening the construction of smart logistics infrastructure, and improving the planning and layout of logistics and warehousing; Based on its good capital advantages, the Greater Bay Area encourages enterprises at all nodes of the logistics supply chain to develop high-performance logistics intelligent equipment, and accelerate the digitization of logistics elements such as goods, vehicles, and venues. In summary, it shows that the digital transformation of the logistics supply chain has become an inevitable trend.

#### **3.2. The level of digital intelligence has been significantly improved**

There are processes, information flows, and content interactions in dealing with transportation or cargo management, and the development of the digital economy has made industries in the supply chain highly connected at all levels. Through the integration of data resources, the sharing and linkage of logistics resources among enterprises in the industrial chain are promoted, the circulation transformation efficiency of each link of the end-to-end supply chain and the collaborative efficiency of logistics production are fully improved, and the sustainability and mobility of channels are enhanced. In the digital transformation economy, blockchain, artificial intelligence, and 5G emerging technologies are applied to all links in the supply chain, making digitization a necessary condition for the entire logistics and transportation

at different speeds and changing expectations and evolution, greatly improving the connectivity of the entire chain, and completing the procurement, production, distribution, and distribution of the supply chain more efficiently and quickly.

#### **3.3. The collaborative innovation efficiency of the logistics supply chain has been steadily improved**

More and more enterprises in the industrial chain realize the importance of collaborative innovation in the logistics supply chain, and begin to reconstruct and reorganize the function, structure and process of the logistics supply chain system and actively lay out it. The key to improving the efficiency of collaborative innovation in the logistics supply chain lies in the integration of "digitization" and the logistics supply chain system, that is, to realize digital collaborative innovation on the basis of the current logistics supply chain system. At present, in the process of business activities carried out by supply chain node enterprises, the core enterprises, as the dominant and controlling position of the entire chain, actively seek supply chain process coordination and overall planning, and then optimize the supply chain process structure. Through the division of labor and coordination of upstream and downstream industries in the supply chain and resource sharing, an industrial collaboration system is built to achieve the innovation synergy effect of 1+1>2.

### **4. The Existing Obstacles of The Regional Logistics Supply Chain System in The Context of The Digital Economy**

#### **4.1. The degree of digitization of the logistics supply chain system is unbalanced and insufficient**

The digitization of the logistics supply chain is a prerequisite for promoting the digital transformation and upgrading of industrial chain enterprises and achieving cost reduction and efficiency increase. At this stage, although blockchain and 5G emerging technologies have been gradually applied to the logistics supply chain, there are still unbalanced and insufficient digitization levels. In particular, the digital intelligence level of the supply chain of small and medium-sized enterprises is restricted by the conditions of talent, capital, technology and other conditions, far behind the leading enterprises in the supply chain. In addition, the different economic levels of various regions lead to obvious differences in the sharing of digital infrastructure platforms and resources, which will form digital barriers between regional logistics supply chain enterprises in the long run, which is not conducive to the construction of a digitally empowered logistics supply chain system.

#### **4.2. The lack of norms and low degree of standardization hinders the establishment of the logistics supply chain system**

Due to the relatively late start of the development of the digital economy and the application of digital technology, the construction of a logistics supply chain system involves many constraints, which makes it highly complex. And because some node enterprises in the supply chain involve too much technology, and in the absence of norms and low degree of

standardization, building a logistics supply chain system is like building on a mirage, which will not be conducive to the integration and coordinated development of the industrial chain industry. Based on the background of the digital economy, non-standardization and non-standard lead to the inability of the entire industrial chain to be fully connected, and at the same time, the supply chain management process is too cumbersome, hindering the collaborative innovation and development of the digital economy and the logistics supply chain.

### 4.3. The response speed is lagging behind, and the logistics supply chain is inefficient

The prerequisite for improving the efficiency of the logistics supply chain is information exchange, which minimizes the time of information transmission and improves efficiency by reducing waste in the information transmission process. The regional logistics supply chain is to serve the entire industrial chain, including upstream suppliers, midstream suppliers, e-commerce platforms, logistics, and then to end consumers. At this stage, the closed enterprise supply chain system makes each link have the problem of time consumption or waiting time, resulting in the lag of the upstream and downstream of the industrial chain and supply chain, and it is necessary to further build supplier websites through information technology and digital means to achieve information exchange.

