Jilin Province Cold Chain Logistics Informationization & Low Carbonization Helps Rural Revitalization

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Abstract. As an important work of agricultural modernization, logistics informatization has been incorporated into the work of rural revitalization. At present, the development of rural low-carbon economy has been put on the agenda. In order to improve the rural ascension environment, a series of major decision-making arrangements such as "Internet+" action and mass entrepreneurial innovation are actively implemented to promote the deep integration of the Internet and modern agriculture and activate rural resources. The elements will enhance the driving force of agricultural development, fully stimulate the rural mass entrepreneurship, and innovate the vitality of the people, and accelerate the structural reform of the agricultural supply side. Jilin Province is a large agricultural province in China. It has the nation's leading agricultural planting base and processing capacity, and has many well-known brands and geographical indication products. With the continuous advancement of the national "Belt and Road" strategy and the deepening of the application of the Internet model in the field of agricultural logistics, the development of the cold chain logistics industry needs to provide a basis for agricultural industry marketing. In combination with the demand of Jilin Province in the development of cold chain logistics, Jilin Province agricultural product cold chain logistics optimization system should establish a multi-level cold chain logistics system structure, promote the development of cold chain logistics enterprises, strengthen the construction of overseas cold chain logistics parks, and establish multi-channel cold chain logistics fund support system.

1. Introduction

With the gradual advancement of China's "One Belt and One Road" development strategy and the continuous promotion of the Internet model in the field of agricultural logistics, it is inseparable from the development of the cold chain logistics industry and lays a good foundation for agricultural industry marketing [1]. Low-carbon economy is a new form of economic development. It can play an important role in promoting the resource allocation and industrial structure upgrading of agricultural cold chain logistics, ensuring the quality of agricultural products, improving the service quality and transportation of agricultural cold chain logistics enterprises. Efficiency, further enhance the competitive advantage of the cold chain logistics industry in agricultural products. With the increasing demand for various fresh agricultural products, China's cold chain agricultural products have developed rapidly, and at the same
time brought great pressure and challenges to the logistics and distribution industry. Cold chain logistics has been further emphasized. Compared with developed countries, China's agricultural product cold chain logistics is still in its infancy. Due to the poor process of cold chain logistics in China, the loss rate of agricultural products in the logistics of picking, transportation and storage is 25%-30%. "Low-carbon economy" refers to the economy with the lowest carbon emissions, eco-environmental cost and social and economic costs in the process of economic development. It is a highly sustainable economy that can improve the self-regulation of the Earth's ecosystem. How to make logistics from "large energy consumers" to "low carbon industry" has become a hot spot in the industry. As one of the most energy-consuming and carbon-emitting businesses in the logistics industry, how to make the cold chain adapt to the low-carbon requirements of economic development is a problem worthy of serious exploration.

2. Current Status and Problems of Cold Chain Logistics Process in Jilin Province

2.1. Analysis of current situation
China's agricultural products have not yet formed a cold chain logistics chain from the field to the table. The phenomenon of interruption of the logistics process is serious, and it is at a low level of long time, high consumption, low efficiency and poor efficiency. This is the main factor affecting the development of China's agricultural product cold chain logistics.

2.2. There is a problem

2.2.1. Enterprises in all links of the cold chain logistics system lack cooperation and cooperation awareness. At present, the business cooperation relationship of all links in China's cold chain logistics system is relatively loose, lacking the awareness and ability of cooperation. Most of the enterprises are independent, only concerned about the interests of the company, and do not cooperate from a system perspective to improve efficiency and the idea of benefit has led to the low efficiency and high cost of China's cold chain logistics system, which cannot effectively meet the growing quality and safety requirements of consumers.

2.2.2. There is an uneconomic phenomenon in the refrigerated transportation link. Almost all the distribution of agricultural products is the responsibility of the enterprise. The cold chain logistics system is still in the stage of "warehousing" and "transportation", which will inevitably lead to high cost

**Figure 1. Cold chain logistics process**
of cold chain logistics and low service level. Therefore, China's agricultural product cold chain logistics urgently needs third-party logistics enterprises that can provide "one-stop" logistics services for agricultural products cold chain nationwide, and outsource the original distribution services.

