



# Research on the Relationship Between Logistics Digitalization and Industrial Integration Development Under the Background of Normalization of Epidemic Prevention

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**Abstract.** This paper focuses on the significance of logistics digitalization and industry integration under the background of normalization of epidemic prevention, proposes a model of the current logistics digitalization and industry integration, and then takes an example to analyze the coupling and coordination degree of logistics digitalization and retail industry development. From the perspective of breaking the data barriers of the supply chain, innovating the integration method between logistics industry and cloud computing, which optimizes the allocation of resources and improves productivity. A strategy for the integration of logistics digitalization and industry is proposed, so as to improve robustness of economy in the pandemic.

**Keywords:** Logistics digitalization · industrial integration · supply chain

## 1 Introduction

On December 12, 2021, the State Council issued the “14th Five-Year Plan for Digital Economy Development” (Guo Fa [2021] No. 29) “Three, Optimizing and Upgrading Digital Infrastructure”, it is proposed to “accelerate the promotion of energy, transportation, water conservancy, logistics, environmental protection and other fields of infrastructure digital transformation”; “V. Vigorously promote the digital transformation of industries”, it is proposed to “improve the digital level of agricultural production, processing, sales, logistics and other links”, “vigorously develop digital commerce, comprehensively speed up business, trade, The digital transformation of logistics, finance and other service industries”, put forward the concept of “logistics digitalization”. The 31 provinces (autonomous regions and municipalities directly under the Central Government) issued the “14th Five-Year Plan and the Outline of Vision 2035”, all of which put forward important measures that are conducive to the development of “digital logistics”, “smart logistics” and “smart logistics”.

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With the introduction of a series of documents, the “digitalization of logistics” and the integrated development of logistics and industry have also set off an academic upsurge. Chen Yujie (2022) studied the effect of a series of factors on the digital transformation of the whole process of the logistics industry. Huang Kai (2022) conducted a research on the innovation of “artificial intelligence + logistics management” to promote the digital transformation of energy logistics, from the application status of artificial intelligence technology in the logistics industry, the demand analysis of “artificial intelligence + logistics management”, “artificial intelligence + logistics management” The innovation direction of “ + Logistics Management” and the four aspects of specific achievable solutions are expounded, which will further provide useful development planning decisions for energy logistics enterprises in the process of digital transformation. Care Qing (2022) proposed that the key path for the construction of a modern logistics system and the integrated development of the industry is to promote the integration of urban and rural areas, the second is to deeply integrate into the manufacturing value chain, the third is to support the commercial industry chain, and the fourth is to improve the software and hardware of the modern logistics industry. Run the machine service.

## **2 The Significance of Logistics Digitalization and Industrial Integration Under the Background of Normalization of Epidemic Prevention**

As we all know, logistics and transportation are the driving force to ensure the development of retail services. Relying on basic transportation facilities, the integrated development of logistics digitalization and retail industry can promote the high-quality development of the retail industry. Through supply chain big data analysis and target customer interest clustering, intelligent analysis in the process of logistics digitalization provides technical support for the retail industry to predict consumption trends.

The integrated development of logistics digitalization and the retail industry promotes the quality of retail services and improves the circulation efficiency of the retail industry. For example, the digital development of food cold chain logistics reduces energy consumption and benefits all parties in the supply chain. The digitization of food cold chain logistics is also in line with the country’s carbon neutrality and energy conservation needs. Intelligent analysis in the process of logistics digitization provides technical support for the retail industry to predict consumption trends. The integrated development of logistics digitalization and the retail industry promotes the quality of retail services and improves the circulation efficiency of the retail industry. The digitization of logistics can take advantage of supply chain information sharing. Through big data analysis and user interest analysis, we can timely analyze and predict tourism consumption places and popular scenic spots, so that corresponding tourism places and scenic spots can seize business opportunities in time [1].

First, the digitalization of logistics has improved the development and application of the digital economy in the retail industry. The integration of logistics digitalization and retailing involves the whole process of the supply chain, and the data includes information on suppliers, logistics nodes, sales volume, etc. of the whole chain. In the era of digital economy, the retail industry integrates into the wave of digital economic development

