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Research on Cold Chain Logistics Based on Environmentally Friendly Rural One, Two and Three Industry Integration Development

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Abstract. In recent years, the state has supported the "three rural" reforms at a positive price, and the rural economic development mode has also undergone earth-shaking changes. With the transformation of the national economic structure and integration, there has been a convergence of agriculture and the secondary and tertiary industries. Momentum. New industries such as leisure agriculture, sightseeing agriculture, agricultural products processing industry, direct sales of agricultural products, and e-commerce platforms for agricultural products have promoted the development of high-end value-added agriculture and promoted the upgrading of agricultural production chains and value chains. To this end, the cold chain logistics based on agricultural products is accompanied by the rapid development of agriculture, how to complete the establishment of a cold chain logistics system for the integration of primary, secondary and tertiary industries in rural areas in the direction of low-carbon, green and environment-friendly national economic development. Perfecting and realizing the maximization of resources and improving the quality and efficiency of cold chain services for agricultural products are issues that need to be considered at present.

1. Introduction

As early as 2016, the General Office of the State Council issued the "Guiding Opinions on Promoting the Integration and Development of primary, secondary and tertiary industries in rural areas", pointing out that the promotion of the integration of rural, secondary, and tertiary industries should adhere to and improve the basic rural management system and strictly observe the red line of farmland protection. Improve the comprehensive agricultural production capacity and ensure national food security. It gives detailed suggestions on the integration mode of agricultural industry, the main body of industrial integration, the mechanism of interest linkage, and the mechanism of integration and promotion. It emphasizes that in the process of industrial integration, leading enterprises and farmers form an equal and mutually beneficial interest link to ensure the sharing of processing. The gains from sales and sales, as well as the content that each department should be responsible for in the process of rural integration.

In recent years, the rapid development of China's rural economy has directly boosted consumer demand for agricultural products such as fruits, meat and aquatic products, and promoted the development of cold chain logistics. However, there are some problems in the cold chain logistics industry, which cause the products to deteriorate and damage during transportation, resulting in serious



waste. In the "Thirteenth Five-Year Plan" period, China should focus on solving key problems such as agricultural and sideline product standardization, logistics standardization, and cold chain storage construction, and establish a cold chain logistics of agricultural products based on green ecology and environmental protection, and promote the integration of primary, secondary and tertiary industries in rural areas. Development and economic efficiency.

2. The basic model of rural integration of the first, second and third industries

2.1. Agricultural industry chain extension type integration

Relying on leading enterprises, farmers' cooperatives and other economic organizations, the cultivation and processing of a certain agricultural product will be extended to the upstream and downstream of the industrial chain to achieve the purpose of improving resource utilization efficiency and extending the industrial value chain. Under this model, forward integration realizes integration with agricultural materials supply, breeding, agriculture-related services, etc., and the integration of backward integration and intensive processing, logistics and sales [1].

2.2. Three-industry clustering cluster fusion

Supported by the advantage and characteristic agricultural product breeding base, the agriculture-related business divisions work together, gather and develop, and the rural one-two industry network links the format. It includes the agglomeration of different business entities in different industries, as well as the agglomeration of different business entities in the same industry, and the integration of different industries within the same business entity. In terms of presentation, "one village, one product" professional townships, villages, etc. belong to this model.

2.3. Agricultural and rural function expansion and integration

Modern industrial civilization has increased people's income, but the city's crowdedness and awkwardness have aroused people's psychological needs for rural recreation and entertainment. The social, economic, ecological and cultural functions of agriculture have gradually emerged. Leisure agriculture and rural tourism are born in response to this demand, forming a development pattern of three industries in the countryside, "I am in you." This kind of integration integrates natural scenery, customs culture, agricultural production with tourism, leisure, entertainment, science and education, and realizes the function expansion of agriculture and rural areas [2].

2.4. Kinds of recycling economy-led integration of circular economy

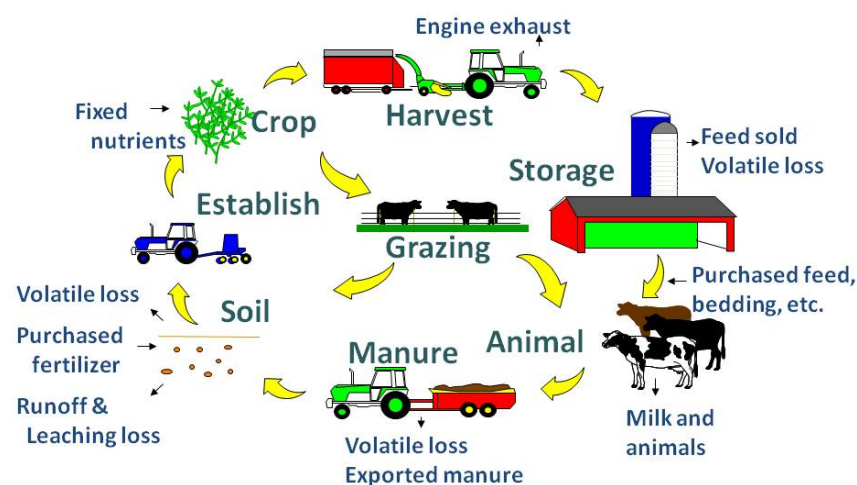


Figure 1. Reconstruction of circular economy dominated by agriculture restructuring

