



**A RESEARCH ON AGRICULTURAL PRODUCTS COLD CHAIN LOGISTICS IN GUANGXI**

**UNDER THE BACKGROUND OF GUANGXI FREE TRADE ZONE**



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## ABSTRACT

**Research Title** : A RESEARCH ON AGRICULTURAL PRODUCTS COLD CHAIN LOGISTICS IN GUANGXI UNDER THE BACKGROUND OF GUANGXI FREE TRADE ZONE

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This paper mainly studied the situation of Guangxi agricultural product cold chain logistics in the context of Guangxi Free Trade Zone. This study found that Guangxi, adjacent to ASEAN, is rich in agricultural products, however, the agricultural products are difficult to preserve and easy to corrupt, hinders the development of the agricultural product market, and the development level of cold chain logistics directly affects the scale and quality of agricultural products import and export trade. This paper mainly used document research method , it studied the situation of agricultural cold chain logistics in Guangxi and problems in the development of cold chain logistics in Guangxi. This research found the development of Guangxi agricultural product cold chain logistics was still in the beginning stages, and there was still a big gap between Guangxi logistics and advanced cold chain logistics technology for agricultural products. The establishment of the Guangxi Free Trade Zone is a major decision for China and promotes the development of facilities, talents, and policies. The demand of cold chain logistics encourages development of agricultural cold chain logistics in Guangxi. Therefore, it is of great significance to the government or enterprises to study the problems and recommendations of cold chain logistics of agricultural products in Guangxi.

**Keywords:** Guangxi free trade zone, agricultural products, cold chain logistics

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Name:

Date:



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# 1. Introduction

## 1.1 Research Background

Established of Guangxi Free Trade Zone that sets up new international land and sea trade channel for ASEAN, the new economic zone in Guangxi will help this autonomous region to construct international transport routes, building a gateway connecting the coast with western Chinese hinterland. The new zone will also help to facilitate Chinese cooperation with the ASEAN, it realizes the integration of logistics resources and promotes the development of agricultural trade(China Knowledge, 2019).

Domestic and foreign scholars have explained what cold chain logistics of agricultural products is. Agricultural products cold-chain logistics refers to reducing the loss of fresh agricultural products, such as vegetables, fruits, poultry, eggs, fish, and ensuring the quality of agricultural products. In the aspects of picking, storage, transportation, and consumption, according to the quality characteristics of the products, it uses different low-temperature standards to control the temperature of the agricultural products method. It mainly includes four stages of freezing processing, frozen storage, refrigerated transportation and frozen sales (Wang, 2018).The cold chain involves the transportation of temperature-sensitive products along a supply chain through thermal and refrigerated packaging methods and the logistical planning to protect the integrity of these shipments. There are several means in which cold chain products can be transported, including refrigerated trucks and railcars, refrigerated cargo ships, reefers as well as by air cargo (Rodrigue.,& Notteboom, 2017).

Pang (2017) pointed out that the cold chain logistics industry is an important guarantee for fresh agricultural products trade. With the deepening of economic globalization, China's cold chain logistics market is getting bigger and bigger. The national cold chain logistics market will grow from 150.9 billion yuan in 2015 to about 220 billion yuan in 2020. All localities should make accurate judgments and make arrangements for the development of related industries in advance.

With the development of agricultural trade in Guangxi, the research results of Guangxi cold chain logistics are also increasingly rich. Found in research, Guangxi cold chain logistics faces many problems and challenges. The processing rate of agricultural products in Guangxi is low, the processing conversion rate is about 40%, which is lower than the national average of 65%. The secondary processing is only 20%. The cold chain logistics of agricultural products is weak, The relative lag of cold chain storage and logistics results in a large post-production loss of agricultural

products, and the loss rate of fruit and vegetable transportation is 25% to 30%. All of this has led to an increase in the cost of agricultural production, and it has become a factor in which agriculture has only increased production and income has not increased. The challenge of cold chain logistics is more difficult and difficult (Fu.,&Gan, 2019). At present, lacking cold chain facilities and old equipment can't provide low-temperature protection for some perishable agricultural products, even they might cause certain impacts on the environment. The existing cold chain facilities caused a large number of losses in the process of transportation and storage of agricultural products and this results in great hidden dangers of safe agricultural products in China(Hou., Xie.,&Wang,2015).

