



AgEcon SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

The Research Progress of the Cold Chain Logistics of Agricultural Products

Haituo QIE*

Beijing Wuzi University, Beijing 101149, China

Abstract This article is based on the result of the research findings about cold chain logistics of agricultural products of many experts and scholars. It analyzes three aspects of cold chain logistics of agricultural products: relevant concepts about cold chain logistics, existing problems and suggestions for improvement of it. While reviewing the experts' views of the second question, this article comes up with some of my views of it and finally puts forth the recommendations for improvement about cold chain logistics of agricultural products based on the market and experts' views, in order to provide a reference for relevant enterprises.

Key words Cold chain of agricultural products, Cold chain logistics, Cold chain prospects

The emergence and development of cold chain logistics has brought new methods and ideas for the conservation of agricultural products, and also provided new opportunities for the development of agricultural economy. The current study on logistics of agricultural products is still in its infancy, which is also one of the factors hindering the development of cold chain logistics. On the basis of previous studies, this paper mainly uses literature review to further explore the cold chain logistics of agricultural products, in order to provide a theoretical reference and practical idea for the study of related issues.

1 Definition

1.1 Cold chain A cold chain is a temperature-controlled supply chain. An unbroken cold chain is an uninterrupted series of storage and distribution activities which maintain a given temperature range. It is used to help extend and ensure the shelf life of products such as fresh agricultural produce, seafood, frozen food, photographic film, chemicals and pharmaceutical drugs. Such products, during transport and when in transient storage, are called cool cargo. Unlike other goods or merchandise, cold chain goods are perishable and always enroute towards end use or destination, even when held temporarily in cold stores and hence commonly referred to as cargo during its entire logistics cycle.

The development of cold chain has gone through a long process, and an agreement is not reached on the definition of cold chain until after 2000. Liu Beilin (2004) maintains that the food cold chain refers to a systematic project making perishable foods always in the low temperature during the production, storage, transportation, marketing and various other links before consump-

tion, to ensure food quality and reduce food losses^[1].

On the basis of the definition proposed by experts and scholars, Fang Xin (2005) defines the cold chain as a particular supply chain system making all links of fresh food from the origin to the customer always in the low-temperature environment required for the products, to ensure food safety and quality, reduce the loss and reduce pollution^[2]. Currently, the definition of Fang Xin on cold chain has been widely accepted and recognized. This article takes the definition of Fang Xin as the basic definition for this study.

1.2 Cold chain logistics Foreign definition of cold chain logistics is that it is a special supply chain system and can make fresh and perishable foods always remain in a state of low temperature in the links of procurement, transportation, storage, marketing and consumption, thus ensuring the freshness and safety of foods, and reducing the waste and pollution caused by technical problems^[3]. Thus, it can be found that in terms of the definition of cold chain and cold chain logistics, domestic and foreign definitions are very similar, and all highlight the way of temperature control in various links to reduce food losses and ensure the freshness.

Domestic scholar Ding Shengjun defines the cold chain logistics as a logistics system making the perishable and fresh foods always at a predetermined low temperature in the links of production, storage, transportation, sale and consumption, with the best logistics means to ensure food quality and reduce food loss^[4].

Zhang Qin (2012) points out that the cold chain logistics is a high-tech cryogenic systematic project. The cold chain logistics of agricultural products is a logistics chain system used for the edible agricultural products, and its purpose is to ensure the freshness and nutrition of these products^[5]. Different from the predecessors' study, Zhang Qin also points out that the transport and storage tools require good quality, and it is necessary to use high level processing technology, coupled with good packaging conditions and appropriate low temperature, in order to truly and effectively ensure food quality.

Thus, for cold chain logistics, the domestic and foreign ex-

Received: April 28, 2014 Accepted: June 25, 2014

Supported by Key Scientific Research Project of Beijing Municipal Education Commission in 2013 (Incentive and Restraint Mechanisms for the Effective Transmission of Food Safety Information – Based on the Follow-up Study of Beijing City).

* Corresponding author. E-mail: qiehaituo@sina.com

perts and scholars' definitions are very similar, aimed at illustrating a low-temperature logistics system which can effectively reduce the losses of perishable and fresh foods from production to selling, and this logistics system needs more high-tech support than previous logistics. Based on this, some scholars incorporate the conditions other than temperature into it, such as process and packaging, indicating that the study on cold chain logistics is developing toward a more comprehensive and in-depth direction.

1.3 Cold chain logistics of agricultural products Peng Lixia (2011) points out that the special nature of purpose of cold chain logistics of agricultural products (ensuring that the quality of perishable agricultural products does not change), and the continually low temperature required for the cold chain logistics of agricultural products, are the two major factors making the cold chain logistics become a very complex huge project, with large investment and high demand^[6].

