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Analysis of the Low-Carbon Model Driven Layout of Agricultural Logistics in Urban and Rural Markets

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ABSTRACT

With the increasingly prominent global climate change and resource environment issues, developing a low-carbon economy has become a global consensus. As an important link connecting urban and rural markets, developing agricultural logistics' low-carbon model is significant for promoting rural economic development, optimizing urban and rural industrial structure, and reducing carbon emissions. This article will analyze the low-carbon model-driven layout of agricultural logistics in urban and rural markets and explore its development status, problems, and future development trends. Agricultural logistics refers to the comprehensive management of various aspects of agricultural production, including material flow, information flow, and capital flow. Under the low-carbon model-driven layout of urban and rural markets, agricultural logistics not only undertakes the transportation task of agricultural supplies and products but also involves important links such as the transmission of agricultural information and the promotion of agricultural technology.

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1. Introduction

Agricultural logistics, product production and sales process of logistics activities together constitute agricultural logistics and are similar to commodity logistics; agricultural logistics can be divided into three basic modes: supply logistics, production logistics and sales logistics [1]. The government's official document on the low-carbon economy was first seen in the UK energy white paper "The Future of our Energy: creating a low-carbon Economy," and the UK, as the forerunner of the first industrial revolution, was first aware of the threat of energy security and climate change. Many scholars have supplemented the concept of low-carbon economy in the subsequent development of social environment research and defined its core content, that is, institutional innovation and structural

design oriented to reduce the carbon emissions of each link in the realisation of product value and gradually build a low carbon emission capacity of the industrial structure of the economic system [2]. Under the environment of low carbon, urban and rural trade circulation requires the free flow of production factors and the optimization of resource allocation; low carbon economy in the form of circulation, production, logistics, distribution, and the ultimate consumer sectors constitute a low-carbon building [3]. The abnormal development that "expensive vegetable hurts farmers" and "cheap vegetable hurts farmers" in China's urban and rural farmers' markets not only reflects the external market environment in which the increase in output of agricultural products isn't synchronized with the increase in income, in fact, it but also includes the unstable situation of urban vegetable price while the high price fluctuation of agricultural products [4]. The acceleration of the integration of urban and rural areas in China provides a good environment for the development of two-way trade; as an important link between supply and demand and the connection between urban and rural areas, the construction of the logistics system is directly related to the development of two-way trade circulation. In the era of low carbon economy, agricultural logistics must be based on the current situation of urban and rural trade circulation development to make the corresponding reform and promote the adjustment and development of rural economic structure. Therefore, it is of great practical significance and application value to construct an effective agricultural logistics mode of urban and rural trade circulation [5].

2. Start of the Art

2.1. Analysis of the Current Operation Mode of Urban and Rural Trade Logistics in China

Generally speaking, according to the division of the main body of the operation, the operation of China's urban and rural trade logistics can be divided into four basic models, the specific situation as shown in Table 1.

Pattern	Concrete content
The main logistics operation mode of agricultural products wholesale center	The main logistics operation mode of the agricultural products wholesale center is in the center of agricultural logistics system, which not only relies mainly on wholesale, but also has retail, market management, logistics distribution, tax and business and product monitoring and another market capacity; the market demand and supply of agricultural products can be basically reflected, the unilateral profit of farm wholesaler due to the bilateral information asymmetry becomes the normal phenomenon.
Agricultural products logistics enterprise logistics operation mode	The leading enterprise of agricultural products logistics is the core of logistics operation; logistics enterprises indirectly sell agricultural products, and the organic combination of the final consumption of urban residents and the production of rural residents is the concentrated embodiment of specialization in the market development to a certain stage; prominent and clear organizational structure is a good way for farmers, enterprises and agricultural wholesalers to develop their own competitive advantage
The main logistics operation mode of agricultural products processing enterprises	Regional agricultural products processing enterprises as a logistics center, the individual farmers, agrarian market makers, and retailers are unified; there isn't a wide range of popularization, which is relatively narrow, and with the deep processing of agricultural products as the main, primary agricultural products with small processing potential is involved less.
The main logistics operation mode of agricultural products circulation enterprise	Most of them are based on large-scale farmers, agricultural production bases, or rural specialized cooperatives; individual farmers, processing enterprises, and production bases usually cater to the enterprise-scale cooperation pattern through collectivization, taking the initiative to adapt to the circulation of agricultural products in many aspects of the high-standard requirements, thereby achieving high efficiency and low risk.

