Research on Food Safety and Security of Cold Chain Logistics

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Abstract. Fresh fruits and vegetables are the necessities of daily life and provide rich nutrients for people's daily life. As the country with the largest population, the annual consumption of seasonal agricultural products, dairy products and aquatic products in China is huge. With the continuous development of e-commerce, the transportation and circulation of fresh food has become more extensive. However, there are still some hidden dangers in the cold chain logistics of food in our country, and the safety problems such as pollution, deterioration and decay of agricultural products in the course of transportation also lead to serious loss of commodities, and the problem of food safety cannot be guaranteed. According to the relevant data, the annual loss of fresh fruits and vegetables in transit in China in the world ranking is very high. Therefore, the rapid development of science and technology in recent years and the demand for the transportation of fresh fruits and vegetables have greatly improved the transportation conditions of fresh fruits and vegetables. In view of this problem, this paper analyzes the problem of food safety in cold chain logistics in China and puts forward relevant safeguard measures.

1. Introduction
Quality requirements for cold-chain foods are increasing. However, in the course of transportation, the problems such as the long transportation distance, the long transportation time, the backward preservation technology and the insufficient quality supervision lead to the deterioration and decay of fresh food and so on. On the one hand, it causes a lot of economic losses, on the other hand, eating stale fruits and vegetables can also affect human health. With the improvement of people's consumption level and quality and safety consciousness, the freshness of perishable foods such as fresh fruits, vegetables and dairy products has become a widespread concern, this greatly speeds up the development of cold chain logistics in China and greatly improves the transportation conditions of cold chain food. However, the cold chain transportation in our country is still in the early stage of development, and there are still some shortcomings in practical application. Therefore, it is of great significance to analyze and explore the development of cold chain transportation of various perishable foods.

2. Analysis on Food Safety Demand of Cold Chain Logistics for Fresh Agricultural Products

2.1. Analysis on the Development Demand of Cold Chain Logistics for Agricultural Products and Fruits in China
China is a large country of fruit and vegetable production, fruits and vegetables are perishable, coupled with many circulation links, cold chain facilities are not complete and many other reasons, resulting in a very high rate of circulation corrosion of fruits and vegetables. Using cold chain logistics
can effectively reduce the circulation decay rate of fruits and vegetables and reduce the consumption of logistics links. At present, more than 80% of fruits and vegetables in China are mainly in normal temperature logistics or natural logistics, which leads to serious postharvest losses of fruits and vegetables. About 130 million tons of vegetables and 12 million tons of fruit are lost in transportation in China every year, and the economic loss of rotten fruits and vegetables can reach 75 billion yuan. According to Ai media consulting data, the total logistics of agricultural products in China reached 3.9 trillion yuan in 2018, exceeded 4 trillion yuan in 2019, and continued to grow, and is expected to reach 4.2 trillion yuan in 2021. In recent years, China's total agricultural logistics and forecast as shown in figure 1.

![Figure 1. Total and Forecast of China's Agricultural Product Logistics 2013-2021(in trillions Yuan)](image)

2.2. Cold chain logistics demand for meat products and aquatic products in China
The cold chain logistics of aquatic products refers to the special supply chain system which ensures the quality and quality safety of aquatic products, reduces the loss and prevents pollution under the suitable low temperature control environment after the aquatic products are captured from the origin, and the processing, storage, transportation, distribution and retail of the products are always in a suitable low temperature control environment. The total production of aquatic products in China has remained relatively stable, and the total number of aquatic cold storage has gradually stabilized after a significant increase in the previous years. However, the operation of cold chain logistics in this field is also faced with the problems of whether aquatic products can keep quality and keep fresh, and whether the balance point between high cold chain cost and loss caused by aquatic product deterioration can be found.

2.3. Development demand of cold chain logistics for dairy products and frozen products in China
For many years, the consumer price index of liquid milk and dairy products in China has fluctuated little, and has a downward trend in recent years, which reflects that the consumption and intake of dairy products are becoming the basic needs of urban and rural residents. However, the shelf life of dairy products is short and the temperature requirement is high. Cold chain logistics has become an important index to measure the market competitiveness of a dairy enterprise.
3. Analysis on Food Safety in Cold Chain Logistics of Fresh Agricultural Products.