The high technology is integrated into the logistics industry, which poses a major challenge for the logistics industry, and also brings unprecedented opportunities for the traditional logistics industry. The cold chain logistics of agricultural products should be defined as the application of cold chain logistics to the field of agricultural products. In the annual meeting for cold chain logistics of agricultural products in December 2013, there was expert humorously saying that the logistics was not sofa plus wheels, and similarly, the cold storage warehouse was not the air conditioner plus warehouse.

The cold chain logistics has higher technical requirements than the ordinary logistics. Every enterprise engaged in the cold chain logistics industry should earnestly seize the opportunities arising from the growth in demand of cold chain, and circumvent a variety of risks in emerging markets.

2 The existing problems in the cold chain logistics of agricultural products

2.1 Lack of overall planning of cold chain logistics of agricultural products Bao Changsheng (2007) and Wu Qinggang (2011) believe that the biggest obstacle to the development of China's cold chain logistics is that the upstream, intermediate and downstream parts in cold chain logistics do not link up well, and it has not yet formed a complete cold chain^[6, 8].

If the purchasers such as supermarket or farmer's market can not get stable supply of qualified agricultural products from the upstream suppliers in the supply chain, then both the suppliers and purchasers can not get stable interests in this unstable partnership. It is just the case even if something is wrong with one link, not to mention the entire chain in this unstable relationship. How to promote the long-term healthy development of cold chain logistics of agricultural products?

In 2007, Bao Changsheng mentioned that there are many primary agricultural products in China, and these primary products have low added value, so even if there is large production capacity, we can not get great competitive advantage. At the same time,

there are flaws in the management team, specialization, brands or planning of cold chain logistics of agricultural products, which undoubtedly causes the cold chain logistics enterprises of agricultural products to develop slowly^[9].

To solve this problem, either business or government alone is not competent, and the best way is to seek opinions of businesses and develop reasonable laws and regulations and use force to guide the businesses to advance in the direction conducive to the development of market and industry.

2.2 Weak infrastructure of cold chain logistics of agricultural products Han Yuhong (2006) points out that because of outdated equipment, the required low temperature can not be provided for agricultural products, so there is a huge loss of perishable foods, especially the primary agricultural products^[10].

Tian Feng (2012) said that China's cold chain logistics enterprises of agricultural products are seriously flawed in terms of the outdated transport tools and small transport capacity. The infrastructure equipment of railway and road is outdated and distributed unevenly in the region, greatly impeding the normal operation of cold chain logistics system of agricultural products^[9]. Wu Qing Gang (2011) suggested that many domestic refrigerated storerooms have exceeded the serviceable life and can no longer provide the required low temperature^[8].

In short, the insufficient transport capacity, low transport quality and high losses of agricultural products are the most direct consequence of weak infrastructure of cold chain logistics of agricultural products. In order to promote the long-term development of cold chain logistics of agricultural products, the optimization and updating of infrastructure is the first problem to be solved.

2.3 High operating costs and difficult financing for the cold chain logistics of agricultural products Since the cold chain logistics has high requirements on equipment and technology, the costs of cold chain logistics are high. This makes many companies unwilling to get involved in the cold chain industry^[9]. Until now, many companies involved in cold chain logistics still make efforts towards the breakeven point. For the transport of agricultural products, the losses arising from the normal temperature transport is likely to be less than the costs arising from the cold chain logistics transport of agricultural products. Truly realizing the cost increase brought about by the cold chain logistics of agricultural products is likely to be unbearable to general logistics companies.

Moreover, compared with the normal temperature logistics system, the cold chain logistics of agricultural products not only has high high-tech content and high establishment and operation costs, but also has huge capital investment but low revenue, so it is not easy to find the right financing channel. It is also the bottleneck that China's cold chain logistics of agricultural products is difficult to break through.

Wu Qinggang (2011) also suggests that the unsound market, vicious competition among enterprises and sacrificing quality for short-term gains, will cause devastating harm to both business and markets in the long run^[8].

2.4 Lack of talents in the field of cold chain logistics of agricultural products

Tian Feng (2012) suggests that the talents for China's cold chain logistics industry of agricultural products are rare at present, and cultivating the specialized cold chain logistics personnel is imminent^[9]. At present, the major of logistics has been set in many universities, but most of them have not yet refined the cold chain logistics.

From the current situation, the cold chain logistics will have good prospects for development in the coming period, but if without the professionals, even the best equipment, laws and regulations and supporting policies can not really promote the development of cold chain logistics of agricultural products. Cultivating a group of high-quality professional management personnel of cold chain logistics of agricultural products is imminent.

