

Research on Coordinated Development of Smart Logistics System of Agricultural Products in Beijing-Tianjin-Hebei under the Background of Big Data

Zhimin Liu, Yujie Luan, Qianlong Xie

Tianjin Agricultural University, Tianjin, China

Keywords: Smart Logistics, Agricultural Products Logistics, Coordinated Development, Big Data

Abstract: With the rapid development of big data technology, smart logistics of agricultural products has become an important means to improve the circulation efficiency and quality safety of agricultural products. This study takes the Beijing-Tianjin-Hebei region as the research object, and aims to provide scientific decision-making basis for the circulation of agricultural products in the Beijing-Tianjin-Hebei region by studying the construction and collaborative development of smart logistics system for agricultural products under the background of big data. This paper analyzes the development status of Beijing-Tianjin-Hebei agricultural smart logistics system to further improve the development of Beijing-Tianjin-Hebei agricultural smart logistics under big data, hoping to provide reference for the development of agricultural smart logistics in the era of big data.

1. Introduction

Under the background of big data, the research on the collaborative development of smart logistics system of agricultural products in Beijing-Tianjin-Hebei emphasizes that the traditional logistics industry and modern Internet information technology can be deeply integrated by using big data from the actual situation, so as to meet the integration and sharing needs of agricultural logistics information resources, optimize logistics business processes, and promote the collaborative development of agricultural logistics management. Beijing-tianjin-hebei region is an important region to promote China's social and economic development. Targeted promotion of the efficient development of regional logistics can bring more opportunities for agricultural products trading in the region, expand the scope of agricultural products market, ensure the stability of agricultural market and the continuous supply of agricultural products market, and then promote the stable and healthy development of the regional economy.

2. Overview of Smart Logistics

With the rapid development of information technology, especially the wide application of the network, at present, the production efficiency of various enterprises has been greatly improved, and the demand for e-commerce between enterprises has also increased. Due to the steady development of Internet technology, logistics has become an important guarantee to ensure the efficient operation

of e-commerce. In this context, the concept of "smart logistics" was integrated by IBM China-Research Lab and US President Barack Obama's "Smart Earth" concept in 2007 [1].

The main purpose of developing smart logistics is to reduce logistics costs through technology and increase economic benefits for logistics enterprises. The core of developing smart logistics is to achieve comprehensive control over all aspects of logistics warehousing, loading and unloading, handling and transportation until reaching consumers through relevant technical means such as information technology and smart equipment, and gradually realize the logistics of each link of intelligence, information, refinement and dynamization, improving the smart analysis, decision-making of the logistics system and the ability of automatic operation execution, so as to improve the efficiency of logistics operation.

3. Development Status of Smart Logistics System for Agricultural Products in Beijing-Tianjin-Hebei

3.1 Policy Status

In January 2022, the National Development and Reform Commission issued the "14th Five-Year Plan for the Construction of Modern Circulation System", which focuses on: "Accelerate the development of smart logistics, actively apply modern information technology and smart equipment, and improve the level of automation, unmanned and smart logistics." It provides clear guidance for the development of rural smart logistics industry and helps rural revitalization. Agricultural products as the basis of ensuring the lives of the people, national economy and people's livelihood are inseparable from agricultural products logistics, which takes the important responsibility of delivering fresh agricultural products to the hands of consumers, the development level is more related to the shopping experience of consumers, and there is a mutual promotion and mutual control relationship with regional economic development. The reform of agricultural products logistics system is an important part of the national economic development of our country.

3.2 Development Status of Smart Logistics of Agricultural Products in Beijing-Tianjin-Hebei Region

3.2.1 Increasing Demand for the Development of Smart Logistics for Agricultural Products

It is known from the data of Beijing and Tianjin Development Statistical Yearbook that the per capita consumption amount of agricultural products of urban residents in Beijing is constantly increasing, and the demand for fresh products is also increasing. The per capita food sales volume of urban residents in Tianjin increased by 2.9% and the price of fresh fruits and vegetables increased by 13.0%, which is highlighted by the increased demand for fresh agricultural products and out-of-season fruits and vegetables. Such changes put forward higher requirements for the deepening development of integrated logistics distribution management center and big data analysis logistics industry in the whole region[2].

