Cold-chain Logistics Optimization of Fresh Agricultural Products Enterprises Based on Internet of Things

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Abstract: With the improvement of people's living standards, people pay more attention to the variety diversity of fresh agricultural products, food safety and the quality of fresh agricultural products. Because fresh agricultural products are perishable, perishable and easily dehydrated, the requirement of distribution service time is particularly high. Refrigerated transportation can effectively improve the decay of agricultural products in the process of distribution and transportation. People's attention has shifted to the quality of agricultural products, and there is a potential demand for the safety of agricultural products. In order to adapt to the development of cold chain logistics of fresh agricultural products, it is necessary to integrate the main body of fresh agricultural products circulation organization. This paper analyzes the problems existing in the cold chain logistics distribution of agricultural products under the Internet of Things technology and makes recommendations in a targeted manner. In order to improve the distribution efficiency of fresh agricultural products, ensure the quality and safety of fresh agricultural products, and optimize the overall logistics process of fresh agricultural products.

1. Introduction

Fresh agricultural products, also known as perishable agricultural products, are not easy to preserve. It mainly includes vegetables and fruits, meat, aquatic products and processed food. Cold chain logistics is a scarce and characteristic part of logistics industry. Cold-chain equipment is the basis of the development of cold-chain logistics and the foundation of its existence [1]. Compared with normal temperature logistics, cold chain logistics process requires higher temperature and humidity of equipment or environment. Because the logistics of agricultural products has the characteristics of huge quantity, variety and low price. Thus, a series of problems arise, such as difficult packaging, transportation, storage and distribution [2]. It takes a lot of manpower and time to transport and distribute agricultural products from the production place to the final consumer. Therefore, it is extremely important to have good and suitable transportation conditions [3]. Another characteristic of agricultural and sideline fresh produce is the dependence on temperature. The change in product quality caused by temperature changes is irreversible [4]. Therefore, the strict control of the temperature of agricultural and sideline products during distribution can be intensified, so that fresh agricultural products can always be in a suitable low temperature environment in all aspects of circulation.

Because the low-cost operation of quality preservation and preservation is more difficult than traditional industrial products. Coupled with China's basic national conditions at this stage, the field of cold chain started late and the level of informatization is not high [5]. The cost of cold chain logistics is high and it is difficult to popularize. In cold chain logistics, the most important issue is to ensure that fresh produce maintains the proper temperature and humidity during the various stages of circulation [6]. Using IoT technology, information exchange and communication are carried out in accordance with agreed information transmission and sharing protocols. From the processing of raw materials to the finished product, changes outside the normal temperature range will cause the bacteria to multiply, thus reducing the quality of the agricultural products [7]. In order to ensure the freshness and quality of agricultural products, it is necessary to complete the logistics and distribution process of agricultural products as quickly as possible through reasonable low temperature control and Internet of Things technology. Through the comprehensive application

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of the Internet of Things technology, it can reduce the interference of information sharing of agricultural products and ensure the quality of fresh agricultural products [8]. Therefore, it is also of great significance to further improve the degree of information acquisition and quality trust of consumers in the whole process of agricultural product circulation.

2. Demand Analysis of Cold Chain Logistics Cloud Service System

Fresh agricultural products cold chain logistics center has certain logistics facilities and equipment, high investment costs. If the location is not properly chosen, it will cause great waste and loss. Due to the accumulation and irreversibility of product quality degradation caused by temperature changes in circulation, cold chain logistics must take into account the temperature requirements of different kinds of fresh agricultural products in distribution. To construct the performance evaluation system of fresh agricultural products logistics distribution system based on e-commerce platform is to evaluate the fresh agricultural products logistics system more objectively, scientifically and accurately. A complete cold chain information system not only needs to collect, receive and display cold chain information, but also completes the quality assessment and diagnosis of the cold chain process. The cold chain process has the characteristics of parameter diversity and control index variability, and the traditional analysis model is difficult to achieve the expected quality evaluation results. In this study, the cold chain information is semantically processed, and an ontology model for reading information from the database is established. Figure 1 shows the development process of the ontology-based cold chain quality assessment system.