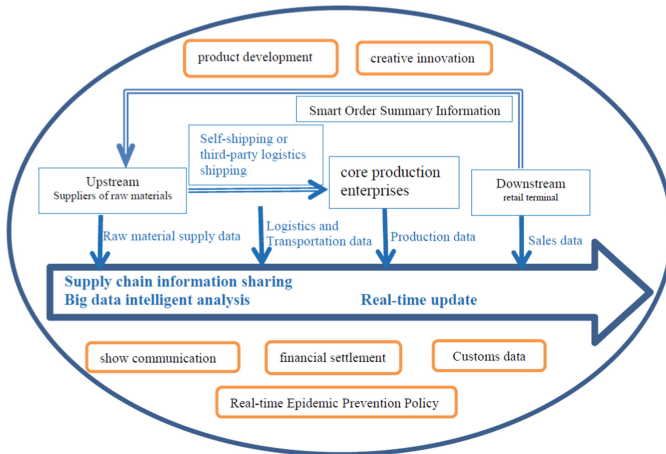
through the digitalization of logistics, and seizes the opportunity of development to build a new development pattern. Secondly, the digitalization of logistics has promoted the transformation of the industrial structure of the retail industry. With the deep integration of logistics digital supply chain data analysis application and retail industry, the original retail enterprises will be intelligently optimized and upgraded, and the popularization and application of retail services will be promoted. Finally, the empowerment of logistics digital technology has promoted the digital development of the retail industry. Consumers and sellers are the core links in the supply chain of retail enterprises. Through the analysis of big data in the supply chain and the clustering of interest of target customers, intelligent analysis in the process of logistics digitalization provides technical support for the retail industry to predict consumption trends. The data analysis and trend forecast provided by digitalization continuously carry out organizational management and development model innovation, and through the improvement of product and service quality, it will drive the digital transformation of the industry in an all-round way, and further improve the circulation efficiency of the retail industry.

### **3 Logistics Digitalization and Industrial Integration Development Model**

With the development of modern logistics, the transportation mode of logistics has developed into a B2B mode based on supply chain and data sharing of supply chain information. That is, the retail terminal aggregates product order information according to market demand, and converts it into information transmission required for production. The core production enterprise analyzes and makes decisions based on the information required for production collected by each department, decides to feed back the production data to the supply chain, and makes overall arrangements for the respective production tasks of upstream and downstream enterprises in the supply chain.

After the raw material suppliers in the upstream of the supply chain prepare the materials, they can transport them to the core enterprises themselves, or they can entrust third-party logistics. With the rapid development of the Internet, the modern logistics model exchanges upstream material information and downstream market demand in the supply chain, and smoothes the flow of products. Circulation costs are reduced, and information is updated in a more timely manner.

Under the background of normalization of epidemic prevention, logistics digitalization and industrial integration development are of great significance. To promote the digitalization of logistics and the development of industrial integration, the model should focus on creating a service platform integrating the digital logistics supply chain. First, the key links of the industrial chain are integrated into the supply chain integrated service platform, including the supply of materials, the supply of machinery and equipment, and the creation, research and development, and procurement of products. Secondly, through digital logistics, all aspects of the industry are coordinated and cooperated, and the entire process from product to sale, as well as the functions required in this process, such as warehousing, transportation, distribution, customs, and financial settlement, are integrated into supply chain integration. Platform [2]. Thirdly, according to the relevant policies of epidemic prevention, adjust logistics and other links in real time, such as



**Fig. 1.** Logistics digitalization and industrial integration development model.

switching the unmanned distribution mode, updating the traffic control route, etc., and timely feedback the data to the platform for further optimization.

In promoting the digitalization of logistics and the development of industrial integration, efforts should be made to build a digital logistics supply chain ecosystem. In this ecosystem, offline industries can give full play to their advantages, and core enterprises in the industry only need to focus on R&D and manufacturing what they are good at. Online use of big data technology, cloud computing and intelligent analysis to update ecological data with information such as order information, sales terminals, logistics warehousing, epidemic prevention and distribution, and online and offline coordination to promote the “organic” development of the digital logistics supply chain ecology.

To promote the digitalization of logistics and the development of production and integration, it is necessary to improve the level of integration, dig deep into the characteristics of the industry, expand the scope of integration, and make the degree of integration deeper. The normalization of epidemic prevention data is integrated into the digital logistics supply chain ecology to enhance the flexibility of the supply chain, so as to cope with the smooth flow of the normalized logistics system for epidemic prevention and promote the recovery of the industry (Fig. 1).

## 4 Research on the Relationship Between Logistics Digitalization and Industrial Integration Development

### 4.1 Indicator System

From the objective point of view of my country’s development situation, this paper uses the coupling relationship analysis method to build logistics from each subsystem according to the interaction mechanism between the resources of logistics digital development and retail industry development, and follows the principles of scientificity, systematicness and authenticity. The evaluation index system of digitalization and retail industry development is shown in Table 1.