Table 1. Urban and rural trade logistics operation mode

2.2 Existing Problems of Agricultural Logistics Model

As shown in table 2, it is the existing problems in China's current agricultural logistics model.

Question	Specific performance
Lack of independent logistics operation mechanism	First of all, China lacks circulation enterprises with independent logistics operations and management of production, processing, and wholesale; only a small number of enterprises in the construction of agricultural logistics integration are relatively perfect. In addition, China's agricultural intermediary organization is still in its infancy, the development is relatively backward, the effective legal protection mechanism is lacking, and logistics registration and management can't meet the needs of the development of the agricultural market.
Low level of agricultural logistics information	China's agricultural products circulation information capacity is relatively weak; there is no authoritative professional platform to publish information on agricultural production and circulation, most of the agricultural products in the circulation market have no corresponding information equipment foundation, and accurate and authoritative agricultural information can't be provided for farmers, sales of agricultural products often have the disjointed phenomenon. In addition, the sharing of agricultural information resources is poor; only 5% of China's wholesale is in the market network.
Low ecological benefit of agricultural logistics	At present, the logistics industry in our country has the phenomenon of excessive energy consumption and the ecological environment pollution caused by the operation of rural logistics enterprises, which are contrary to the requirements of the development of the low-carbon economy. The current extensive agricultural logistics development mode has not only caused the waste of resources but also caused environmental problems such as waste gas pollution and noise pollution, so scale expansion of agricultural products enterprises faces multiple barriers.

Table 2. Existing problems of agricultural logistics model

3. Methodology

3.1. The Principle of Low Carbon Economy in Urban and Rural Trade Logistics

The first is the low-carbon principle. The low carbon construction in the development of agricultural logistics is mainly to control, integrate and share the logistics resources in the rational planning, coordination, and overall planning of agricultural products flow to improve the efficiency of logistics operation, avoid duplication of workload, reduce the carbon emissions of logistics delivery, and achieve the goal of green economy to the maximum extent [6]. To this end, an integrated network service system needs to be built to meet the rapid development of farmers' production and sales needs; service content can be transformed from single storage and transport to the integration of science and technology, management and information technology as one of the integrated logistics services to radiate the whole country and support international logistics, only under the condition of perfect low carbon, the circulation of agricultural products and the integrated service system of urban and rural logistics can effectively regulate the circulation of agricultural products and agricultural products to achieve the healthy development of urban and rural trade.

The second is the economic principle. As shown in Table 3, China's current urban and rural trade logistics model is decentralized and fragmented, resource concentration isn't high and other defects, scale economic effect is difficult to reach, and the cost is high. According to statistics, in 2012, China's social material circulation amounted to 13.61 trillion Yuan, of which the total logistics of agricultural products reached 4.37 trillion. Each year, the cost of agricultural

products circulation growth reached two digits. While emphasizing low carbon, the principle of economy is also emphasized, which means the agricultural logistics network planning, the source control of agricultural logistics and the stability and continuity of the whole maintenance process [7]. To realize the economies of scale of urban and rural trade logistics, it is necessary to integrate the agricultural resources and the distribution network, communicate the urban and rural goods and services, and build a smooth flow of factor resources; scale management is taken as a long-term development strategy to protect the ecological environment. Therefore, the sustainable development of agricultural economy, which is of great benefit, low cost, green health and resource integration, is realized.

	Unit	current period	Year-on-year growth rate (%)
The first is the total cost of social logistics	Billion Yuan	71985	16.8
Transportation cost	Billion Yuan	39341	14.7
Storage cost	Billion Yuan	25123	21.2
Management expenses	Billion Yuan	8786	19.8
The second is the added value of logistics	Billion Yuan	28510	12.5
Communications and transportation industry	Billion Yuan	20976	12.4
Warehousing industry	Billion Yuan	2231	14.1
Postal industry	Billion Yuan	611	16.2
The third is the total social logistics	Billion Yuan	1361010	16.0
Total logistics of agricultural products	Billion Yuan	43720	11.7
Total industrial logistics	Billion Yuan	1318022	15.6
Total import cargo logistics	Billion Yuan	966585	23.7
Total renewable resources logistics	Billion Yuan	4760	42.2
Total logistics of units and residents	Billion Yuan	2210	16.8

Table 3. Statistical data on the logistics industry in 2012

3.2. The Construction of Logistics Mode of Urban and Rural Two-Way Trade Circulation System

The main body of the urban and rural commercial goods and materials circulation system takes the core enterprise as the leading for the construction of the push-pull two-way urban and rural logistics model; the core idea is supply chain management technology, the market is as the guidance, and the agricultural product circulation and the processing enterprise, the farmer and the citizen satisfaction, the government and the folk interest coexist are as the physical distribution standard, that is the construction of new agricultural industrialization logistics [8]. The system of urban and rural commercial goods circulation takes enterprises as the main body and crosses the industry, agriculture, and business, the main body of the

connection is diversification, and the direct and indirect interests are intertwined, which is a comprehensive industrial chain system to co-ordinate the overall planning of agricultural products, agricultural information and agricultural funds, technical support, competition and cooperation [9].