2.2.3. **Information network system is imperfect, cold chain logistics information is asymmetric.** The development of cold chain logistics of agricultural products involves multiple subjects, and there is a lack of effective correlation between them. Different entities lack effective communication and communication, which makes the cold chain logistics information asymmetrical or information collection. On the other hand, different logistics enterprises are independent. When building a network system, enterprises do not have network interfaces with each other. It is difficult to communicate, and it is difficult to realize the sharing of information resources, which further leads to waste of resources.

2.2.4. **The infrastructure of cold chain logistics is backward.** The domestic cold chain facilities and equipment are seriously inadequate. According to the statistics of the China Federation of Logistics and Purchasing, China's commercial cold (storage) warehouse covers an area of more than 7 million square meters, and the capacity of freezing (hidden) is 5 million tons. There are 40,000 vehicles, accounting for about 0.3% of freight cars, 0.8% to 1% in the United States, 2.5% to 2.8% in the UK, 2% to 3% in developed countries such as Germany, and 33.8 in the country. Among the 10,000 vehicles, there are only 6,970 refrigerated trucks, accounting for only 2%. The refrigerated transport volume accounts for only 25% of the perishable cargo volume, less than 1% of the total rail freight volume. At present, the annual loss rate of fruit, vegetables and other agricultural products in China's harvesting, storage and transportation is as high as 25% to 30% [2], and the loss is the highest in the world (equivalent to the basic nutritional needs of 200 million people). And soy products are shipped without the guarantee of a cold chain. The main reason for this situation is the uneven development and distribution of cold chain infrastructure, and there is no coordination and cooperation between enterprises, so it is impossible to provide low temperature protection.

3. **Cold chain logistics informationization and low carbonization research**

3.1. **User needs analysis**

The level of informationization of agricultural enterprises in China is uneven. Some well-known enterprises have established a sound enterprise information system and can manage the production lines of enterprises. On the contrary, most small and medium-sized enterprises are in the stage of survival and development, and their information resources are widespread. Less, business process is not clear [3]. In this case, for large enterprises with high degree of informatization, the system needs to open the necessary data interfaces for it, and integrate the corresponding functional modules by integration to maximize the use of existing resources and meet the requirements without additional burden. On the contrary, for small and medium-sized enterprises with weak informationization, the system needs to analyze and refine its common needs, provide them in the form of common components, and publish them in the form of cloud services, so that many enterprises can share the research and development costs. Minimize one-time investment and reduce the burden on the company.

3.2. **System function**

In terms of system functions, because the functions actually used by different users are different and independent, the system needs to provide multi-tenant data isolation, component selection, and component customization in addition to the business services of public goods cold chain logistics public services. Services such as providing differentiated services for different users while ensuring the security of system data interaction.
3.3. Universal component design

This paper analyzes the business of 12 enterprises engaged in the cold chain logistics business of fresh vegetables, fruits, meat and comprehensive agricultural products, refines common needs, and designs equipment adaptation, order management, cold storage monitoring, vehicle tracking, order playback, and distribution. Core common components such as optimization. Under the premise of no special requirements, enterprise users can quickly customize the application system applicable to their own services by selecting and adapting common components. The functions of each component are as follows: Device adaptation: Provide users with standard environment-aware device access channels. The user can access the environment-aware device that complies with the system data communication protocol, and complete the collection and transmission of the environmental information of the cold storage and transportation vehicle body.

Order management: Provide internal logistics order management services for enterprises without order information management system, realize intelligent matching scheduling of orders, vehicles, drivers and other information, replace the original paper order file management means of enterprises, and improve internal management efficiency [4]. Cold storage monitoring: Provide 24 h online monitoring function for cold storage environment for enterprises with cold storage temperature and humidity environment information monitoring requirements, and realize remote alarm with safety threshold. Vehicle tracking: combined with real-time sensory data to provide online tracking and vehicle environment monitoring services for on-going vehicles, combined with agricultural product safety storage and transportation model to achieve transportation process monitoring and early warning. Order replay: According to the order, combined with the electronic map to realize the whole process of fresh agricultural product distribution, provide the user with the distribution starting point, driving route, duration, and the whole process of the body temperature and humidity curve and extreme value.

Figure 2. Cold chain logistics platform structure
information. Distribution optimization: Based on the distribution line and order distribution, combined with real-time traffic network data, the company provides distribution optimization services to the driver in a variety of optimization methods such as the shortest time, the shortest path and the lowest cost, and improves the distribution efficiency.