### 4.4. The lack of trust mechanism in the logistics supply chain system makes it difficult to form collaborative innovation

The higher the trust intensity, the greater the possibility of forming a strategic alliance, which will help improve the efficiency of the logistics supply chain. However, in the context of the digital economy, there are still problems of information asymmetry in the trust mechanism and collaborative innovation process of China's logistics supply chain enterprises. Although the digital technology of supply chain node enterprises has been further developed, for the sake of short-term interests and vested interests, the members of the supply chain node have not been fully allowed to share information resources, resulting in a great obstacle to the coordination of task activities between members of upstream and downstream enterprises in the supply chain, and even causing disconnection, which brings challenges to the cooperation between enterprises, and causes the fragile and

vicious circle of trust between members of supply chain enterprises, thus affecting the ability of collaborative innovation.

## 5. Strategies for Building a Regional Logistics Supply Chain System in The Context of Digital Economy

On the basis of the above-mentioned regional logistics and supply chain analysis, based on the background of the digital economy, it is necessary to optimize the logistics supply chain management process, clarify the information interaction and integration between the upstream and downstream node enterprises of the logistics supply chain, and connect up and down, realize the integration and penetration of digital technology and the logistics supply chain system, strengthen the elasticity and resilience of the logistics supply chain, and establish and improve the trust mechanism of the logistics supply chain system.

### 5.1. Optimize the logistics supply chain management model

In the context of the digital economy, the traditional logistics and supply chain management model has been difficult to adapt to the current high-quality development model, and the logistics supply chain model needs to be optimized for in-depth management, strengthen the logistics supply chain management process through intelligent means and digital technology, and improve and upgrade all nodes of the supply chain. Through the introduction of intelligent technology, we can reduce errors and inefficiencies caused by human factors, and improve the management efficiency of the logistics supply chain.

As can be found from Figure 1, each link or subject of the supply chain relies on the artificial intelligence logistics supply chain data computing center to build an intelligent management platform to provide technical support and effective guarantee for logistics supply chain solutions, logistics planning, logistics supply chain warehousing management, etc. At the same time, it also simplifies the logistics supply chain management process, promotes the logistics supply chain system management process to be more efficient and scientific, reduces unnecessary time and cost waste, and improves the stability of the regional logistics supply chain system.

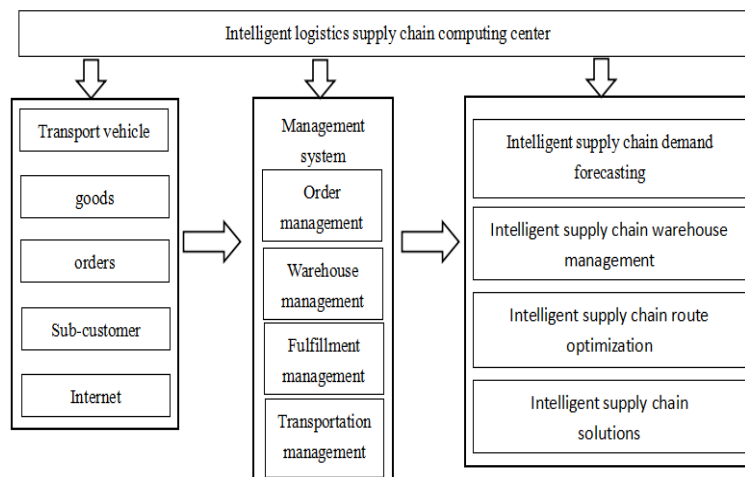


Figure 1. Intelligent logistics supply chain system

## 5.2. Improve the level of digitization and realize information interaction and integration

At this stage, although the digital level of the digital logistics supply chain has been improved to a certain extent, the development of digital logistics and warehousing facilities is still relatively lagging behind, the digital intelligence ability of the supply chain is not high, and the supply chain data circulation is not smooth, and the competitiveness of the regional logistics supply chain is not strong. Therefore, there is a need to further improve the level of digitization.