3.1. Unbalanced cold chain infrastructure in some areas
The overall construction and development of cold storage in China is out of balance. From the distribution point of view, the development of cold chain in China is mainly concentrated in East, North and Central China. The cold chain network and system are relatively sound in Shanghai, Shandong and Guangdong.

3.2. Improved regulatory environment for cold chain logistics policies
The lag and advance of the cold chain policy restricts the development of the industry to a certain extent, and the lag of the cold chain logistics land, traffic, electricity and other policies makes the development of the industry difficult. The policy of implementing national six emission standards and matching new energy trucks is advanced, and the particularity of cold chain logistics and other industries is not enough, which leads to the high cost and the inability to improve the operation efficiency. With the new problems in the field of "Internet plus" logistics, the traditional supervision mode can not keep up with the needs of the times, and puts forward new requirements for the modernization of logistics industry governance system and governance ability. In addition, cold chain policy in publicity, popularization, implementation and other aspects need to be further strengthened.

3.3. Compression of profit margins
Due to the continuous decline in prices, intensified competition, business growth continued to slow down and other factors, logistics enterprises profit level is further weakening. According to the cold chain commission, many cold chain logistics enterprises and cold chain equipment enterprises have increased revenue, but profit margins have declined compared with the previous year. The reasons are: first, the pressure on customers to operate, logistics costs do not rise fall; second, salary, social security and other human costs, rent costs are increasing day by day, tax burden, fuel, road and bridge costs have not been reduced; third, increasingly stringent policy standards have brought many constraints to enterprises, to a certain extent has an impact on the profits of enterprises.

3.4. Slow enterprise transformation and upgrading
Market demand, customer structure are undergoing profound changes, cold chain logistics services put forward new requirements. The labor cost of our country is getting higher and higher, and many operation links in cold chain logistics are in the environment of low temperature and bad, the cost reduction and efficiency increase of cold chain logistics enterprises can not rely on people blindly, automation and intelligence are very important. With the rapid development of Internet, Internet of things, big data and artificial intelligence, enterprises must upgrade their business philosophy at all times. Therefore, the technical equipment, personnel management and management concept of cold chain logistics enterprises need to be iteratively upgraded to survive the fierce market competition. In addition, in the cold chain technology facilities construction and operation management, but also to enhance the concept of safety, environmental protection and energy conservation.
4. Cause Analysis of Food Safety Problems in Cold Chain Logistics

4.1. Domestic consumer preference for fresh food safety requirements further increased

As shown in figure 2, the proportion of imports of all kinds of fruits shows that the preference of domestic consumers has changed greatly, and the demand for imported fruits has recent years. For example, there are many provinces in the domestic kiwifruit production area, but under the influence of "orange Huainan is orange, orange Huaibei is trifoliate orange ", the domestic market kiwifruit theory jin, foreign import kiwifruit theory situation. The main reason is that the quality of domestic kiwifruit is very different from the standardization of final sales, especially the failure to guarantee health and safety seriously affects the trust of domestic consumers in domestic kiwifruit, so the standardization of production, the improvement of the supporting infrastructure of cold chain in fruit origin, the avoidance of cold chain disconnection is very important to improve the quality of fresh products.

4.2. Domestic cold chain logistics technology and knowledge have not been popularized

As shown in figure 3, the proportion of imports of all kinds of fruits shows that the preference of domestic consumers has changed greatly, and the demand for imported fruits has recent years. For example, there are many provinces in the domestic kiwifruit production area, but under the influence of "orange Huainan is orange, orange Huaibei is trifoliate orange ", the domestic market kiwifruit theory jin, foreign import kiwifruit theory situation. The main reason is that the quality of domestic kiwifruit is very different from the standardization of final sales, especially the failure to guarantee health and safety seriously affects the trust of domestic consumers in domestic kiwifruit, so the standardization of production, the improvement of the supporting infrastructure of cold chain in fruit origin, the avoidance of cold chain disconnection is very important to improve the quality of fresh products.
Because the domestic weather is hot in 3-7, many fresh food stores have poor awareness of food cold chain standards, which can not guarantee the quality of food, resulting in food safety problems in the final link of cold chain logistics, and the number of exports has decreased sharply. Some frozen foods are even frozen after thawing, and such foods will lose their original taste and quality. On the other hand, food production and processing enterprises blindly pursue low-cost distribution, regardless of the value law of cold chain logistics, and finally make the safety of cold chain logistics into a vicious circle. In July-December, as the weather turned cool, the preservation conditions of many products were optimized and the number of exports began to increase. Therefore, the further popularization and optimization of cold chain logistics will play a good role in China's fresh exports.