**Table 1.** Margins and print area specifications.

Target layer	Indicator layer	Unit
Digitalization of logistics	Logistics digital transformation network users	million households
	turnover	million person kilometers
	Passenger traffic	ten thousand people
	shipment volume	ten thousand tons
	Online logistics practitioners	ten thousand people
	Business outlets	individual
	Total online and offline business	Billion Yuan
retail development	GDP	Billion Yuan
	Commodity retail price classification index	-
	Resident per capital consumption expenditure	Yuan
	total retail sales	Billion Yuan
	retail business costs	Billion Yuan

This paper selects the relevant data of 30 provinces and municipalities in my country from 2014 to 2019 (excluding Hong Kong, Macao, Taiwan, and Tibet due to the unavailability of data), and the data sources mainly come from the “China Statistical Yearbook”, “National Economic and Social Development Statistics” Communiqué, White Paper on China’s Digital Economy Development, Peking University Digital Financial Inclusion Index, and statistical yearbooks of various provinces and cities. Due to the influence of the data at the beginning of the period, economic data are converted into constant prices in 2010 according to the price index, and some missing data are supplemented according to the average increment method.

**4.2 Research Methods**

This paper chooses the coupling model of the coupling mechanism of logistics digitalization and retail development, and mainly analyzes the coupling relationship and coordination relationship between the two. The specific model settings are as follows: Set the parameters in the process of logistics digitalization and retail development as  $u_i (i = 1, 2)$ , for the  $u_{ij} (j = 1, 2, 3, \dots, n)$  is the parameter’s index of number  $j$ , its value is  $W_{ij}$ , parametric order  $V(u_{ij})$  as:

$$V(u_{ij}) = \begin{cases} \frac{W_{ij} - \beta_{ij}}{\alpha_{ij} - \beta_{ij}}, & V_{ij} \text{ positive utility} \\ \frac{\alpha_{ij} - W_{ij}}{\alpha_{ij} - \beta_{ij}}, & V_{ij} \text{ negative utility} \end{cases} \quad (1)$$

In formula (1),  $\alpha_{ij}$  is the upper limit of the parameter,  $\beta_{ij}$  is the lower limit of the parameter, and the interval of  $V(u_{ij})$  is between 0 and 1. The higher the parameter, the

greater the contribution of the system order. The coupling coordination degree is further measured, and the setting calculation is as:

$$C = \left\{ \frac{V(u_1) \times V(u_2)}{\frac{V(u_1)+V(u_2)}{2}} \right\}^{\frac{1}{2}} \tag{2}$$

$$T = x \times V(u_1) + y \times V(u_2) \tag{3}$$

$$D = (C \times T)^{\frac{1}{2}} \tag{4}$$

In formula (2),  $V(u_1)$ ,  $V(u_2)$  represent the order degree of logistics digitalization and retail development, respectively,  $C$  represents the coupling degree of the two,  $T$  represents the comprehensive index of coordination between the two, and  $D$  represents the two. The degree of coupling coordination reflects the degree of overall synergy of the system.  $x$  and  $y$  represent the correlation coefficients respectively. This paper sets the correlation coefficients as  $x = 1/2$  and  $y = 1/2$  respectively. And evaluate the coupling coordination degree. When the coupling coordination degree is 0–0.4, it is a low degree of coordination, indicating that there is a serious imbalance in the development of logistics digitalization and retail industry; when the coupling coordination degree is 0.4–0.5, it is a moderate coordination., indicating that the coordination degree of logistics digitalization and retail development is low; when the coupling coordination degree is in the range of 0.5–0.8, it is highly coordinated, indicating that the logistics digitalization and retail development are in the running-in stage, and there is a certain benign growth space; when the coupling coordination degree is in the 0.8–1.0 is ideal coordination, indicating that there is a high degree of fit between the digitalization of logistics and the development of the retail industry, and there is complementarity between the two.

### 4.3 Empirical Analysis

This paper uses panel data to analyze the time series change of the coupling and coordination degree of logistics digitalization and retail development, and divides the research objects into three major regions of the east, the middle, and the west to analyze the coupling and coordination degree [3]. The specific calculation results are shown in Table 2.