In accordance with the concept of circular economy, following the principles of ecological chain and biological chain, industrial restructuring and integration between planting, aquaculture and animal husbandry has formed a new type of industry such as planting and compounding and ecological agriculture, which has effectively promoted the processing or sales of agricultural products.

3. Analysis of Cold Chain Logistics Capability Requirements for the Coordinated Development of Primary, secondary and tertiary industries in rural areas

Table 1. Indicator system for capacity requirements of cold chain logistics service providers in rural industrial integration

Primary indicator	Secondary indicators	Description
Warehousing capacity	Cold storage coverage ratio	The distribution of cold storage in the country
	Cold storage utilization	Used to describe the area of the cold storage and its use, reflecting the level of cold storage utilization
	Cold storage inventory turnover rate	It is used to measure the speed of the cold collection in the cold storage. Under normal circumstances, the smaller the cold chain food inventory turnover rate, the higher the efficiency of business operations, and the increase in the circulation of cold collections.
Transportation and distribution capabilities	Marine refrigerated transport capacity	Reflecting the extent to which cold chain logistics suppliers have refrigerated transport equipment that meets market demand and quality of cold collections
	Air refrigerated transport capacity	
	Onshore refrigerated transport capacity	
Informatization level	Cold chain coverage ratio	Refers to the time ratio of the cold collection at the required low temperature to the entire cold chain during refrigerated transport.
	Cold chain information technology usage	Description
	Cold chain information sharing	The distribution of cold storage in the country
Service capabilities	Delivery accuracy	Used to describe the area of the cold storage and its use, reflecting the level of cold storage utilization
	customer satisfaction	It is used to measure the speed of the cold collection in the cold storage. Under normal circumstances, the smaller the cold chain food inventory turnover rate, the higher the efficiency of business operations, and the increase in the circulation of cold collections.
	Cold collection safety accident rate	Reflecting the extent to which cold chain logistics suppliers have refrigerated transport equipment that meets market demand and quality of cold collections

The development of primary, secondary and tertiary industries in rural areas and cold chain logistics service providers complement each other and promote each other. On the one hand, due to the characteristics of agricultural products, shelf life and other issues, the logistics requirements are relatively high, the cold chain supporting, timely delivery and smooth supply chain, are directly related to the success or failure of the transaction. On the other hand, due to the inconsistent length of the cold

chain logistics cycle, the unstable delivery time and the fluctuation of the receiving time all affect the quality of agricultural products, and also increase the difficulty of the cold chain logistics service providers [3-4]. Therefore, cold chain logistics provides the necessary guarantee for the development of primary, secondary and tertiary industries in rural areas, and the integration and development of rural industries has also stimulated the rapid improvement of cold chain logistics itself.

4. Current factors restricting the development of cold chain logistics

The quality of cold chain logistics services and transportation is not up to standard, and the interest factors are abandoned. The main reason is the lack of perfect systems, standards and specifications to ensure the quality of cold chain logistics services and transportation. The lack of reliable service providers in the cold chain logistics industry is cold chain logistics. The lack of marketization, lack of third-party logistics; the cost of cold chain logistics is too high and cold chain logistics is often in a broken state because the cold chain logistics industry lacks overall integration and planning, there is no reasonable allocation Resources, to achieve information sharing to achieve cost reduction. In summary, the current problems of China's cold chain logistics can be summarized into the following four aspects.

4.1. The cold chain logistics system is not perfect, and relevant standards and specifications need to be improved and implemented

The lack of cold chain logistics system makes the relevant specifications and standards of cold chain logistics have problems to be perfected or implemented insufficiently. This leads to a large number of transportation vehicles and cold storage facilities that do not meet the requirements of cold chain logistics technical standards. In the chain logistics industry, related companies are reluctant to adopt costly cold chain logistics^[5]. This is a matter of interest and involves all parties in the value chain. The government has also neglected the formulation and implementation of the cold chain rules. Although there are relevant regulations, the government will pay more attention to the production areas of the products, health issues, etc., rather than the quality of cold chain logistics, which makes the cold chain logistics system, standards and other insufficiency.

