

Analysis on the Development Situation, Challenges and Countermeasure of Cold Chain Logistics in China

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Abstract: In the process of economic development and operation in China, cold chain logistics plays a huge role. Running through agriculture, industry and service sectors, cold chain logistics is an important industry for China to win the critical battle against poverty and raise consumption level, and it is also the key enterprises paid attention to by Chinese policies. Regarding the construction of dual-cycle development pattern and the further development of logistics industry, cold chain logistics plays a pivotal role and is an important basis for the construction of major route, regional distribution centers and terminal distribution nodes, so China must continuously strengthen the development of cold chain logistics to achieve further development in economy. But in current society, cold chain logistics still has many demerits. In order to reinforce relevant construction and drive economic development, this paper analyzed the development situation of cold chain logistics in China, and made a thorough analysis on the challenge to find the countermeasures to promote its development.

Keywords: Cold chain logistics, Development situation, Challenges, Countermeasure.

1. Introduction

Cold chain logistics refers to that some perishable products and those needing to be preserved at a low temperature are stored in a low-temperature environment during production, transportation and sales links, so as to guarantee quality and reduce consumption.[1] In recent years, as information technology, logistics industry and people's living demand develop and change constantly, cold chain logistics as an emerging industry gradually grows and becomes an important part of economic development in China. With the increasing demand of cold chain logistics in market, the governments of all countries have also introduced many policies in favour of the development of cold chain logistics. However, even under vigorous support, cold chain industry still faces many development issues, and this paper will find some countermeasures by big data analysis.

2. The Emergence of Cold Chain Logistics

After the Internet, Internet of Things and cloud computing, another disruptive information technology industrial revolution - Big Data - has been created. It has played a huge role in the cold chain logistics industry, which has improved the decision-making ability of cold chain logistics enterprises, simplified the process of cold chain logistics, improved the quality of services and helped to realize the integrated management of cold chain logistics information. At the same time, the application in the marketing of agricultural products has also brought personalized and quality marketing methods and business concepts, and the people in the cold chain logistics industry are constantly exploring how to promote intelligent control with the help of big data. The integration of modern information and communication technologies (such as RFID, sensor network, intelligent embedding technology, global positioning system, geographic information system and other advanced information technology) is used to collect, transmit, exchange and process information of commodities in the whole cold chain

circulation process, so that the distribution path is dynamically optimized, temperature and humidity are automatically controlled, information is shared and synchronized, and fault detection and early warning are performed to ensure that commodities are safely controlled and traceable from production to consumers. Safe, controllable and traceable[2].

In addition, the rapid development of computer hardware and software technology and Internet communication technology has accelerated and promoted the cold chain logistics information construction in China, which can provide guarantee to meet consumers' demand for high-quality agricultural products, reduce the cost investment of the whole cold chain chain, improve the efficiency of cold chain logistics as well as the realization of green and intelligent cold chain to provide security. These cold chain logistics automation equipment and technology make the intelligent cold chain logistics with autonomous capabilities, such as making the whole chain of cold chain with information perception, processing, calculation, information interaction and information sharing capabilities, which helps to realize the intelligence, automation, energy saving and integrated management of the upstream, middle and downstream of cold chain logistics, reduce operating cost investment and improve the overall profitability of the cold chain.

Finally, with the development of cold chain informatization and digitalization, intelligent cold chain logistics has become an inevitable development trend, that is, for fresh agricultural products, through intelligent hardware, Internet of Things, big data and other intelligent technologies and means, to improve the ability of logistics system analysis and decision making and intelligent execution, to enhance the level of intelligence, networking and automation of the whole logistics system, and to realize from circulation links, underlying technologies, application fields and functional goals, etc., wisdom.

3. Development Situation of Cold Chain Logistics

China is the most important contributor to the rapid growth and development of cold chain logistics market in Asian-Pacific region, fully displaying national superiority in international stage. Depending on quickly rising cold chain demand and the development of relevant infrastructure, China has grown up as a considerable emerging market, and promptly steps from production-oriented economy to consumption-oriented economy. While, China's development of cold chain logistics industry is closely bound up with its economic development level and people's demand. With the improvement of people's living standards, their material needs have turned from originally having enough food and clothing to currently chasing for high-quality food, more kinds of food and fresher food, which injects vitality into the development of cold chain logistics. According to relevant public data of China, from 2015 to 2019, Chinese cold chain market scale kept on expanding, and the industrial scale reached 3.391 billion dollars in 2019. Renminbi rises by 17.50% than last year, and total market sales reaches the maximal growth rate of recent years, with estimated output exceeding 400 billion yuan.[3]

4. Analysis on Weakness of Cold Chain Logistics

4.1. Uneven distribution of cold chain regions

Cold chain logistics requires highly on technologies and fund, and a whole-course temperature preservation during transportation needs large capital input, so cold chain logistics is intensively distributed in east costal area with developed economy and high per capital consumption level, but lags behind in mid-west region with poorly-developed economy and insufficient internal forces. Nevertheless, the fresh food trading in China main concentrates in mid-west region, which results in imbalance between the two, and failure to achieve the desired effect or further narrow economic gap between east and west regions [4].