Zeng (2018) believed that the development of agricultural cold chain logistics in Guangxi Beibu Gulf Economic Zone is an important part of Guangxi's economic development. It is conducive to improving the quality of agricultural products, improving the industrial structure of Guangxi, promoting the continuous increase of farmers' income, and cultivating modern agriculture with regional characteristics. Relevant government departments should give full play to the leading role, scientific analysis of their development strategies, adhere to policy support, increase financial input, and systematize and guide the healthy and orderly development of all relevant entities in the cold chain logistics industry.

## **1.2 Research Problem**

In foreign countries, cold chain logistics develop more mature. Cold chain facilities and cold-chain equipment relatively backward in China, the original old equipment, development, and distribution is not balanced, is unable to provide a low temperature for perishable food circulation system, as for the lagged far behind in the cold chain technology application abroad. In terms of logistics information system, service network and logistics information system of cold chain logistics in China plays an important role in the development, service network and imperfect, incomplete information system, the influence on the quality of agricultural products logistics, accuracy and timeliness, at the same time, the cost of agricultural products cold chain and the degree of loss of goods is also high (Chen.,Chen.,Zhang.,&Xie, 2015). According to statistics, the loss rate of fruit transportation in Guangxi is 20%. Every year, tens of millions of fruits are rotted and deteriorated during transportation that caused by improper logistics distribution methods, if cold chain logistics services can be introduced during fruit transportation, the loss caused by decay during transportation will be minimized(Guo, 2018).



Through domestic and foreign literature research, it can be known that foreign cold chain logistics technology is relatively perfect, and the research on the development of agricultural cold chain logistics is quite rich. It summarizes the theoretical knowledge of many cold chain logistics and provides a lot of reference for China's agricultural cold chain logistics research. The cold chain logistics of agricultural products in Guangxi started late, but with the continuous expansion of China's consumer market, domestic scholars have a more comprehensive and in-depth study on the development current situation and existing problems of agricultural products cold chain logistics in Guangxi. Compare the research and analysis of scholars at domestic and foreign, the development of Guangxi agricultural product cold chain logistics mainly has the following problems:

- a. Guangxi's cold chain technology and cold chain equipment are backward.
- b. Guangxi lacks cold chain logistics talented people for agricultural products.
- c. Guangxi government lacks effective policies to promote the development of cold chain logistics.

### **1.3 Research Objective**

By analyzing the development current situation of cold chain logistics in Guangxi, this paper summarizes the development opportunities and problems of cold chain logistics of agricultural products in Guangxi, finds out the gap between advanced cold chain logistics technology, and puts forward the urgency and importance of developing cold chain logistics of Agricultural Products in Guangxi, and proposes solutions to solve the main problems:

- a. How to solve the problem of cold chain facilities and cold chain equipment backward in Guangxi.
- b. How to develop agricultural products cold chain logistics talents.
- c. What policies should the government develop to promote the development of cold chain logistics.

To provide feasibility advice and analysis for relevant government departments, enterprises, etc.

#### **1.4 Research Scope**

This paper mainly studies the development current situation and analysis of Guangxi agricultural product cold chain logistics in the context of Guangxi Free Trade Zone. The Guangxi Free Trade Zone has just been established. In this context, there are few studies on this aspect at home and abroad. The scope of this paper is refined to the newly established free trade zone in Guangxi, and its influence on the development of agricultural cold chain logistics in Guangxi. This paper studies a large number of relevant excellent journal articles and papers. Through the search, identification, collation and research of data, and choose about 30 studies as my research focus, initially form an academic understanding of cold chain logistics, analyzing the research dynamics of cold chain logistics at home and abroad, learn and use the theories related to this research, and find the direction and focus of this paper.

#### **1.5 Research Significance**

With the continuous improvement of the living standards and quality of Chinese residents, increasing the demand for fresh agricultural products, and cold chain logistics is an important guarantee for fresh agricultural products. It is a great significance to study the development trend of cold chain logistics. Plenty is at risk when temperature-sensitive products experience environmental shifts. Quality, flavor, consistency, efficacy, and safety are all on the line. Cold chain logistics can help minimize the threat for such deviations and give these manufacturers and suppliers better control over their products every step of the way (Wensing, 2018). For a place and a country, accelerating the development of cold chain logistics business, which requires research and analysis of the product characteristics of the region, and products in the future development can be detailed and accurate forecasting, to identify the key issues in a timely manner to make a solution(Wang, 2016).

