Research on Innovation Management Modes of Agricultural Product Logistics under the Background of Big Data

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Abstract. With a gradual process of the information revolution, big data has become an extremely important component of all industries. This paper focuses on the analysis of the current situation of agricultural logistics in China, the infrastructure construction of new agricultural logistics under the background of big data and the existing problems as well as the blueprint for future development so as to make up for the blindness of traditional logistics. In order to promote the development of agricultural logistics, this paper proposed strategies for developing modern agricultural logistics based on big data.

Keywords: logistics; agricultural product; big data.

1. Introduction

As a concept proposed at the beginning of the 21st century, big data, which has played a crucial role in various fields, is no longer a fresh item. Society nowadays is rapidly developing with advanced science and technology, flowing information, closer communication between people and more convenient lifestyle. Big data is exactly the product of this high-tech era. It refers to the data collection that captures, manages and processes various events within a certain period, helping people have better decision-making power in all fields. As a large agricultural country, China still has many agricultural problems to be solved, among which the logistics of agricultural products is a decisive one. Although the agricultural logistics infrastructure in China has significantly changed, it still can't keep up with the demand of agricultural development and seriously affect the speed of that. Besides, the information construction of agriculture is still relatively backward which leads to the farmers' blind choice of farming types, even the unequal distribution of agricultural products in the distribution process and a series of problems caused by unmarketable agricultural products. Thus, it is urgent for China to introduce related technologies, supporting facilities and talents of big data into agricultural logistics to acquire and analyze relevant logistics information for guiding farmers to plant seeds selectively and pertinently from a macro perspective. Based on this purpose, this paper will carry out research and discussion on the intelligent logistics system of agricultural products under the background of big data.

2. Current Situation of Agricultural Logistics in China

Agricultural logistics is a necessary measure for the circulation of agricultural products. Although China insists on developing the tertiary industry, it is still a country with great agricultural production, consumption and import and export trade of agricultural products. Therefore, agricultural logistics is also one of the important issues faced by China. To do a good job in agricultural logistics is a necessary guarantee of ensuring food safety and comprehensive agricultural modernization. However, there are still many problems to be solved in agricultural product logistics.

Domestic scale of agricultural logistics is huge.From fig.1, At present, the common agricultural logistics in China is mainly based on the wholesale market model. After the harvest of vegetables, fruits, raw poultry, aquatic products and other agricultural products, they are purchased from scattered farmers and then are sent into local farm product markets via wholesales market at all levels, and finally they reach to consumers. This is a relatively backward model of logistics. In many areas of China, especially the vast district of central and western China, there is no planned or unified

management of agricultural products trading which leads to intense competition of distributors, and sometimes even malign competition happens.[1]
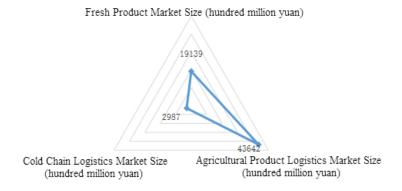

Fig. 1 Proportion of cold chain logistics

When it comes to logistics, we must mention cold chain logistics which means that the frozen food stays in a specified low temperature environment throughout the whole links of production, storage, transportation, sales and consumption to ensure food quality and reduce food loss. This is the most suitable way for agricultural product logistics and our common frozen products are also carried out to market circulation through this way. But the popularity rate of this type of logistics is not so high.

Under the guidance of big data, cold chain logistics, the most advanced agricultural logistics mode, has gradually increased its share integrated with fresh agricultural product logistics, which forms a multilevel online logistics pattern of fresh agricultural products step by step.[2]

Big data illustrated that the scale of China's fresh food e-commerce financing has reached 12 billion yuan in 2018. Pagoda, Hi Shop First Table and other small brick-and-mortar chain stores. The capital is not only used to maintain the daily operation of agricultural product logistics, but also to accelerate the precooling and cold chain transportation in the agricultural product logistics chain. Although these are relatively optimistic phenomena at present, the coverage is limited to developed cities. Bigger problems still exist in the agricultural logistics of rural areas and small and medium-sized cities .

3. Current Problems Existing in Chinese Agricultural Logistics

The standards required by   are relatively high, and the corresponding management and capital investment in cold chain logistics is also larger than that of ordinary room-temperature logistics. As shown in the figure, according to relevant data, it is easy to find that in 2018 the scale of agricultural product logistics in China has reached 4364.21 billion yuan, and the scale of raw and fresh market 1913.1 billion yuan, while the scale of cold chain logistics market   has only reached 298.7 billion yuan. The circulation rate of fruits and vegetables, meat and aquatic products in China is 22%, 34% and 41% respectively, their refrigerated transport rate is 35%, 57% and 69% respectively, and the fruits' attrition rate in circulation reaches 15%. The cold chain rate of fresh agricultural products in developed country, however, such as the United States, reaches 100%.[3] The domestic development of cold chain logistics market is far behind the development of both agricultural product logistics and fresh product market, and the usage rate of cold chain logistics is not high in the fresh agricultural product market. This is a great blow to the circulation of domestic agricultural products which has severely reduced normal income in agriculture, and it is difficult to ensure the quality of agricultural products to the consumer terminal.

