

Study on the Development of Agricultural Products Cold Chain Logistics

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Abstract—Since China is a vast agricultural country, effective circulation of agricultural products is closely related to national economy development, agriculture modernization as well as fundamental interest of farmers. With the rapid development of agricultural economy, people's life quality has been constantly improved with higher demand for agricultural products safety, freshness as well as quality. Although the supply and demand of agricultural products are comparatively balanced, lots of waste has been caused due to problems existing in transportation with bad effect on agricultural products' quality. Since cold chain is the necessary condition for guaranteeing transportation of agricultural products, so it is of great necessity to study the development of cold chain logistics of agricultural products.

Keywords- *agricultural products; cold chain logistics; comparative study*

I. INTRODUCTION

In recent years, enormous economic waste has been caused for rotten and degenerative fruits and vegetables during transportation which value 70 billion yuan. This loss is caused by inappropriate transportation means, so if one-stop cold chain logistics is introduced to agricultural products transportation, losses of fruits and vegetables during transportation can be greatly reduced, and thus the cold chain logistics has large increasing space. By knowing about status quo of agricultural products cold chain logistics and analyzing overseas advanced agricultural products cold chain logistics system, problems existing in the development of agricultural cold chain logistics in our country can be found so as to propose some constructive suggestions for cold chain logistics system by learning from overseas advanced theory and management experience with the construction of an effective agricultural products cold chain logistics mode.

II. THE DEVELOPMENT STATUS AS WELL AS EXISTING PROBLEMS IN AGRICULTURAL PRODUCTS COLD CHAIN LOGISTICS

A. *The development status of overseas agricultural products cold chain logistics*

1) *The development status of agricultural products cold chain logistics in Canada*

A complete agricultural products cold chain logistics system has been formed in Canada, which experienced

three stages for establishing a complete cold chain logistics.

a) *The budding and generation stage of cold chain logistics concept (in the 1930s)*

With the invention of freezer and emergence of refrigerator in the early stage of world war two, people had realized the importance of retaining food freshness and freezing food. With the transformation of economic forms, industrial economy has even larger development space with an increasingly larger position and function of logistics in commodity circulation and marketing, which is the budding stage of Canadian cold chain logistics development.

b) *The practice and promotion stage of cold chain logistics management (from the 1950s to the middle 1980s)*

With the popularization of freezer and employment of road transportation system, especially the development of supermarket, the initial development of cold chain logistics in Canada has become relatively mature. From the 1970s to the middle 1980s, logistics management technology has been generated and constantly perfected with the development and popularization of computer technology and application; while various transportation associations have been established at that time, which made the cold chain logistics standard with relatively perfect cold chain logistics system initially.

c) *The stage of rapid development under internationalization and informatization (since the middle 1980s)*

In recent years, Canadian service economy has been rapidly developed and logistics has been developed into informatization, automation and intellectualization with the development of third-party logistics.

As we all know, Japan has a long history for the development of logistics, and Japanese agricultural products logistics has received rapid development for government's support; besides, agricultural products cold chain logistics, as part of agricultural products logistics, has been developed even more rapidly. Japan, as one of the countries with long history of cold chain logistics development, its circulation mode of agricultural products is direct sales-oriented mode. Japan has a huge, smooth, complex and effective agricultural products cold chain logistics system with very developed infrastructure and equipment. Its roadway,

railway and waterway are convenient with high-speed ways all over urban and rural areas and roadway network has high degree of connectivity. By employing cold chain technology equipment in the whole logistics, the loss rate of agricultural product will be greatly reduced.

Nowadays technology and equipment in each section of cold chain logistics have been quite mature and perfect for agricultural products in Japan, which is in the leading position internationally. Logistics facilities in each large and medium-sized cities, harbors and main highway hubs have been planned rationally. Various infrastructures nationwide include highway net, new railway transportation network, coastal harbor facilities and aviation hub have formed a relatively complete cold chain logistics system. By adopting advanced technological equipment with sufficient facilities and perfect cold chain in the whole cold chain logistics will not only guarantee food security within the whole society, but improve industrial level of agriculture.

B. The development status and development trend of domestic agricultural products cold chain logistics

1) The development status of domestic agricultural products cold chain logistics

Cold chain logistics in our country was originated as early as in the 1950s for the export of agricultural meat, and agricultural products cold chain logistics began to develop at that time with improvement of partial insulation vehicles. Since China is a vast agricultural country with agricultural products turnover ranking the first in the world, so effective circulation of agricultural products is related to the overall development of national economy, agricultural modernization as well as farmers' fundamental interests. Agricultural products cold chain logistics has received certain development after decades' development. Since 21st century, the technology on storage and freshness of agricultural products has been developed rapidly. With the constant improvement of environment and conditions, agricultural products cold chain logistics has been rapidly developed.