The lack of reliable and adequate cold chain facilities in sub-Saharan Africa is one of the main causes of losses of perishable products, These losses result not only in a deterioration of food security in all its dimensions but also in loss of market opportunities, waste of the scarce resources (water, land, and energy) devoted to producing the foodstuffs, and a significant ecological footprint. Reliable and efficient cold chains contribute not only to reducing these losses but also to improving the technical and operational efficiency of the food supply chain. Cold chains thus facilitate compliance with quality and safety requirements and promote market growth (FAO.,&IIR, 2016).

The cold chain ensures that perishable products are safe and of high quality at the point of consumption. Failing to keep the product at the correct temperatures can result in a variety of negative attributes. These can include textural degradation, discoloring, bruising and microbial growth. Effective management of the cold chain maintains the quality of a product, which leads to a satisfied customer, greater demand, and overall protection of public health (Yeoh, 2017).

This paper takes Guangxi agricultural product cold chain as the research object, combined with the background of Guangxi Free Trade Zone, comprehensively analyze the development prospects of agricultural cold chain logistics in Guangxi, and analyze the shortcomings and problems in the development of agricultural cold chain logistics in Guangxi, to provide a reference for the better development of Guangxi agricultural product cold chain logistics. The good development of Guangxi agricultural product cold chain logistics will further promote the import and export trade of Guangxi agricultural products and improve international competitiveness. This is a great significance.

## **2. Literature review**

### **2.1 Guangxi free trade zone**

Free Trade Zones (FTZs) may help improve their generating economic development to their geographical regions. The goal is the generation of economic development for a geographical region. General local conditions are improved by economic development by creating income and jobs, as well as by attracting new capital investment (Benton.,Napier.,&Ulku, 2016). One of important trends in the free trade zones in Asia is that many countries have been showing their interests in the logistics industry. This may be due to the hopes of improving national export competitiveness through a sophisticated domestic logistics industry. Chinese free trade zones have undertaken the dual roles of ‘windows’ in developing the foreign-oriented economy and of ‘radiators’ in accelerating inland economic development by introducing a series of reforms in the foreign trade system by running these zones with different preferential policies (Free Trade Zone, 2005).

Guangxi Free Trade Zone can learn from the establishment and development of other free trade zones, and combine its own characteristics to summarize the methods that are in line with Guangxi development. Guangxi has received approval to establish one of the six new pilot free

trade zones in China to take opening up in border areas to a higher level, according to a master plan announced by China on Aug 26, 2019. The plan clarifies that the new Guangxi free trade zone aims to make full use of the unique advantages of Guangxi and ASEAN countries, contribute to the construction of the New International Land-Sea Trade Corridor in West China, as well as form an important gateway to the link between the Maritime Silk Road and the Silk Road Economic Belt (Guangxi China, 2019).

## **2.2 Agricultural products**

According to the Statistical Bureau of Guangxi Zhuang Autonomous Region (2019), Guangxi is a largely agricultural province. Over the past 70 years, agricultural production in the region has developed in an all-round way, the characteristic advantage of agriculture is developing steadily. The total value added of the primary industry in 1950-2018 has risen 8.8 times. The output of major agricultural products has increased substantially. In 2018, the grain output reached 13.73 million tons, which is 3.2 times that of 1950; the sugar cane was 72.93 million tons, which is 171 times that of 1950, accounting for more than 60% of the national total; the vegetable output is 34.32 million tons, which is an important autumn and winter dish in the country. The garden fruit is 17.91 million tons, which is 204 times that of 1952; the aquatic product is 3.32 million tons, which is 185 times that of 1950.

Li (2015) believes that Guangxi's superior geographical location and abundant agricultural resources determine the convenience and competitiveness of agricultural products exported to other countries. For example, the geographical position is superior, which provides favorable conditions for transporting agricultural products, especially the transportation of fresh agricultural products that require freshness, which can effectively shorten transportation time and maintain freshness. However, there are technical problems in the production, processing, and transportation of agricultural products in Guangxi. Due to the technical level and the backwardness of equipment, agricultural products can't meet the daily needs of people in terms of quality and health.