3.2.2 Level of Infrastructure

The Beijing-Tianjin-Hebei region is a region with a high concentration of population, economy and cargo transportation in China. It is an important growth pole of northern China's economic development and an important energy channel in the country. It carries 8.2% of the country's population with 2.3% of the regional area, creates 10.0% of the total economic volume and achieves 6.5% of the cargo transportation volume. By 2016, the Beijing-Tianjin-Hebei region had 8,496 kilometers of railways in operation, 227,000 kilometers of highways, seven airports and four ports with cargo functions, and basically formed a comprehensive freight infrastructure network.

The development status of smart logistics of agricultural products in Beijing-Tianjin-Hebei region is moving towards a more smart, efficient and sustainable direction. Through big data analysis to promote logistics informatization and technological innovation, the circulation efficiency and quality of agricultural products will be improved, and better agricultural products services will be provided to farmers and consumers.

3.2.3 Informatization and Intelligent Development

On October 16, 2023, the commerce authorities of Beijing, Tianjin and Hebei signed the "Agreement on Deepening Market Integration and Business Development Cooperation in the Beijing Tianjin Hebei Region" in Beijing, one of the important items is to share the results of trade logistics. That is to optimize the layout of the business logistics industry and build the business logistics base and standardizing the application of linked logistics. The governments of the Beijing-Tianjin-Hebei region actively promoted the integrated development of transportation and logistics in This region, opened up the Beijing-Qin Expressway Beijing-Hebei, Jibei-Tianjin connection section and other expressways and ordinary trunk highways such as Songlan Highway and Beijing-Jiang Highway, jointly organized the formulation of regional coordination standards for Beijing-Tianjin-Hebei cold chain logistics, and promote a modern cold logistics system serving Beijing and Tianjin with "full chain, networking, strict standards, traceable lakes, new models, and high efficiency". The Beijing-Tianjin Logistics Standardization Alliance was established to support trade logistics distribution enterprises to expand regional joint distribution operation network[3].

With the continuous growth of the total amount of logistics in the Beijing-Tianjin-Hebei region, as well as the extensive application of new technologies such as artificial intelligence, Internet of Things, and remote sensing in the field of logistics, "big data +" has been relatively mature in logistics transportation, logistics distribution and other aspects, and has been placed high expectations by relevant industries. As an important direction of the development of agricultural economy and service industry in China, smart logistics of agricultural products is still in its primary stage and has a lot of room for development[4].

4. Problems in the Smart Logistics System of Agricultural Products in Beijing-Tianjin-Hebei Region

After a period of development, the smart logistics in the Beijing-Tianjin-Hebei region has made some achievements. However, the development of smart logistics is still in an exploratory stage, there are still some practical problems in the development of smart logistics in the Beijing-Tianjin-Hebei region.

4.1 It is Difficult to Collect Agricultural Product Logistics Information

The establishment and operation of smart logistics system cannot be separated from timely and accurate logistics information. Due to the limitation of traditional agricultural production mode, the proportion of agricultural large-scale production and operation in China is still very low, and agricultural production and logistics activities are small and scattered, which hinders the collection of agricultural products logistics information to a great extent. The logistics information of agricultural products collected by existing Optimization Countermeasures for the Development of Beijing-Tianjin-Hebei Agricultural Products Wisdom Logistics under the Background of Big Data Countermeasures methods has some problems, such as information dispersion, repetition and lag. How to ensure the logistics information of farmers and agricultural products scattered in various places, and ensure the timely and accurate acquisition, is an important issue facing the integration of smart logistics and modern agriculture.