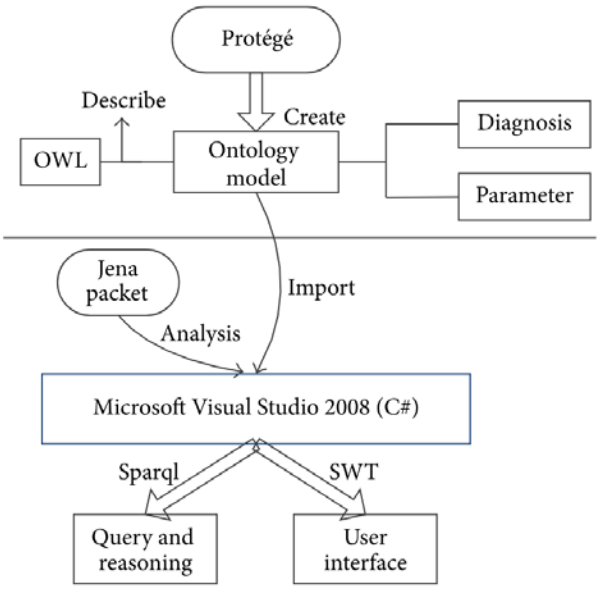

Fig.1. Development process of the cold chain quality assessment system

Cold chain logistics enterprises set up the IoT system at all stages of the circulation of agricultural products, and the real-time information of agricultural products can be efficiently transmitted and shared in real time in various IoT systems. The cold chain logistics of agricultural products is mainly to coordinate the links between the processes in the cold chain and their technical and economical. To ensure that the fresh produce in the process of processing, storage and transportation for a long time to maintain its nutrient loss and non-corrosion [9]. Once the goods cannot be delivered to the customer's point within the time period specified by the customer, the product may deteriorate and rot during transportation. The investment of facilities and equipment in cold chain logistics is much larger than that in normal temperature logistics, and the construction cost of cold chain logistics system is higher. People's demand for fresh agricultural products is year-round and universal, which leads to contradictions between the producing and consuming areas of fresh agricultural products due to time and distance. The cultivation of logistics talents in China is still in the exploratory stage, and the high-quality logistics talents that can be used by the

society can not meet the needs of the logistics field. Therefore, it is an urgent task for the development of cold chain logistics to strengthen the training of logistics talents, especially those senior logistics managers who serve the cold chain.

Because there are many and complex factors affecting the logistics system of fresh agricultural products, the evaluation system does not need to cover all the factors and indicators of the object of study, which is neither possible nor necessary. In the circulation of agricultural products, the degree of information among enterprises is different, which leads to the information flow is not smooth. At the same time, there is a lack of necessary coordinated logistics development between government supervision departments and production, circulation and sales links. The fresh and perishable characteristics of fresh agricultural products make supermarkets have to buy fresh-keeping facilities, establish corresponding logistics channels, set up management teams, and occupy more capital. In addition, because of their weak position, there are unreasonable phenomena in the distribution of profits. Agricultural product production logistics requires rational distribution and planning of agricultural products in spatial scope [10]. The traditional cold chain logistics is mainly based on the agricultural product market, using industrial logistics or enterprise logistics to transport to the market, consumers to the market to buy the products they need. The goal of cold chain logistics from beginning to end is to deliver the product from the place of origin to the retail terminal to the consumer in the shortest time and at the lowest possible cost, while ensuring that the product is in the specified low temperature environment.