4.2. Cold chain logistics and agricultural products marketization is not high

From the perspective of logistics service providers that can provide cold chain logistics equipment, only 28% of agricultural cold chain logistics service providers can provide four types of cold chain logistics equipment. Among them, the cold chain logistics service providers of agricultural products that can provide four types of cold chain logistics equipment in the self-operated mode and the outsourcing mode account for 16% and 10% respectively. It can be seen that the logistics service providers who can provide complete cold chain logistics services for agricultural products e-commerce enterprises are relatively scarce.

4.3. Insufficient construction of hardware facilities in the cold chain logistics industry

China's cold chain logistics industry is small in scale, limited in technology, and lack of uniform standards in the industry, resulting in frequent chaos is the current development status of China's cold chain logistics industry. After combing, we can sum up the surface causes of the chaos in the cold chain logistics industry as follows. The quality of cold chain logistics services is not up to standard; the cold chain logistics industry lacks reliable service providers; the cost of cold chain logistics remains high; the infrastructure of transportation and storage involved in cold chain logistics is insufficient; cold chain logistics is often in a broken state.

4.4. Lack of macro-level resource integration and development planning for the cold chain logistics industry

As far as the current situation of agriculture, rural areas and farmers is concerned, the way of Internet + cold chain logistics is an effective way to promote agricultural products to all parts of the country and the world. At present, there is a lack of integration of industry resources, and there is no clear

development plan. The vehicle resources and supply chain network resources of the enterprise contain closed customer data resources. The open cold chain logistics platform has not yet been formed to realize resource sharing and jointly promote cold. Progress in the chain logistics industry.

5. Suggestions for the development of cold chain logistics based on the integration of Primary, secondary and tertiary industries in rural areas

5.1. Establish an information sharing and exchange platform for agricultural products industry and cold chain logistics

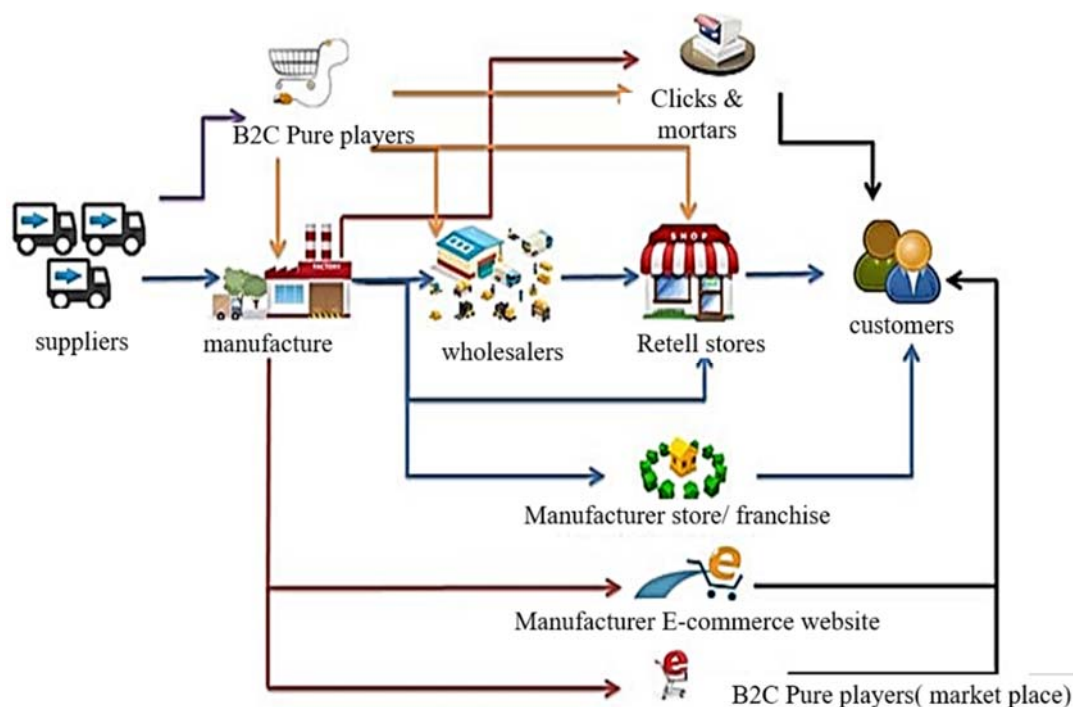


Figure 2. Cold storage information sharing of agricultural products on the Internet information platform

The development process based on "Internet + Cold Chain Logistics" is to apply the modern Internet technologies such as mobile internet, cloud computing, big data, and Internet of Things to the cold chain logistics industry to promote the transformation and upgrading of cold chain logistics. Based on the "Internet +" technology, enterprises can use cloud computing to build enterprise-level data centers and collaborative platforms, and collect transaction information, cargo movement information, and vehicle information on the platform. Through data collection and data analysis, Supply chain networks, vehicle resources, cold storage and facility resources, and cargo resources are optimized, planned, and matched to improve the accuracy of planning and demand forecasting through collaboration.