4.2 Logistics Infrastructure is Not Perfect

First, there is a big infrastructure gap in big cities. Urban land planning and land efficiency evaluation lead to insufficient cold storage capacity for commercial needs in big cities. Taking Beijing as an example, under the capital's non-core function easing policy, the old cold storage in Beijing's fifth Ring Road has the demand for demolition, transformation and upgrading, the cold chain layout needs to be improved, the total gap is large, and the structural imbalance of resources needs to be improved. The second is the lack of cold storage. Due to the obvious seasonality of agricultural production, the seasonal utilization rate of cold storage in producing areas is unbalanced, and the annual operation efficiency is lower than that of urban cold storage. There is a lack of distribution centers with cold storage in the producing areas, and the provisions of agricultural land facilities cause the pre-cold storage in the producing areas to have no land indicators. According to the questionnaire survey in the Beijing-Tianjin-Hebei region, more than 60% of the agricultural production and operation units in the producing areas believe that the existing cold storage can not meet the needs, and they hope that the government will lead social funds with financial funds in the producing areas, jointly build non-profit common cold storage, or cooperate with logistics enterprises to establish distribution centers. However, the current cold storage support policy does not give full play to the efficiency of financial funds to promote the large-scale development of agricultural modernization. In addition, there is a significant gap in the level of cold chain facilities between urban and rural areas. The third is the problem of commercial facilities at the consumer end. Cold chain node Settings only consider the flow of people, did not consider logistics. For example, some underground shopping malls do not have an entrance to facilitate logistics purchase. There are also problems with the standard of commercial facilities. Due to the lack of corresponding logistics norms and guidelines, the planning and designers are not considered enough, which leads to problems in logistics operation. However, the backward information construction has seriously affected the information sharing and data sharing in the Beijing-Tianjin area, resulting in the incompatibility of logistics information between cities. These problems hinder the automation process and affect the development of smart logistics [5].

4.3 Lack of Professional Talents

The era of big data is the epitome of the era of knowledge economy. In the era of knowledge economy, talent has become the most important resource for the development of various industries, and it is also the key for enterprises to obtain core competitive advantages. The Beijing-Tianjin-Hebei region still lacks professional talent teams in the process of constructing agricultural product logistics system. Currently, less than 25% of employees have professional qualifications, and less than 10% have a bachelor's degree or above. On the one hand, the number of professional talents is low, the overall quality of farmers and workers in agricultural products processing enterprises is low, and the understanding of big data and agricultural products e-commerce is low, which plays a relatively limited role. On the other hand, the ability to cultivate and introduce talents is insufficient. The enterprises and governments in the Beijing-Tianjin-Hebei agricultural product logistics system have relatively low efforts to train employees, and they have not introduced a group of professional talents from outside, thus limiting the overall level of Tianjin's agricultural product e-logistics system[6].

5. Optimization Countermeasures for the Development of Beijing-Tianjin-Hebei Agricultural Products Wisdom Logistics under the Background of Big Data Countermeasures

5.1 Strengthen Big Data Network Construction

Make full use of the advantages of big data to promote the quality and safety supervision of the

whole process of fresh agricultural products. "Smart + cold chain" logistics through the input and monitoring of raw material information such as fresh agricultural products seeds, fertilizer feed, seeding, etc., through big data technology to implement RFID information input and video surveillance for various links such as acquisition, cleaning, classification, processing, packaging, loading and unloading, transportation, warehousing, distribution, etc. Ensuring continuity of cold chain operations throughout the fresh produce supply chain. On this basis, through the application of big data, the smart control of temperature, humidity and wind speed of each link has been realized, and the quality and safety of each link in the supply chain of fresh agricultural products have been ensured to the maximum, and the quality and safety of products have been further improved [7].

In addition, through the means of big data, online and offline experience exchange to ensure the standardization of modern logistics, information sharing, openness and transparency, accurate traceability, thus promoting the development of "smart + cold chain" logistics, providing consumers with an smart, accurate, efficient, collaborative smart logistics solution. Thus reducing the loss and waste of fresh produce in the process of circulation.

5.2 Improve Logistics Infrastructure

Increase investment in agricultural logistics infrastructure. In particular, the construction and renovation of cold chain transportation and cold storage facilities, improve the transportation quality and efficiency of agricultural products, reduce loss and waste. Investment in agricultural logistics infrastructure, is crucial for the quality and efficiency of the transportation of agricultural products [8]. The strengthening of cold chain transport and cold storage facilities can effectively control the temperature, humidity and freshness of agricultural products, reducing the risk of goods loss and quality decline. At the same time, improving logistics efficiency can reduce transportation time, so that agricultural products can reach the market in a timely manner, reducing the possibility of excessive storage and waste.