The agricultural products from the producer to the consumer must require a low-temperature environment to ensure the quality of the products. Most of the agricultural products in Guangxi are transported and stored at room temperature. The agricultural products cold chain logistics in Guangxi have many problems, insufficient investment in cold chain equipment and high logistics

costs have caused serious losses. Therefore, the development of cold chain logistics is a great significance to Guangxi's agricultural products (Li, 2018).

### **2.3 Cold chain logistics**

Guangxi is a subtropical fruit, animal husbandry, and sea freshwater aquaculture province. The sales volume of chilled fish is large. About 20-25% of fruit and 30% of vegetables are decayed and damaged every year. The refrigerated transport rate of perishable goods is only 15%- 20%. If Guangxi develops cold chain logistics, it can avoid the artificial loss of goods deterioration and rot. To solve these problems, it needs a large number of cold chain technology professionals. The development of cold chain logistics is inseparable from the cold chain logistics talents (Wu, 2018).

Mao and Zheng (2017) believe that cold chain logistics is an important part of the agricultural product supply chain. The lack of any link in the cold chain logistics system or "fracture" will lead to an increase in the circulation cost of agricultural products, affecting the circulation efficiency of agricultural products. The circulation rate, refrigerated transport rate, and pre-cooling preservation rate are much lower than those of developed countries, and the loss rate is much higher than that of developed countries. It is necessary to develop cold chain logistics.

Fan and Zhang (2016) pointed out that with the development and popularization of rural e-commerce in China, fresh agricultural products have become a key component of rural e-commerce, which has been favored by more and more consumers. The growth of demand for fresh agricultural products has put forward new requirements for China's cold chain logistics. The development of the logistics industry will narrow the regional gap, create conditions for urbanization, and promote international trade and international investment. Logistics development and import and export trade mutually promote each other and influence each other. The modernization of modern logistics can quickly promote the growth of foreign trade, and the long-term effect is still significant (Li.,Xu.,Ren.,&Li, 2016).

### **2.4 Past research**

The E-commerce of fresh agriculture products is sprouting in recent years. Cold-chain logistics is an inevitable question in the development of the business (Tang.,He.,&Chen, 2016). Although Guangxi is a large province in the production of agricultural products, due to backward economic development conditions and lack of necessary hardware and software investment, the

coverage rate of cold-chain logistics of agricultural products is low, and the cold-chain logistics of partial agricultural products only have a coverage rate of 8%. The current trend of economic development in Guangxi can't adapt to a high-requirement development mode of cold-chain logistics of agricultural products. Guangxi should enhance the construction of the infrastructure of cold-chain logistics and train agricultural products cold chain logistics technical personnel (Zhong, 2015).

With the development of economic globalization, agricultural products cold chain logistics should actively participate in the activities of international certification and accreditation organizations to keep up with international standards and interactive development. Promote international mutual recognition actively, including FTA mutual recognition and cooperation (Weng.,&An, 2016). Wen (2018) believes that after years of construction and development, the infrastructure of the cold chain logistics industry in Guangxi has become increasingly perfect, and the cold chain market has begun to take shape, taking into account the benefits of the national "Belt and Road" strategy and the continued trade with China-ASEAN. There is a mutual promotion relationship between the development of cold chain logistics in Guangxi and the import and export trade of agricultural products. The positive development of cold chain logistics has a positive impact on the import and export trade of agricultural products in Guangxi.