First of all, based on digital information technology, an information sharing platform can be built in the early stage to accurately and effectively collect relevant information such as demand, supply orders, and logistics, so as to ensure that the information is connected and connected in the supply link. Secondly, the introduction of cloud computing, data analysis

and other information technologies to improve data analysis and processing capabilities, so as to strengthen the real-time monitoring of the supply chain links and provide decision-making support. Finally, in the procurement, processing and production, warehousing and distribution, distribution and other links, guide suppliers, manufacturers, distributors and other entities to participate in the entire regional logistics supply chain management process, match and unify the information status of different links and different time periods, and implement dynamic management according to the changes in regional logistics supply chain demand to ensure the coherence and interoperability of the upstream and downstream nodes of the supply chain. Based on this, the cooperation between enterprises at each node of the supply chain will be closer due to the information sharing platform, so that the data acquisition will be more convenient and fast, and the timely response will be achieved, as shown in Figure 2.

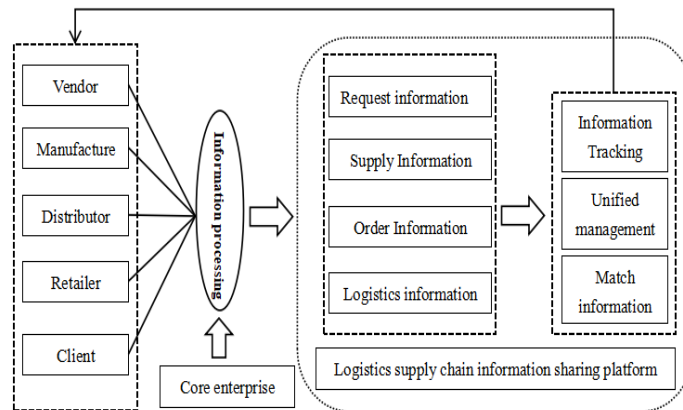


Figure 2. Information sharing platform for collaborative management of regional logistics service supply chain

## 5.3. Strengthen the resilience and resilience of the logistics supply chain

Strengthen the ability of logistics supply chain security risk early warning and response, give full play to the synergy of logistics supply chain in the face of abnormal problems, guide the nodes of the industrial chain to adjust the supply chain model in a timely manner, and strengthen the supply chain information security sharing and resource synergy. In this way, even if the supply chain encounters a shock and causes problems in some chain links, it can still maintain continuous supply and recover quickly in a short period of time, avoiding increased costs and waste of resources.

Specifically, for example, in the procurement process, artificial intelligence, 5G technology and other means enable enterprises to predict demand and expenditure structure in the procurement process, realize the risk rating of suppliers, and ensure the reliability of the supply chain. In the logistics link, industrial chain enterprises rely on the advantages of warehouse and distribution network resources to form efficient warehouse and distribution integration services. Not only that, with the support of digital technology, it helps to optimize and upgrade supply lines, reduce inventory, and improve turnover. It is the timely and rapid response of all links that prevents the risk of mismatch between supply and demand, enhances the ability of the supply chain to respond quickly to the market, and reduces the risk of the supply chain.

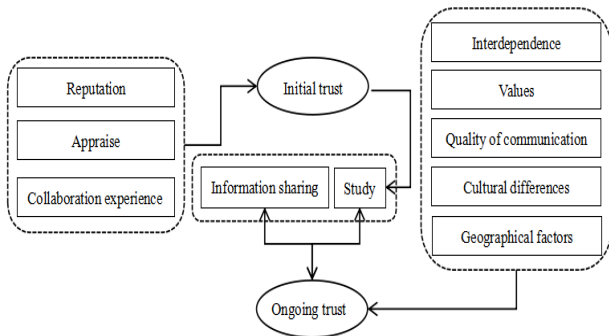
At the same time, it is also necessary to strengthen the monitoring efficiency of core enterprises in the supply chain and upstream and downstream enterprises, accelerate the digital transformation and upgrading of leading enterprises such as "chain masters", improve the flexibility and coordination of the supply chain, and then strengthen the elasticity and resilience of the logistics supply chain, so that the entire logistics supply chain can be more visualized and jointly prevent the risk of supply chain disruption.