4.2. Few supporting facilities and low informational level

Since China's cold chain logistics starts later, the corresponding supporting facilities are in shortage and many facilities fail to meet related standards, so whatever heat preservation or fresh-keeping is easily to be unstable, leading to that product quality can't be sufficiently guaranteed. As energy consumption is concerned, due to technical problem, energy consumption increases substantially. The number of relevant vehicles is far less enough. Compared to developed countries, the transportation rate of vegetables and fruits in China is lower, very easy to show "chain breakage". During transportation, because of lacking information monitoring, consumers are unable to timely master the transportation information.

4.3. Insufficient industry regulation

At present, China hasn't formed a complete supervision system and regulation, and the procedure coverage of supervision is still not enough. Cold chain logistics transports many kinds of products, including fruits, agricultural products, grain and so on. Policies on transporting these different kinds of products are not uniform, making relevant enterprises to

refer to multiple standards in operation to respond to the lawful inspection activities of different sectors. Second, because the supervision is non-uniform in the whole process of cold chain logistics, so some part of such supervision may be inadequate. A few bad enterprises may make use of such opportunities, thus product quality problem may easily appear and do harm to people's health.

5. Recommendations on Enhancing Cold Chain Logistics Development

5.1. Technical perspective

The goods transported by the intelligent cold chain logistics, that is, from the place of origin through processing and packaging and transportation, transported to the place of sale, and then through storage and sales, finally reach the hands of consumers. For the cold chain data information mining, collection and detection, to ensure that the data generated by each link in the whole cold chain process are not missed, which is the basis for cold chain logistics to achieve wisdom; in addition, there must be the technical basis of in-warehouse technology, trunk line technology, last mile technology, end technology, and wisdom data chassis; combining the strong budget capacity of hardware and software platforms together, in order to more effectively realize the wisdom of warehousing, transportation, distribution, packaging, loading and unloading, information processing and other wisdom, and then realize the wisdom of cold chain logistics (Figure 1)[5].

5.1.1. The Intelligent Transportation

The agricultural products cold chain logistics has very demanding requirements on distribution equipment, operation management, temperature control, and higher requirements on basic transportation facilities and equipment. And through the integration of various transportation methods, including the application of vehicle identification technology, positioning technology, information technology, mobile communication and network technology and other high-tech, traffic management, vehicle control, operation truck management, electronic charging, emergency rescue and other functions can be realized to reduce cargo transportation costs and shorten cargo delivery time; at the same time, the whole process can be monitored to solve unexpected situations in a timely manner, and to protect product quality.

5.1.2. Warehouse Intelligence

The real-time automatic collection of goods, quantity, location, carrier and other information is carried out in the existing warehouse management operation links, and through information interaction, fast cargo entry, accurate cargo exit, inventory verification, cargo storage area transfer, cargo quantity adjustment, real-time information display, temperature detection and alarm are realized at the operation site.

The intelligent technologies needed in intelligent warehousing include warehouse robots, warehouse siting, demand forecasting, etc. Among them, the warehouse robots include automatic guided transport vehicles, unmanned forklifts, shelf shuttles, sorting robots, etc., which are mainly used for handling, shelving, sorting and other aspects in the warehouse. In the intelligent logistics scene, the logistics company can use the accumulated logistics data to determine the size of different regional traffic, combined with artificial intelligence related planning technology, by the computer automatically optimize learning, so as to give the optimal site

selection mode; through the cell phone user consumption characteristics, merchant history consumption and other big data, and then use big data algorithms to predict demand in

advance, front warehousing and transport links, rather than waiting for the consumer to place an order and then hastily transferring the cargo.