In this old model, the physical and value loss in logistics process is serious, and it also leads to slow and insufficient data transmission which seriously affects the correct decision-making and effective operation of the whole supply chain. Therefore, it often leads to backlogs and unmarketable agricultural products, which is difficult to be consumed by market. Besides, this will also greatly demoralized farmers and set up a vicious circle of agricultural development .

In addition, there is also an another problem: the local agricultural products are characteristic. As vegetables are mainly sold in local area and the cost of long-distance logistics is high, some companies have tried to use the third party logistics for distribution but they can't ensure the quality of products in practice. Then they start to build a logistics distribution system of their own which makes the logistics cost account for 30% of the total product cost. Our country is vast in territory, but due to the cost, the fresh transportation radius is short, and the consumption of agricultural products is mostly provided for the local area. This will also lead to poor supply in areas where demand is huge, and the oversupply in areas where demand is less. Therefore, the contradiction between supply and demand of agricultural products requires the rapid development of cold chain logistics.

The present situation and problems of agricultural logistics in China are mentioned in the preceding section. In short, the market size is huge, but the technology is backward and the cost is higher.

4. The Research on the Model of Agricultural Logistics Innovation based on the Big Data

These problems, certainly, have reasonable solutions, and the current coefficient of utilizing big data is low in the field of agricultural product circulation. If we advance the development of agricultural big data, however, then we can effectively integrate the resources, optimize the circulation structure of agricultural products and improve the circulation efficiency.

4.1 Adjustment of Hardware

4.2 Adjustment of Supply and Demand Relations Guided by the Big Data

With the help of big data, we can make relatively reasonable adjustment to the supply and demand relations in regions to form the circulation of agricultural products in a larger area　complement which is complementary and cost-saving without causing unmarketable problems. Specifically, we can deeply study and analyze the front end, middle end and terminal end of the agricultural product logistics, circulation data, logistics data and consumption data to adjust the direction of circulation. And we can also conduct advance booking, group purchase and other activities, so that agricultural products are sold to right places, facilitating various stages of the agricultural product circulation to exchange resources of high efficiency.

4.3 Establish a Complete Trace-ability System for Agricultural Products

Record the production and circulation routes of every product. Collect and record data from its manufacture to its sale every agricultural product from the various parts to achieve the standard that "provable source, traceable flow and clear responsibility". Trace the flow of products through this technique can also solve the safety issue of agricultural products. In such market environment, lots of reliable brands and companies will spring up. And their competition is beneficial for regional connectivity, quality improvement and the balance of supply and demand of agricultural products.

4.4 Adjustment of Soft Power

4.4.1 Pay Attention to Talents' Cultivation and Education

In the background of big data, it is in urgent need of cultivating some talents skilled in both data processing and logistics. And it is also extremely important that we need staff who can accept, understand and apply the big data technology. As for the construction of agricultural logistics informatization, relevant infrastructure can be developed based on comprehensive analysis of the overall data by relevant talents. In the case of complete logistics infrastructure construction, transportation tools of logistics can be further improved and optimized. And the efficiency of logistics can be greatly improve through these advanced technical means and professional equipment.

4.4.2 Improve the Farmers' Information Capability

Farmers are not only the main participants of agricultural cooperation business but the great beneficiaries as well, hence the level of farmers' information capability directly determines the achievement and value of applying agricultural cooperation. The improvement of farmers' information capability plays an important part in farmers' participation in agricultural cooperative value chain and the successful transition of their role in new urbanization.

5. Conclusion and Outlook

At present, the domestic cold chain logistics market is rapidly developing with the help of big data, but it is quite fragmented because the main service suppliers are buyers or third party logistics. With the further expansion of cold chain logistics market, an increasing number of   enterprises will also join in. We have also found so far that many express enterprises have accelerated the layout of cold chain logistics industry relying on their own transportation network and equipment system to obtain big data of logistics and to further promote the development of cold chain logistics and agricultural logistics. Overall, big data will shine in agricultural logistics.

References

[1]. Gao Fei, Discussion on Operation Modes of Agricultural Products Logistics of Electronic Commerce [J]. Economic and Technological Economic Guide. 2019,27(23),225.

[2]. Zhou Dan, Wang Dezhang, A Joint Research on 'Internet Plus Agricultural Logistics'[J]. Academic Communication. 2015(11):166-171.

[3]. Hao Yu, Present Situation, Problems and Trend of the Logistics of Fresh Agricultural Products in the Internet Plus Era. [J]. Value Engineering.2019,38(22),130-131.