5.3 Improve Information Exchange and Transparency

Establish a smart logistics information platform for agricultural products to promote information sharing and exchange. At the same time, it is necessary to strengthen supervision and control, strengthen the monitoring and disclosure of information on the agricultural product market, improve the transparency of information, and increase consumers' trust in agricultural products. The smart logistics information platform for agricultural products should be established to promote information sharing and exchange among producers, sellers and consumers [8]. Through such a platform, relevant information about agricultural products, such as production location, production method, packaging and quality testing, can be transparently recorded and disseminated. At the same time, strengthening supervision, monitoring and disclosure of agricultural product market information can increase market transparency. Transparent market information can increase consumer trust in agricultural products and help consumers make more informed purchasing decisions. In addition, producers and sellers can also adjust their production and sales strategies more effectively based on market information to adapt to changes in market demand.

5.4 Strengthen the Construction of Talents and Enhance the Competitiveness of Smart Logistics

The key to enhance the core competitiveness of smart logistics of agricultural products lies in the cultivation of talents, so relevant enterprises are encouraged to train specialized talents in smart logistics. In the personnel training work carried out by universities, it is necessary not only to reflect the interdisciplinarity but also to pay attention to the combination of science and technology [9].

Through cooperation with universities, scientific research institutions and logistics enterprises, the establishment of a joint training system for logistics enterprises is discussed, and innovative, managerial and technical talents are cultivated through the teaching method combining theory and practice, so as to promote logistics education to keep up with the pace of industrial development. It is necessary to learn from the advanced experience of the West to realize the improvement and supplement of China's smart logistics talent construction system, and provide more professional talent support for the development of smart logistics of agricultural products in China [10].

6. Conclusion

Relying on big data to build and develop the smart logistics of agricultural products in the Beijing-Tianjin-Hebei region, the governments of Beijing, Tianjin and Hebei have made important practices for the specific planning of future development with practical actions. Practice has proved that in the context of big data, the development of smart logistics in the Beijing-Tianjin-Hebei region needs the three places to go hand in hand, from the supply and demand balance, infrastructure construction, information disclosure, and talent to better promote the transformation and upgrading of logistics professionals. At the same time, it is also necessary to further expand investment, constantly inject excellent and fresh "blood" into the large family of smart logistics of agricultural products in the Beijing-Tianjin-Hebei region, and improve the overall level of the logistics industry.

Acknowledgements

This study was supported by: 2023 Tianjin Statistical Science Research Project; Project Number (TJ2023KY10)

References

- [1] Chen Yanyu, Zheng Wenzhe, Li Wenbo, Huang Yimiao. *The Robustness and Sustainability of Port Logistics Systems for Emergency Supplies from Overseas*. *Journal of Advanced Transportation*, 2020, (07):1-10.
- [2] Yin L. *Research on key technologies of cold chain smart logistics system for agricultural products in Beijing-Tianjin-Hebei region*. *Shanxi Agricultural Economy*, 2021,(23):167-168+171.
- [3] Li Yue, Xiao Jianhua, Xu Lixuan, Zhong Shijia. *Research on technological innovation countermeasures of Tianjin Smart Logistics under the background of Beijing-Tianjin-Hebei coordinated development*. *Industrial Innovation Research*,2020,(01):1-4.
- [4] Meng Qingpeng, Wang Chengjie. *Research on smart logistics promotion strategy of fresh agricultural products*. *Journal of Agricultural Economics*,2019,(05):141-142.
- [5] Wang Huipo, Wang Limei. *Research on the development of smart logistics in Beijing-Tianjin-Hebei region under the background of Digital economy*. *Value Engineering*,2023,42(24):1-3.
- [6] Zhou Dongmei. *Research on smart logistics development of agricultural products in the era of big Data*. *Shanxi Agricultural Economy*,2022,(03):166-168.
- [7] Han Jiawei, Li Jiacheng, Ren Qingshan, Zhao Chunjiang, Yang Xinting. *Research on the development of smart logistics of agricultural products*. *China Engineering Science*, 2021,23(04):30-36.
- [8] Zhang R. *Research on the logistics development path of "wisdom + cold chain" for fresh agricultural products in the new retail era*. *Business Economics Research*,2022,(09):112-115.
- [9] Zhang Chunxia, Peng Donghua. *Wisdom logistics development countermeasures in China*. *Circulation economy in China*, 2013, 27 (10) : 35 to 39.
- [10] Zhu X T. *Research on the integration and innovation development path of smart logistics and modern agriculture in Taicang City under the background of "big data"*. *Logistics Technology*, 2002,45(18):55-57.