![Diagram of system components](image)

**Figure 3. General component design**

4. **System application effects**
The system is applied to a cold chain ordering platform for agricultural products in Jilin Province. The enterprise has a high level of information management, and has established a complete internal enterprise resource planning (ERP) system and office automation (OA). The system, the company hopes to strengthen the management of the distribution process of its own distribution vehicles without repetitive work, and provide information support for the distribution drivers to improve their distribution efficiency.
The enterprise has used professional logistics vehicle management software, although it can meet the requirements of distribution supervision, but due to the firmware function, the vehicle and order configuration operations need to be carried out in the software, which is duplicated with the original OA system, which seriously increases the management technicians' workload. In order to meet the needs of enterprises, the cold chain logistics cloud service system realizes the data connection with the internal OA system of the enterprise. The distribution management personnel call the data interface to submit the vehicle and order related information to the cold chain logistics data center while using the OA system to assign the order. The customized vehicle fence component is integrated with the vehicle tracking component and released to the enterprise. The vehicle with abnormal driving status is alerted, and the function is not bundled, which specifically solves the enterprise's demand for online supervision of the delivery vehicle. As shown in Figure 4.

5. Enhance cold chain logistics informationization and low carbonization measures

5.1. Establish a multi-level cold chain logistics architecture
The spatial layout structure of the cold chain logistics system determines the efficiency and cost of the cold chain logistics. In the agricultural product export area, relying on the export agricultural product base, the central city (peripheral), key townships, production bases, and demonstration parks are arranged in a row, and the cold is fully promoted. Construction of chain logistics system; construction of comprehensive or professional cold chain storage facilities in the central city (surroundings), forming a cold chain warehousing and logistics center with strong radiation-driven capacity; laying out key areas for fruit and vegetable production, and building fresh and cold storage of fruits and vegetables.

5.2. Strengthening the construction of cold chain logistics information technology for agricultural products
In the development of cold chain logistics of agricultural products, no matter how the logistics service providers and demanders obtain timely and accurate logistics information, or the timeliness characteristics of agricultural products cold chain logistics, they put forward particularly stringent requirements for logistics information technology. In view of this, it is necessary to strengthen the construction of cold chain logistics information technology for agricultural products. First of all, relevant government departments should give strong policy guidance for the construction of agricultural cold chain logistics information technology. For example, through the formulation of tax incentives, logistics
companies are encouraged to develop cold chain logistics information technology, or for logistics enterprises that use cold chain logistics information technology, the government grants certain financial subsidies; secondly, effective use of existing information technologies should be carried out. Such as GPS technology, RFID technology, EDI technology, etc., to increase the real-time dynamic supervision of the comprehensive links of agricultural products cold chain logistics, promote the refinement of the comprehensive links of agricultural products cold chain logistics, and achieve clear rights and responsibilities [5]; Finally, build The scientific and complete computer management information system and electronic exchange system carry out real-time dynamic monitoring of the refrigerated truck transportation link, simplifying the transportation plan, approval and deployment of refrigerated vehicles as much as possible, and promoting the comprehensive sharing of information and data of all enterprises.

5.3. Strengthening the standardization of infrastructure and cold chain logistics

In order to achieve the coordination of the entire cold chain logistics system, facility equipment coordination is the primary condition [6]. In view of the infrastructure in China's cold chain logistics system, it is imperative to renovate and update existing refrigeration and refrigeration facilities on a large scale. At the same time, a standardized system for cold chain logistics systems is established to standardize facilities, systems, and technical standards. The cold chain logistics system achieves a synergistic basis.

6. Conclusion

Jilin Province is a large agricultural province in China. It has the nation's leading agricultural planting base and processing capacity, and has many well-known brands and geographical indication products. With the national "Belt and Road" strategy and the continuous promotion of the rural revitalization strategy and the deepening of the application of the Internet model in the field of agricultural logistics, the development of the cold chain logistics industry needs to provide the basis for agricultural industry marketing. In combination with the demand of Jilin Province in the development of cold chain logistics, Jilin Province agricultural product cold chain logistics optimization system should establish a multi-level cold chain logistics system structure, promote the development of cold chain logistics enterprises, strengthen the construction of overseas cold chain logistics parks, and establish multi-channel cold chain logistics funding support.

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