### 3. Findings and Conclusion

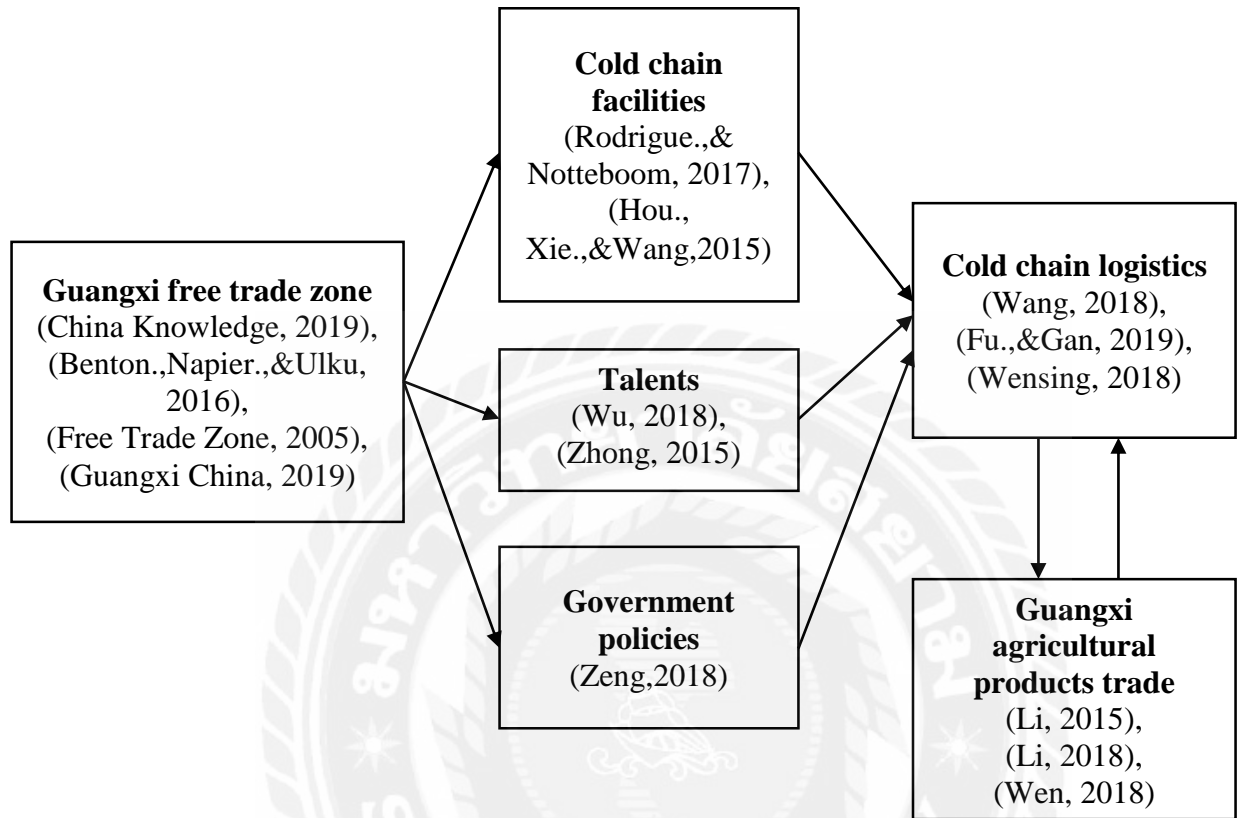


Figure 1: Established Framework

This paper mainly uses the document research method to study the relationship between Guangxi Free Trade Zone, cold chain logistics and Guangxi agricultural trade. The results show that the establishment of Guangxi Free Trade Zone is closely related to the development of agricultural trade and cold chain logistics in Guangxi(Wen, 2018). Many of the free trade zones plans share a common theme of heightening trade facilitation, improving investment promotion and protection, optimizing trade structure, and easing the business environment. Establishing the Guangxi Free Trade Zone, as an important gateway to connect the “Belt and Road”, Guangxi will also actively develop logistics to promote trade development(Wong, 2019). Guangxi Free Trade Zone will adopt a series of policies to accelerate the construction of an ASEAN-oriented logistics

system. Building a multimodal transport system with sea-rail intermodal transport as the backbone, and improving the modern logistics system of land, sea and air integration(CHINA, 2019).

Xu (2019) believes that the construction of cold chain logistics requires experienced logistics talents and various policies formulated by government departments. Talents and policies can ensure the needs of agricultural product logistics construction. According to the current situation and development trend of production, circulation and consumption demand of fresh agricultural products, the government can adopt relevant policies and other methods to focus on cultivating cold chain logistics enterprises with regional characteristics(Weng.,&Huang, 2019).

The results show that the development of cold chain logistics and the development of agricultural trade in Guangxi have a mutually reinforcing relationship. On the one hand, cold chain logistics can reduce the damage rate of agricultural products, increase the value, and promote the development of agricultural products. On the other hand, the development of fresh agricultural products is the development of the industrial chain, which will drive the development of the cold chain logistics industry(Liu.,&John, 2019).