Government-led urban and rural trade material circulation system focuses on constructing agricultural logistics nodes. It strengthens the horizontal and vertical links between nodes, the logistics organization model shown in Figure 1. At present, one of the important characteristics of agricultural logistics is the grid system, which determines the circulation efficiency and cost-sharing of agricultural products. It is necessary to construct the modern urban and rural commercial material circulation system from the overall situation of urban and rural areas to promote the progress of the agricultural economy; based on the policy and the national agricultural development strategy, modern agricultural logistics is developed, layout emphasis, mastery of structure, regional division, multi optimization and integration of urban and rural areas achieve integration of industry and agriculture [10]. In addition, the government should rely on administrative power to establish agricultural logistics node low-carbon standards and avoid duplication of agricultural value chain; the relationship between the government and the market lies in the sixteen-word policy of "government guidance, market reference, free economy, consultation and win-win".

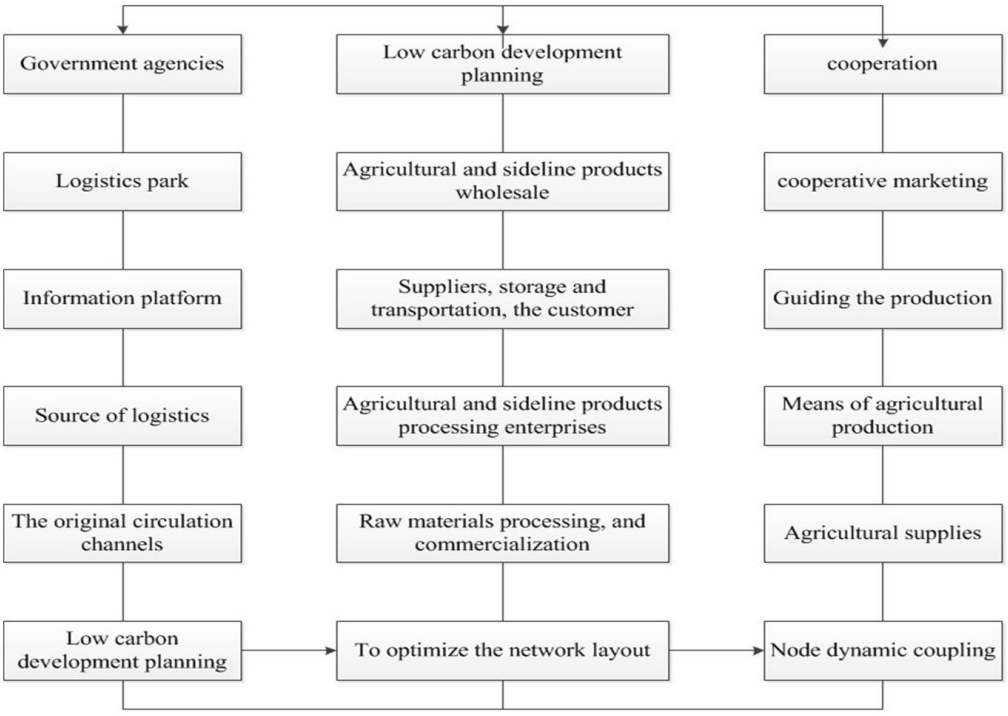

Figure 1. Government-led urban and rural trade goods and materials circulation system

3.3. The Characteristics of the Main Body of Urban and Rural Commercial Goods and Materials Circulation System

The satisfaction of farmers and citizens is the driving force for the construction of urban and rural logistics systems. Farmers and citizens are in the upper and lower reaches of the value chain of the agricultural industry, which belong to two interrelated and differentiated markets; the former is the driving force of the construction of the bi-directional logistics system under the low carbon target of farmers' satisfaction, the thrust of the target is agricultural commodities and agricultural resources, the individual farmers or organizations are as driving forces; the latter takes the satisfaction of the public as the goal, which pulls the public basket project to solve the problem of agricultural products from the field into thousands of households, such a push and a pull form a cooperative operation mechanism [11].