It can be seen from Table 2 that during the research period, the coupling coordination degree of my country’s overall logistics digitalization and retail development fluctuated

**Table 2.** Time series change results of coupling coordination degree of logistics digitalization and retail development

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
National	0.4634	0.4659	0.4677	0.4691	0.4662	0.4553	0.4726	0.4674	0.4729	0.4683	0.4669
East area	0.6651	0.6732	0.6754	0.6703	0.6591	0.6473	0.6579	0.6454	0.6489	0.6372	0.658
Central area	0.4323	0.429	0.4283	0.4291	0.4269	0.4193	0.4402	0.4383	0.438	0.4342	0.4316
West area	0.2846	0.2903	0.2891	0.2955	0.3003	0.2891	0.3114	0.3092	0.3202	0.3241	0.3014

in the range of 0.4553 to 0.4729, and reached a peak of 0.4729 in 2018. During the research period, the development of logistics digitalization and retail industry has been in the middle. The degree of coordination stage and the fluctuation range is not large. It shows that the degree of coupling and coordination between the digitalization of logistics and the development of the retail industry is stable, but the coupling effect of complementary effects has not yet been formed, that is, there is still a lag between the digitalization of logistics and the development of the retail industry, which cannot meet the needs of the development of new retail, and ultimately leads to the digitalization of logistics and retail. From the perspective of the coupling coordination degree of each region, the average value of the coupling coordination degree of the eastern logistics digitalization and retail industry reaches 0.6580, which belongs to the high coordination stage, indicating that the characteristics of the dependence relationship between the logistics digitalization and retail industry in the eastern region are relatively close, and under market conditions The lower development has a highly resonant character. The average coupling coordination degree of logistics digitalization and retail industry in the western region is 0.3014, which belongs to the stage of low coordination, indicating that there is a serious imbalance between the various subsystems of logistics digitalization and retail industry in the western region, and the problem of development imbalance is more serious.

#### **4.4 Conclusion**

The degree of coupling and coordination between logistics digitalization and retail development is stable, but it has not yet formed a complementary coupling effect. The central region belongs to the moderate coordination stage, and there is a simple correlation effect on the characteristics of the dependencies between the subsystems, but the synergistic growth trend is not obvious [4]. The western region belongs to the stage of low coordination, and there are serious imbalances among various subsystems, and the problem of development imbalance is more serious. In order to better integrate the development of logistics digitalization and retail industry, it is necessary to promote the healthy development of relevant parameters from the aspect of logistics digitalization, so as to realize the deep integration of logistics digitalization and retail industry.

## **5 Logistics Digitalization and Industrial Integration Development Strategy**

### **5.1 The Government Takes the Lead to Break Down the Data Barriers of the Supply Chain**

Due to business competition, enterprises are not very enthusiastic about supply chain information sharing and interconnection. Considering the current situation of the low degree of intensification of digital logistics platforms and the poor degree of data interoperability, the government can take the lead in the concept of “big market”, from top to bottom, unify data interface standards, implement intensive management, data sharing and sharing, and supervise at the same time [3]. Legal and compliant use of information to prevent information leakage. To achieve efficient and smooth logistics information, to achieve supply chain information sharing.

## **5.2 Innovate the Way of Logistics Industry and Industry Integration to Stimulate the Vitality of All Parties**

In the process of digital transformation of logistics, it is possible to use the analysis of the needs and interests of sales terminal customers to innovate the integrated service model of the supply chain, further integrate with the industry, create a long-term strategic partnership of mutual benefit and win-win, and enhance the ability of the two to respond to changes in market demand. Promote the integration and linkage of the logistics industry and industrial facilities and equipment. If the product itself has special transportation needs, the transportation equipment can be deeply integrated with the logistics enterprise, and a special line and characteristic logistics transportation plan can be formulated. The special transportation capacity of the logistics industry can also be customized according to the characteristics of the industry. All parties focus on the work they are good at, stimulate the vitality of all parties, and enhance industrial flexibility and the ability to capture market trends.

## **5.3 Optimized Resource Allocation and Promote Cloud Management for Industries**

The perspective of breaking the data barriers of the supply chain, innovating the integration method between logistics industry and cloud computing, which optimizes the allocation of resources and improves productivity. A strategy for the integration of logistics digitalization and industry is proposed, so as to improve robustness of economy in the pandemic. During the period of epidemic prevention normalization, the optimization process can reduce labor and reduce the risk of virus transmission. It also provides a platform for the government to keep close surveillance on the dynamic data of the logistics industry in a period of time. Real-time status, such of epidemic prevention stations, unmanned distribution capacity, storage capacity, turnovers, etc., are useful references for decision-making to optimize and adjust industrial policies. At the same time, the integration industry is encouraged to processing logistics data on the cloud by enhancing data analysis and intelligent decision-making capabilities, which promises supply chains be exerted as expect [5]. By cloud computing, it can receive feedback and information from supply chain sensitively, so as to optimize the internal operation of the industry in a better and more smart to meet the normalized market demand for epidemic prevention in the pandemic.

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