5. Safeguard measures for food logistics safety

5.1. Fonts in Equation Editor (or MathType)
Accelerating the development of standards and regulations for cold-chain food logistics
Nowadays, our country is implementing the "the Belt And Road" and rural revitalization strategy, with elegantly achievement. For example, Mengyin wanhua food co., ltd. developed the "the Belt And Road" international market after this moment. Including the development of many countries in the world. At the same time, the continuous improvement of technology and policy support are showing the complementary role. For example, the National Agricultural Products Modern Logistics Engineering And Technology Center has independently developed cross-border agricultural products logistics quality control technology. It has provided support for targeted poverty alleviation, helped rural industry revitalization, promoted the development of "one village and one great industry", boosted the economic development of county towns, and helped farmers to export their agricultural products.

5.2. Strengthen the cold chain logistics technology research. Promoting the construction of infrastructure
Our country is accelerating the research of cold chain logistics related technology, and applying the related technology to popularize. 2019, The National Research Center of Modern Agricultural Products Logistics Technology and Yantai Ruijia Energy Saving Technology Co., Ltd. signed the "Cooperation Agreement on Joint R&D and Manufacturing of Cold-chain Logistics Equipment for Agricultural Products". At the same time, the cold chain equipment manufacturing base was established as a demonstration base of modern agricultural products logistics engineering technology, which further made up for the deficiency of the existing cold chain technology and its manufacturing equipment.

5.3. Accelerating the upgrade of cold chain logistics equipment and technology
Accelerating the independent research and development, introduction, digestion and absorption of various new cold chain logistics technologies that save energy and protect the environment, and constantly improve the independent innovation ability and technical merit of the cold chain logistics industry. At present our country has been in Energy-saving and environment-friendly refrigerating unit, differential pressure precooling unit, differential pressure air supply device, low temperature steam thawing, fruit and vegetable comprehensive cleaning device, the pressure difference precooling and variable temperature storage intelligent integration equipment, spiral thaw, double quick-freezing device, vacuum freezing device, LNG cold energy recycling technology made significant breakthrough, raising the overall level of fresh agricultural products cold chain logistics has become a centerpiece of agricultural technology development in our country.

5.4. Increasing investment in cold chain logistics
The construction of cold-chain logistics facilities should give full play to the role of market mechanism and encourage enterprises to increase investment and raise funds through multiple channels. The central and local governments should provide necessary guidance and support for
important projects such as large refrigerated fresh keeping facilities, refrigerated transportation vehicles, product quality certification and enterprise informatization, and encourage the gamut of the cold chain logistics’s development. It is vital to broaden the channels of financing and payment of wages in cold chain logistics enterprises of agricultural products. Banking industry should increase financing support and provide auxiliary product of financial services for agricultural cold-chain logistics enterprises.

5.5. Strengthen the training of food logistics professionals
With the rapid change of customers in the market, enterprises have to adapt to it more and more quickly. It is the main work of human resource management to give play to the subjective initiative of team members to reach the upper limit. In today's society with increasingly high human cost, we actively replace simple repetitive work of human resources with automatic equipment and facilities, and use technical means to assist staff in planning and scheduling to make scientific decisions. In another aspect, the weakness of cold chain logistics management and the lack of engineering talents related to cold chain logistics are the important factors restricting the rapid development of cold chain logistics in China. Relevant state departments and educational institutions should formulate relevant policies on cold chain logistics personnel training and devote themselves to cultivating high-quality cold chain logistics personnel.

6. Conclusion
In order to protect the interests of consumers, in the distribution process of cold chain logistics, enterprises should strive to improve the service level, save the cost of distribution, speed up the distribution, and ensure the freshness of food. In addition to calculating the cost of conventional logistics, we should also consider the possible spoilage and deterioration of food during transportation, as well as a series of problems such as the cost of cold chain distribution and inadequate service. The solution of these problems is not accomplished overnight, but requires us to do a good job in the research of cold chain logistics of fresh products in the process of solving them, combining with the present situation of quality and safety, so as to further promote the smooth progress of production, transportation and sales of fresh products in China.

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