On one hand, with the rapid development of economy, there is an increasingly higher demand for cold chain logistics. Fruits, vegetables, meat and aquatic products are all service objects by cold chain logistics. In recent years, there is an urgent demand for cold chain logistics with the increase of production quantity and demand for these agricultural products especially for dairy products since the total output of dairy products in our country ranks the fourth in the world. According to data from Shenlong analyst, the total output of dairy products in 2013 reached 41.5 million tons, increasing by 4% compared to the 40 million tons in 2012. In 2013, the total output of meat in the whole country reached 83.73 million tons. China, as the second largest producing country for poultry, it is expected to replace America to become the first largest country in the coming years. The total output of poultry in our country will be greatly increased in a few years, so there will be more urgent demand for agricultural products cold chain logistics.

On the other hand, the refrigerated transportation rate of fruits and vegetables, meat and aquatic products in

2010 reached 15%, 30% and 40% respectively. In terms of infrastructures, in 2009, there were nearly 20 thousand refrigeration houses in the whole country with the total capacity of 8.8 million tons. The quantity of insulation refrigerated trucks was increased to 40 thousand by 2010 from the 21 thousand in 2000. The five vertical and two lateral green channels have been opened for the circulation of fresh agricultural products. Since 2012, construction projects of cold chain logistics infrastructures have also increased, for example, the largest cold chain logistics base project in North China with annual throughput capacity of 2.4 million tons and storage capacity of 80 thousand tons has been launched in city of Xingtai, Hebei. On the whole, the development of agricultural products cold chain logistics has been on right track.

2) The development trend of domestic agricultural cold chain logistics

a) The sound policy environment, economic environment as well as cultural environment of agricultural products cold chain logistics

With the good momentum of agricultural products, our government has attached even greater importance to developing agricultural products cold chain logistics, issuing a series of policies to promote the development of cold chain logistics and to encourage its development. In the future, our country will continuously issue a series of detailed policies to promote the development of agricultural products cold chain logistics, which will provide a sound policy environment with a rapid development for agricultural products cold chain.

b) The rebound of infrastructures for agricultural products cold chain logistics

In recent years, with the guidance by government's policies and demand by cold chain market, refrigerated houses, delivery center and other cold chain infrastructures have received more importance. Since the second half of 2010, the trend had become even more obvious. Then these infrastructures had been carried out comprehensively since 2012, and there will be more facilities for cold chain implemented in the future.

c) The standard construction of agricultural products cold chain logistics will be gradually perfected

There has always been a large gap between our country and developed countries regarding the standard construction of agricultural products cold chain logistics. The standard construction of agricultural products cold chain logistics will not only affect the operation efficiency of cold chain logistics enterprises, but it can even affect the circulation efficiency of cold chain logistics service objects, especially the quality security of agricultural products.

d) The informatization level of agricultural products cold chain logistics will be further improved

Whichever system it is, it must be a good system as long as it has high level of informatization. The informatization level can affect the construction of agricultural products cold chain logistics. With high informatization level, the cold chain system will be more convenient, fast, efficient and thus the logistics system

can give full play to its maximum value. In the Development Planning of Agricultural Products Cold Chain Logistics, it proposes that bar code, RFID, GPS and sensor technology should be promoted and applied with the establishment of national and regional process monitoring system platform for fresh agricultural products' quality and security.

III. COUNTERMEASURE TO ACCELERATING THE DEVELOPMENT OF AGRICULTURAL PRODUCTS' COLD CHAIN LOGISTICS

Problems existing in the development of agricultural products cold chain logistics have been found out by comparative study on agricultural products cold chain logistics home and abroad, and then countermeasures have been concluded according to research and investigation on polices, industrial environment and enterprises.

A. *Accelerating standard construction of agricultural products cold chain logistics*

It is beneficial to accelerate the construction of agricultural products cold chain logistics system by accelerating the standardization of agricultural products cold chain logistics so as to optimize cold chain logistics system and perfect its construction. Our country should accelerate standard construction for agricultural products cold chain logistics and perfect the laws and regulations of cold chain as well as the standard construction of cold chain logistics. For example, clear temperature standards and certification standards should be set. By further strengthening the formulation strength of national standards, guidelines and relevant standards should be formulated for cold chain logistics which are close to international level so as to standardize and guide agricultural products cold chain logistics in our country with improvement of logistics service quality and management level. By technological innovation and improvement of service efficiency, we can better take part in international competition.

A good cold chain logistics system can't live without a complete and effective cold chain logistics standard system. Besides, a good cold chain logistics standard system can't live without government's support and enterprise's effort. With common efforts and cooperation between the two parties, it can not only realize their benefits but also realize massive people's interest so as to promote the effective development of agricultural products cold chain logistics system in our country with the realization and improvement of farmers' interests.

The problem of imperfect standardization of overall cold chain logistics in our country exists in most regions and most enterprises.