## 5.4. Improve the trust mechanism of the logistics supply chain system

Due to the conflict between short-term interests and vested interests, the members of the supply chain nodes do not fully share information resources, which causes great obstacles to the collaborative innovation between the upstream and downstream members of the supply chain. However, the development of node enterprises within the supply chain chain is uneven, and there will be a crisis of trust. Under the background of digital economy, if some node enterprises in the supply chain lag behind due to the constraints of resources, information and other conditions, negative psychology will occur in the process of coordinated development, which will directly affect the timeliness and effectiveness of information acquisition of supply chain node enterprises in the long run.

In order to solve this hidden danger, it is first necessary to clarify the process of generating trust in the logistics supply

chain. Each node of the supply chain is embedded in the entire chain network through direct or indirect connections, and the exchange of information and mutual learning in the whole chain are inevitable. In the early stage of the supply chain, due to the lack of information resources in node enterprises, most enterprises demand cooperation and establish initial trust based on reputation, evaluation of others, and previous cooperation experience. With the continuous development of society and time, the interdependence of the supply chain, the level of communication quality, cultural differences, and regional factors play an important role in the continuous generation of trust in the logistics supply chain, and its dynamic process is shown in Figure 3.



**Figure 3.** The process mechanism of trust generation in the logistics supply chain

In addition, how to ensure the stable operation of the supply chain trust mechanism has become the top priority. On the one hand, it is necessary to formulate a sufficiently high exit cost and penalty cost, and the establishment of a penalty mechanism can ensure the integrity of the logistics supply chain system to a certain extent, thereby improving the trust of each node enterprise; On the other hand, in the process of initial trust to continuous trust, enterprises within the supply chain should also establish a strict information sharing mechanism, especially the "chain master" enterprises, to provide "invisible guarantees" for small and medium-sized enterprises in the supply chain nodes and maintain the coordinated development of the logistics supply chain.

## 6. Conclusion

Driven by emerging technologies such as the Internet of

Things, artificial intelligence, cloud computing, process automation RPA, and blockchain, the global logistics industry has entered the "Wuka era". At present, the core of the innovation and development of the logistics supply chain system lies in the in-depth integration of the digital economy and logistics supply chain management, and it is necessary to recreate the basic IQ of the existing logistics supply chain system to achieve "digital and digital" collaborative innovation, which should also be the basic direction of the innovation of the logistics supply chain at present and for a long time in the future. For enterprises at all nodes of the supply chain, how to grasp the opportunities of digital development and give full play to the new advantages of the digital economy is the key to competitive development. Especially for the relatively backward regions in the development of digital supply chains, it is necessary to rely on digital means to improve the logistics supply chain system, strengthen the flexibility and resilience of the logistics supply chain, establish and improve the trust mechanism of the logistics supply chain system, and achieve collaborative innovation and development through the division of labor and coordination of upstream and downstream industries in the supply chain and resource sharing.

## References

- [1] Tianxia W ,Hong C ,Rui D , et al. Intelligent Logistics System Design and Supply Chain Management under Edge Computing and Internet of Things [J]. Computational Intelligence and Neuroscience, 2022, 2022 1823762-1823762.
- [2] Xin Z ,Xiaomin S ,Wenan P . Big Data Logistics Service Supply Chain Innovation Model Based on Artificial Intelligence and Blockchain [J]. Mobile Information Systems, 2022, 2022.
- [3] Shin M ,Taghipour A . Supply Chains Digital Transformation: Automated Underground Logistics Systems [J]. Journal of Economics, Business and Management, 2021, 9 (2).
- [4] Yao W ,Li N . Research on Agricultural Products Logistics and Supply Chain System Based on Computer Big Data Model [J]. E3S Web of Conferences, 2021, 253 02035.
- [5] Virpi T ,Joseph R ,M. J W , et al. Managing Internal Supply Chain Integration: Integration Mechanisms and Requirements [J]. Journal of Business Logistics, 2017, 38 (4): 290-309.