5.2. Perfecting the environment of the cold chain system for the purpose of promoting agricultural development

First, the government should increase macroeconomic policy support for cross-border agricultural products e-commerce and cold chain logistics, and implement it. Second, government departments should jointly develop industry standards and technical specifications for cross-border agricultural products e-commerce and cold chain logistics in conjunction with industry associations and relevant departments. Finally, in terms of taxation, we will continue to give preferential policies to agricultural e-commerce and cold-chain logistics service providers, increase investment in land and capital, and

continue to promote the implementation scope and implementation of “green channels” for fresh agricultural products [6].

5.3. Through the establishment of agricultural cooperative organizations to achieve integration of production and marketing

Farmers' associations play an important role in agricultural product logistics, and China can also form agricultural cooperative organizations according to their own conditions. On one hand, agricultural cooperative organizations can exchange information on domestic and foreign agricultural products with farmers, urge farmers to produce better products, and use advanced technology and environmentally friendly packaging to enhance the international competitiveness of China's agricultural products. On the other hand, the agricultural cooperative organization organizes the agricultural products produced by the scattered farmers, and after packaging, directly transports them to the consumption destinations and even the international market, and realizes the integration of production and sales, thereby reducing unnecessary intermediate links and thus reducing the circulation losses. To achieve green and efficient production.

5.4. Increase investment in cold chain logistics infrastructure construction and encourage technological innovation

Further promote the development and update of cold chain logistics equipment. In view of the current domestic situation, in the coming period, the cold chain logistics industry will continue to improve and update the existing cold chain logistics equipment and equipment, and develop more rapid refrigerated trucks for the refrigeration and express transportation business. The temperature control range is wide, flexible and suitable. Small refrigerated trucks transported in small quantities, as well as equipment such as refrigerated containers that can accommodate diversification of goods and long-distance transportation. On the other hand, cold chain logistics enterprises should actively promote the reform and innovation of cold chain technology and increase research and development efforts. Such as the cold storage preservation technology, the application of Internet of Things technology, etc., while increasing the standardization system construction and information construction, in order to provide quality products and services to meet the requirements of cross-border agricultural products e-commerce for cold chain logistics service providers [7].

6. Conclusion

In order to realize the green development of primary, secondary and tertiary industries in rural areas, it is necessary to improve the overall development level of China's cold chain logistics. It is necessary to comprehensively improve the current cold chain logistics. It is necessary not only to establish a complete cold chain logistics system, but also to continuously improve the cold chain. The degree of marketization of logistics must rely on continuous innovation and development, accelerate the integration of agricultural industry, build an "Internet + cold chain logistics" platform, use data analysis for resource integration and overall planning, optimize allocation, reduce the cost of cold chain logistics, and promote The cold chain logistics realizes a virtuous circle and promotes the transformation and upgrading of the cold chain logistics industry, thereby improving the efficiency and quality of cold chain logistics and broadening the road for agricultural development.

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References

- [1] Chen Shibo, Li Wei, Chen Yaping. Thoughts on Promoting the Development of Rural First, Second and Third Industries in the New Era. Agricultural Economics and Management, Vol.

- 1 (2018) No.15, p. 103 - 105.
- [2] Lin Yuan. The top-level design of primary, secondary and tertiary industries in rural areas has been released. More than 100,000 leading enterprises will receive policy red envelopes. Rural. Agriculture. Farmers (B version), Vol. 12 (2016) No.1, p. 103 - 105.
- [3] Lu Wenming, Du Yiming. A Rational Analysis of the Integration and Development of Rural Industry and Reflections on Shanghai Practice. Shanghai Rural Economy, Vol. 11 (2015) No.38, p. 17 - 22.
- [4] Huang Chengzhou, Xie Ruhe. The Development and Countermeasures of China's Food Cold Chain Logistics. Storage and Transportation of Commodities, Vol. 4 (2007) No.29, p. 37 - 39.
- [5] Lan Hongjie. Study on Collaborative Objects and Process of Food Cold Chain Logistics System. China Circulation Economy, Vol. 2 (2009) No.23, p. 20 - 23.
- [6] He Jing, Cheng Wei, Zong Chuanhong. Research on the Status Quo and Countermeasures of China's Food Cold Chain Logistics Development. Shopping Modernization, Vol. 3 (2006) No.18, p.115 - 116.
- [7] Wang Xuhui, Zhang Qilin. The Construction of Cold Chain Logistics System of Fresh Agricultural Products Based on Internet of Things: Framework, Mechanism and Path. Journal of Nanjing Agricultural University (Social Science Edition), Vol. 1 (2016) No.20, p. 31 - 41.