3. Current Operating Model of Fresh Agricultural Products

The core of any advanced management mechanism is the cultivation and application of talents. This soft obstacle is one of the reasons that restrict the development and promotion of cold chain logistics in China. Influenced by the self-sufficient small-scale peasant economic model in China's agricultural economy, many peasant households have weak awareness of market participation and poor initiative. Because the cold chain is a supply chain system with the aim of ensuring the quality of refrigerated products and keeping the low temperature environment as the core requirement. Therefore, it is more complicated and more complicated than the general temperature logistics system. In the cold chain logistics cloud platform model conceptual model, the cloud platform schema entity refers to an objective object that can engage in the cloud platform model. The system needs to be able to support the retrieval of foreign images as input search criteria cookies. For example, monitor the captured picture, the picture taken by the camera, and the picture with the case. Use a variety of communication devices to connect to a unified whole through the network. Figure 2 is a conceptual model of the cloud platform model and the urban logistics system.

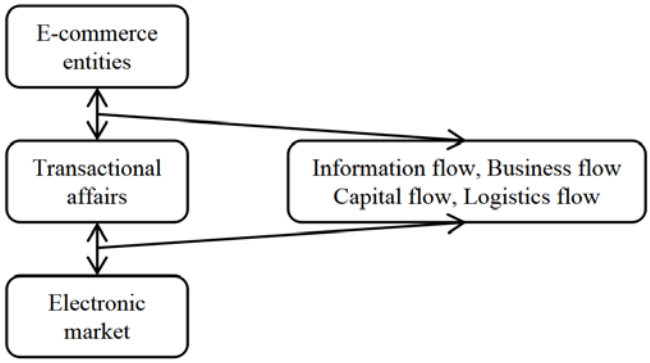

Fig.2. Cloud platform model and conceptual model of urban logistics system

The agricultural product cold chain logistics data center is the core part of the data layer, which provides a standard data interface for various environmentally aware devices. Real-time access includes cold storage environment, vehicle driving status and vehicle environment monitoring data, and provides real-time analysis and early warning service in combination with agricultural product safety storage and transportation knowledge base. As the development of China's cold chain logistics industry is still not perfect, in order to achieve the smooth circulation of cold chain

products, there are some activities with low efficiency or inefficiency in logistics. The operation cost of cold chain logistics is very high, including not only the operation cost of normal temperature logistics. Although advanced fresh-keeping equipment has a high short-term investment, it should focus on the long-term. The transportation level of cold chain logistics is measured by the punctual arrival rate, the cost per ton kilometer, the loss rate of fresh products on the way, and the number of refrigerated and frozen vehicles. In the process of logistics, factors such as production layout, seasonal production and decentralized production should be fully considered. Logistics should be combined with local production conditions. The primary goal of logistics center is to maximize efficiency. Improving social and economic benefits is the main objective of logistics center construction.

4. Conclusion

With the continuous improvement of material living standards and the diversification of market demand, people are increasingly demanding the quality of fresh agricultural products, which puts forward higher requirements for the cold chain logistics industry of agricultural products. Under the environment of Internet of Things, the circulation mode of agricultural products will be more in line with the requirements of agricultural informatization than the traditional mode. Fresh agricultural products are the necessities of people's daily life. Because of their special characteristics, they have special requirements for distribution. Cold chain logistics came into being and developed rapidly. Based on the current situation of the quality and safety of agricultural products in China, this paper summarizes the shortcomings of the cold chain of domestic agricultural products. It points out many problems existing in the safety monitoring of traditional agricultural products that hinder the development of modern logistics. And gave suggestions for promoting the development of agricultural chain cold chain logistics safety. According to the status quo and development tendency of the production, circulation and consumption demand of fresh agricultural products in China, the government can adopt policy inclination and other methods to focus on the cultivation of cold chain logistics enterprises with regional characteristics. Through the research on the circulation mode of agricultural products in the Internet environment and the optimization of the distribution path of the cost of joining the Internet of Things technology. It can not only deepen the understanding of the application of Internet of Things technology in agriculture, but also have a positive impact on the issue of promoting the informationization of agricultural products circulation.

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