The modern logistics model extends to the development of rural areas. The low-carbon two-way urban and rural logistics as a skeleton of the new urban and rural trade circulation system will link individual and agricultural markets to achieve production and marketing integration in the market economy; government, enterprises, citizens, and farmers can share the production and marketing integration results of low-carbon logistics system, which are brought by the low-cost and high-efficiency network, supply chain enterprise node is as a "market maker", the way of urban and rural exchange of agricultural and sideline products and rural supplies, rural commodities plays well the role in "urban and rural material intermediary".

The main body of urban and rural commercial goods and materials circulation system isn't a static development system, the dynamic development of urban and rural trade is a prominent feature of the circulation system [12]. In the "rural-city" low-carbon logistics value chain system, the dynamic competition and cooperation between the members are maintained to avoid the problem of lack of vitality and inefficiency brought by the traditional and mechanical logistics supply chain. The low carbon urban and rural trade circulation is also being extended in the product and the upper and lower reaches and homogeneous products, which is the division of agricultural products, large-scale industrial management and industrial chain development, and the development of new sources of value.

The full play of the role of the enterprise platform makes the economic and low carbon of urban and rural trade goods circulation get all-embracing; the enterprise platform plays a role in both internal and external logistics networks, internal logistics network achieves the management of node information sharing, external logistics network makes the value of agricultural products achieve smooth channels, the information that is set up between the internal and external nodes fully flow, the logistics efficiency of the logistics network acts according to circumstances instead of blindly copying the logistics mode, the benefits of internal and external network construction make the volume of urban and rural trade market is enlarged several times.

Purchase storage and transportation centre of agricultural grain systems are constructed and developed. At present, with the development of the economy in our country, the quality and operating environment of the rural grain purchasing, storage, and transportation centers are difficult to meet the development requirements of the modern logistics industry. Therefore, to transform the grain purchase and sale centre into a modern logistics distribution centre, it is necessary to strengthen hardware construction and software development. In terms of hardware facilities, and speed up the construction of rural grain logistics facilities, the grain storage facilities, such as shallow silos, which are built, should be equipped with technical facilities in time [13]. In software development, the purchase and sale of storage and transportation center should focus on the introduction of advanced agricultural product logistics technology and actively study and learn from foreign advanced management experience, such as in the field of grain storage, the use of mature physics and ecological grain storage method, diatomite insecticide and gas controlled grain storage method.

3.4. The Characteristics of Government-Oriented Urban and Rural Commodity Circulation System

Agricultural logistics attraction is based on existing distribution channels, under the guidance of the government, the multi-level regional logistics park planning within the unified plan, agricultural products and logistics base should be combined with industrial, small commodities, service industry logistics base, at the present stage, there are some problems such as poor infrastructure, poor ability of transfer of transport vehicles and loose degree of connection between regions, the construction of large scale network logistics system based on the objective requirements of the modern urban and rural circulation system and aimed to solve the problem that the circulation of factors of urban and rural resources hasn't been smooth, and has yet to be strengthened, coordination of transport capacity and the construction of circulation infrastructure are the focuses of the next phase [14].

The development of agricultural cooperative economy is the focus of constructing specialized cooperatives. The ultimate goal of low-carbon urban and rural logistics network construction is to provide agricultural materials, the common participation of network members is

indispensable, the work among the members is complementary, and the producers of agricultural products, processing enterprises and logistics enterprises interact with each other, and also have their own supply chain. The practice has proved that under the household contract responsibility system, the scale economy of agricultural cooperatives can integrate these value chain that lacks coordination, farm cooperation purchases and agricultural material and markets agricultural products, the operation frequency of logistics system and the probability of one-way event are shortened, low carbon trade circulation in the source is curbed.

Low-carbon urban and rural trade circulation systems depend on the public agricultural information platform. Government public information platforms can be timely allocation of rural goods bearing the city, achieve real-time tracking of agricultural supply, standardized operation mode of information collection and transmission, business management, query, technical cooperation, agricultural consulting can also be integrated rendering, unified government credibility platform achieves a little more than a few services, intermediate link cost is saved, operating cost of collective amortization platform also achieves the effect of reducing the burden on farmers, the enthusiasm of farmers to participate in urban and rural logistics platform is also improved.