Studying the relationship between the Guangxi Free Trade Zone and influencing cold chain logistics will have certain significance for the government and logistics companies. The study found three key factors affecting cold chain logistics: equipment, talent, and policy. The establishment of the Guangxi Free Trade Zone has a positive impact on these three key factors. From a practical point of view, these three factors will directly affect the development of cold chain logistics. From a long-term perspective, Cold chain logistics and Guangxi agricultural products trade have relationships that positively affect each other.

The results of this study suggest that cold chain facilities, cold chain talents, and policies can directly affect the development of cold chain logistics for agricultural products in Guangxi, because these three factors can promote the development of cold chain logistics. The development of cold chain logistics will further promote the development of Guangxi agricultural product trade. Therefore, in the context of the Guangxi Free Trade Zone, in order to promote the development of cold chain logistics of agricultural products in Guangxi, it is suggested to develop the key factors affecting it.



## **4. Recommendation**

### **4.1 Recommendation for cold chain facilities**

The loss of transporting agricultural products is mainly due to the lack of cold chain equipment, so it is necessary to increase investment in agricultural cold chain infrastructure. Enterprises must vigorously promote the use of advanced cold chain equipment, vigorously promote the use of refrigerated containers, and improve the demand and supply system of refrigerated containers(Wei, 2019). Ashvin(2017) believes that according to market demand, enterprises or governments should prioritize procurement and meet the most important needs of the market, purchase cold chain equipment in stages, and gradually debug and feedback the equipment at each stage to maximize the allocation of resources.

The improvement of cold chain logistics facilities is the basic guarantee for the promotion and development of cold chain logistics for agricultural products. The government should actively develop the construction of cold storage, and increase support for cold chain logistics enterprises in land, water, electricity, and taxation. The logistics industry should increase investment in cold chain logistics facilities, and constantly update its cold chain technology. In the era of developed network information, the information construction of cold chain logistics should be improved to achieve resource sharing, information exchange, and advanced information among enterprises. Technology can reduce costs and improve operational efficiency for agricultural cold chain logistics.

### **4.2 Recommendation for cold chain logistics talents**

The government or enterprises can adopt the talent introduction mechanism to formulate incentive policies, encourage enterprises to introduce or cultivate cold chain logistics personnel, and improve the introduction and training of cold chain logistics professionals(Fan.,Fan., &Ma, 2019). There is a huge talent gap in China's cold chain logistics industry, so companies should learn from foreign experiences and cooperate with universities to train cold chain logistics talents(Zhang, 2017).

Lack of talents severely restricts the development of cold chain logistics for agricultural products in Guangxi. The development of talents is a long-term process. The establishment of the Guangxi Free Trade Zone has formulated effective policies for attracting various types of talents. On this basis, this requires the government to increase investment in cold chain logistics education,

investing teachers in universities, and introducing talents to cultivate cold chain logistics professionals in universities. Enterprises should actively cooperate with universities. In accordance with the talents required by enterprises, encourage students in cold chain logistics majors at universities to go to practice and gain experience in enterprises. Conduct centralized training for cold chain logistics employees in enterprises. , Timely training the domestic and foreign professional cold chain logistics knowledge, improve employees' cold chain logistics skills.

#### **4.3 Recommendation for policies**

Guangxi attaches great importance to the development of the cold chain logistics industry. It has issued a series of policies such as the Guangxi Cold Chain Logistics Industry Plan to build a modern cold chain logistics system for ASEAN, the Greater Bay Area, and the Southwest China region (Guangxi China, 2019). Cold-chain logistics in Guangxi is littered with problems including structural imbalances. Refrigeration companies, for example, are concentrated in the central cities, with few at production bases and no advanced information platform systems. In view of this, Guangxi is working on a high-standard development plan, and is about to roll out preferential policies in support of cold-chain logistics, encourage the entry of new enterprises and establish public information service platforms (Wong, 2017).

The Guangxi government should formulate relevant policies to accelerate the construction of cold chain logistics systems, formulate relevant standards and specifications for cold chain logistics, and promote the standardized development of cold chain logistics. On the basis of the establishment of Guangxi free trade zone, formulate some policies to promote the development of cold chain logistics, from the aspects of fiscal taxation, infrastructure allocation to promote the development of cold chain logistics enterprises. Support the construction of cold chain logistics infrastructure, support the construction of the whole cold chain logistics and cover the collection of agricultural products, processing, transportation, sales of all links of the cold chain logistics system, reduce the cost of cold chain logistics of agricultural products.

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