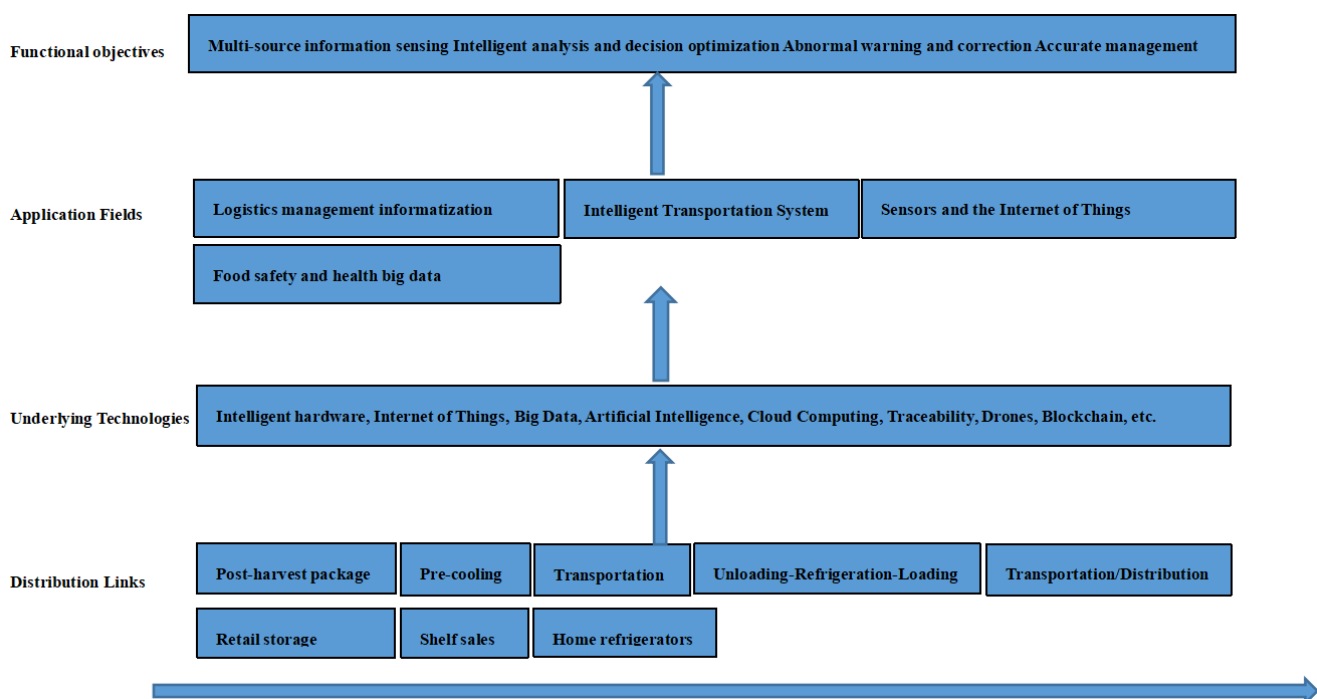


Figure 1. Cold Chain Intelligent Logistics Connotation

5.1.3. Distribution Intelligence

The integrated global positioning system (GPS), distribution path optimization model, multi-objective decision-making and other technologies assign distribution orders to available vehicles, and realize electronic distribution order information, intelligent distribution decision-making, real-time display of distribution routes, navigation tracking of distribution vehicles and query display of spatial distribution information, and complete distribution tasks together with the warehouse department.

The intelligent technologies needed in distribution include drone distribution, unmanned vehicle distribution, crowdsourcing distribution, intelligent courier cabinets, etc. And the cold chain distribution needs to be based on the above intelligent technologies, combined with the Internet of Things technology, temperature control devices installed in the delivery vehicle, real-time monitoring of the temperature conditions in the vehicle to ensure that the entire cold chain is normal; at the same time, users can observe the condition of the vehicle in real time through their cell phones after placing an order. During the epidemic, Hangzhou unmanned vehicle delivery has become a beautiful scenery, playing an important role in this special period of the epidemic.

5.2. Policy Perspective

5.2.1. Form uniform regulations

It is recommended to establish national uniform cold chain logistics supervision and treatment regulations, set up special organizations, comprehensively construct the supervision of cold chain logistics related links, and secure the normalization of each link. It is also suggested to build information announcement platform, reward good logistics and transportation enterprises in the platform, criticize those violating the regulations, and set good example of the industry, to push the development of normative system. At the same

time, we have to establish and improve relevant laws and regulations according to the development situation of modern cold chain logistics. Aiming at existing problems, we shall make a thorough analysis, formulate precaution measures, and prevent further deterioration. The supervision standards should be unified to avoid the behavior of making use of policy vulnerabilities.

5.2.2. Reinforce innovation and drive infrastructure construction

It is essential to increase capital input and technical input, strengthen the research of freshness and heat preservation techniques, and reduce use cost. Based on cold chain infrastructure construction, talents of all fields can be guided into the relevant construction. The techniques and equipment of cold chain logistics industry must be innovated, to create more high-quality products and comprehensively reduce energy consumption. Some technical development results such as information technologies and Internet+ could be full made use to build a high-quality logistics supervision platform, as so to provide more security to consumers, promote infrastructure construction in all aspects, and lay a foundation for the development of cold chain development.

5.2.3. Optimize coordination layout

It's a necessity to fully implement the construction of cold chain logistics center, realize a radiation effect taking distribution center as base point, and change regional development imbalance and mismatch between cold chain logistics layout and industrial layout. The upstream and downstream of product purchasing and supply should be guaranteed to linked, effectively avoiding the phenomenon of supply chain breakage. Coordination layout can be optimized to give full play to the effect of cold chain logistics. The construction of cold chain logistics could also be integrated with China's rural vitalization strategy and the strategy of developing mid-west region, implementing the unification of

policy and practice.

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