B. *Accelerate the construction of infrastructures for cold chain logistics*

Compared to developed countries, the infrastructures of cold chain logistics in our country is relatively backward since most of them were established before which have been eliminated by developed countries. These infrastructures can't meet our demand for cold chain logistics operation. Besides, the reason for

backward construction of cold chain logistics infrastructures is that we have no rapidly and effectively developed agricultural products cold chain logistics. Therefore, we should accelerate the construction of cold chain infrastructures, which is of great importance. A good logistics infrastructure is not only related to the normal and effective operation of cold chain logistics, but it is also related to agricultural plans.

The construction of cold storage facilities in origins and wholesale markets should be strengthened in order to accelerate the infrastructure construction of cold chain logistics so as to realize a closed circulation of the whole industrial chain for cold chain logistics with as less sufficient section as possible. At present, cold storage capacity in our country is relatively low, which can't provide cold chain guarantee for fresh agricultural products with still large shortage regarding construction of refrigeration house. Therefore, refrigerated enterprises should be encouraged to make technological reformation on current refrigeration houses with further construction of a group of advanced and applicable refrigerated facilities as well as construction of refrigerated infrastructures in main transportation roads so as to form supporting storage and delivery facilities matched with intermodal as soon as possible. Also the low-temperature delivery center should be constructed, encouraging a group of delivery centers with functions of transit and distribution near large and medium-sized cities so as to form an integrated cold chain logistics system and increase vehicles for cold chain transportation. Refrigerated cold chain enterprises should be encouraged to procure more new-type insulation vehicles to improve the capability of cold chain logistics transportation.

C. *Cultivate more professional talents for cold chain logistics*

There are very few logistics talents in current logistics system, within whom most are non-professionals. And in logistics companies, some are even just graduated from middle school or high school with few of college graduates, let alone university graduates, so there are even less graduates working in cold chain logistics. Therefore, professional logistics talents should be cultivated for the establishment of high-effective agricultural products cold chain logistics so as to meet necessary conditions for the development of cold chain logistics. First, relevant staff should be given retraining by strengthening cultivation of technology on cold chain logistics for excellent employees so that they can learn advanced cold chain logistics technology and management experience in the world. Besides, related logistics courses should be set in each college and university so as to cultivate cold chain logistics talents from the very beginning. Students should be allowed to practice in companies so as to combine their theoretical knowledge together with practice, leading to excellent logistics talents. In the end, enterprises should strengthen cooperation with professional institutes to cultivate a group of senior logistics talents by actively organizing logistics training class of high level so as to solve the problem of insufficient professional cold chain logistics at present.

The problem of insufficient professional cold chain logistics talents in the South is even more serious than that in the North since the development of cold chain logistics in the South is faster. There are many logistics companies and most of them are medium and small-sized enterprises who have much demand for professional logistics talents. Hunan, as a representative, has even more serious problem of insufficient professional talents in cold chain logistics, so more attention should be paid to cultivating professional logistics talents.

D. The third-party cold chain logistics enterprises should be cultivated rapidly so as to promote logistics out-resourcing

The previous logistics mode can't far to meet current transportation need for fresh agricultural products due to the relationship between supply and demand as well as people's demand for life quality. At present, the main cold chain logistics mode in our country is the self-conducted cold chain logistics by production or sales enterprises themselves. Cold chain logistics is single refrigerated storage and refrigerated transportation with low efficiency and high cost because of the scattered resources and small scales. The third-party agricultural products cold chain logistics enterprises can centralize resources so as to input into each section of constructing cold chain logistics to provide logistics services like storage, transportation and delivery for agricultural products operators, which can raise the cold chain logistics efficiency and reduce losses and cost.

Compared to traditional logistics mode for fresh agricultural products, the third-party logistics mode has the following advantages.

1)The third-party logistics mode can shorten logistics time and reduce logistics losses by reducing intermediate links during the logistics of fresh agricultural products. Besides, supported by information network system, the storage quantity and storage time can be further reduced so as to further reduce cost.

2)By relying on high-degree professionalism, third-party logistics enterprises can reduce the cost of cold chain logistics system by scale operation.

3)By establishing information network system, third-party logistics enterprises can increase collection and processing speed of production and sales information of fresh agricultural products; besides, with the help of information network system, each section of the supply chain can be connected so as to form direct and fast communication of production and sales information for a better balance between supply and demand.

IV. CONCLUSION

By analyzing development of agricultural products cold chain logistics home and abroad, the paper has found the gap between our country and developed countries with proposal of some constructive suggestions and strategies. The standard construction of agricultural products cold chain logistics should be accelerated as well as the construction of infrastructures. Besides, more professional talents should be cultivated for cold chain logistics; in addition, third-party cold chain logistics enterprises should be cultivated with the promotion of logistics out-resourcing business.

Our country is a vast country where agriculture is of great importance, so how to guarantee farmers' interests is question related to each farmer as well as the whole nation. Supply and demand is antithetical but also connected. Therefore, research on agricultural cold chain logistics system is the most important matter. I hope the agricultural products cold chain logistics system can be developed better and better regardless of facilities of technology so as to meet social development and demand.

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