The government-led urban and rural logistics network is a value-added logistics system which is different from the traditional farmers' spontaneous logistics model; the system has the characteristics of logistics resource sharing, quick response, the introduction of market mechanism and the lowest cost of search, decentralized agricultural resources are integrated by information technology, the resources system after the integration, in turn, promotes the rationality and the degree of transparency and openness of the layout of urban and rural trade logistics, which is an important embodiment of the transformation of government functions in the logistics industry, the macro-control system of urban and rural trade plays an important role in ensuring the market regulation of agricultural products and agricultural means of production.

The policy orientation of the national level is the basis of the legal status of agricultural logistics [15]. At present, China's leading enterprises engaged in agricultural logistics are tiny; in order to develop agricultural logistics, the country must introduce the relevant laws and regulations, regulate the organizational behaviour of rural logistics, and encourage the development of urban and rural logistics. Under normal circumstances, policy work focuses on establishing an agricultural logistics system. Research and development of agricultural logistics and supply chain management system planning and implementation are necessary conditions to promote the healthy and rapid development of leading enterprises in farming logistics.

4. Result Analysis and Discussion

To verify the feasibility of the system of urban and rural commodity circulation, we select the three basic counties in the same province, among which A city adopts the traditional urban and rural commercial material circulation system, B city is the pilot of the enterprise primary urban and rural commerce material Circulation system, C city is as the pilot of city government-led urban and rural commercial material circulation system, the actual effect of the three logistics systems is compared from several aspects, as shown in figure 2, data of A city is as a benchmark, marked 1, data of city B and C is obtained based on the conversion.

According to the above, it can be found that the two kinds of agricultural logistics systems in urban and rural areas are much higher than the traditional logistics system, which means that the two new urban and rural commodity circulation systems are feasible and advanced. At the same time, the government-led system is higher than the system which takes enterprise as the main body in many aspects, to a certain extent, which proves that the government plays a very important role in the promotion of the agricultural logistics system in the low carbon environment. Therefore, the important role of the enterprise and the government should be fully played.

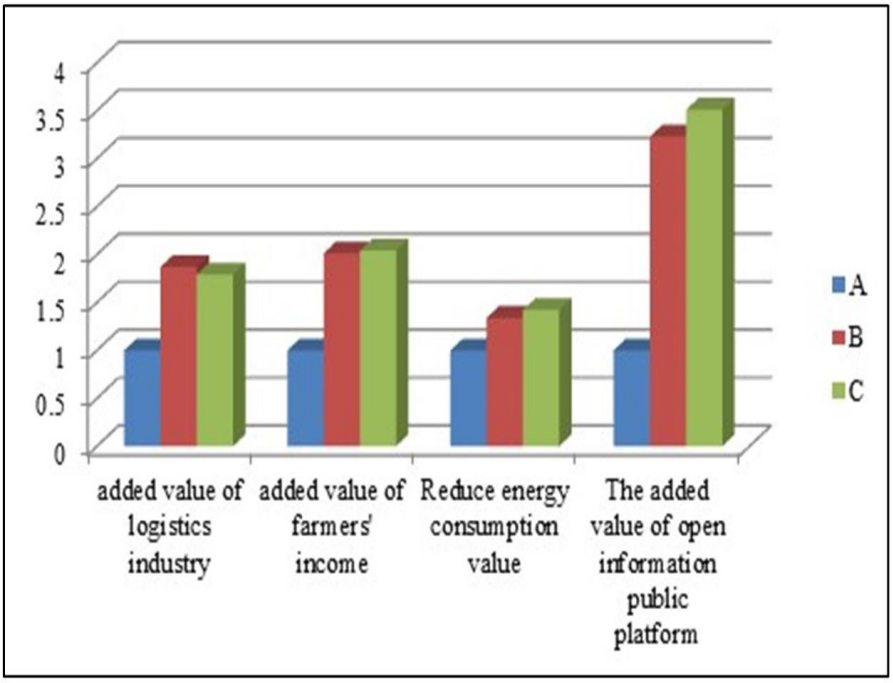

Figure 2. Comparison of the results of the pilot

5. Conclusions

The low-carbon economy is the development value established by countries worldwide based on environmental protection factors. As one of the world's major developing countries, the establishment of China's low carbon values is indispensable in the process of economic development; the urban and rural economic development strategy of the next stage is to revitalize the urban and rural trade and make the city drives countryside, countryside promotes the city". In the material circulation between urban and rural areas, how to simplify and optimize the development of a low-carbon model is the urgent need for sustainable development of the agricultural economy, agricultural enterprises, individual farmers, logistics units and government decision-making departments as the main body of rural trade, should pay close attention to achieve the smooth operation and the green and healthy development of China's agricultural economy.

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