Although the current situation of cold chain logistics of agricultural products allows of no optimist, the outlook is still very good, and the main reason is the growing demand and progressive development of information technology. Agricultural product is always an important livelihood issue, and the cold chain logistics industries of agricultural products usher in a larger space for development along with people's growing emphasis on food, meat, dairy products and other fresh products.

In recent years, pharmaceutical and flower companies have established cold chain logistics department, or outsourced the cold chain logistics business. Some technical standards for cold chain logistics have been introduced to provide better environment for the development of cold chain logistics of agricultural products. Thus for cold chain and cold chain practitioners, the prospects for development are very bright.

In short, these problems can not be solved within one day, and in the annual meeting for cold chain logistics of agricultural products in December 2013, some experts pointed out that there was an urgent need to establish the cold chain logistics network. Developing China's cold chain logistics system of agricultural products step by step is still the ultimate solution to the problems concerning the cold chain of agricultural products. In such situation and environment, relevant experts and scholars have put forth many suggestions and opinions, in order to provide the necessary reference for the development of cold chain logistics of agricultural products.

3 Recommendations for improving the cold chain logistics of agricultural products

3.1 Strengthening the overall planning of cold chain logistics of agricultural products

The refrigerated logistics of agricultural products crosses many industries and sectors, thus it can not be effectively promoted by relying on any party. In order to promote the long-term development of cold chain logistics of agricultural products, it is necessary to make the government well cooperate with the cold chain logistics industry^[10].

First of all, the government should fully consider China's basic conditions and actual needs of cold chain logistics business of

agricultural products, and draw on the experience of developed countries, to develop the policies and incentives for the development of cold chain logistics of agricultural products.

The organizations related to the cold chain logistics industry of agricultural products should play the role of communication and coordination, and develop and implement the overall industry planning and industry standards, to ensure the healthy development of the market.

For the cold chain enterprises of agricultural products, they should actively participate in the overall planning of cold chain logistics of agricultural products, and actively improve services to enhance customer satisfaction and loyalty. In particular, the cross-border cooperation of food business, cold chain logistics enterprises and commercial enterprises is an inevitable trend, and an effective way to enhance the competitiveness. All of these factors must be considered when making the overall planning, and only by doing this can we ensure the smooth implementation of the overall planning.

3.2 Strengthening the software and hardware construction of cold chain logistics of agricultural products

The hardware planning content of cold chain logistics system of agricultural products includes plant planning, storage facility planning and transport equipment planning (Han Yuhong, 2006)^[10]. This requires the cold chain logistics enterprises of agricultural products to improve the cold chain equipment, innovate upon the refrigeration methods, and accelerate the introduction and popularization of advanced technology. For the current status of domestic cold chain logistics equipment, it is necessary to develop more airtight refrigerator cars with flexibility^[8].

In addition, it is necessary to strengthen the cooperation with advanced countries, and improve the research and development level of new refrigeration equipment and scientific plant planning.

The software planning of cold chain logistics system is the planning of cold chain logistics information system, which includes the planning of inventory control system, customer service system, warehouse management system and transportation management system.

Through the introduction of information technology, the cold chain logistics enterprises can not only achieve traceability of agricultural information, but also monitor the logistics information, to provide a basis for accurate decisions.

3.3 Reducing the costs of cold chain logistics of agricultural products

The service quality of cold chain logistics of agricultural products is related to people's livelihood, and governments at all levels should further increase supervision on cold chain logistics, and actively take measures to ensure the sustained, rapid and healthy development of cold chain logistics^[8] (Wu Qinggang, 2011). The cold chain logistics companies also need to introduce advanced technology, to improve service quality and reduce service costs. In terms of the cold storage warehouse and delivery route choice, it should follow the principle of optimization, reduce costs and improve the utilization rate of funds, and strengthen co-

operation among the subjects on the chain.

3.4 Strengthening the training of professional talent of cold chain logistics of agricultural products The lack of cold chain logistics talents has largely restricted the development of cold chain logistics, but the lack of talent also indicates more job opportunities. If this issue can be resolved properly, it will not only promote the development of cold chain logistics of agricultural products, but also provide more employment opportunities and broader stage for more job seekers.

4 Conclusions

In short, since the emergence of the concept of cold chain, the experts and scholars' studies have come along, and especially in recent years, with changes in the market environment, there have been more and more a variety of theoretical studies and practical attempts carried out around "cold chain logistics of agricultural products". The cold chain logistics of agricultural products ushers in great opportunities for its development, but opportunities and challenges will always coexist for the subjects in the cold chain market. This paper reviews the experts and scholars' studies on cold chain logistics of agricultural products in recent years, in order to provide some reference for resolving the related issues.

(From page 28)

References

- [1] LUO AJ. A theoretical research of policy to grain subsidy in China[D]. Hunan: Hunan Normal University Library, 2006. (in Chinese).
- [2] LI G. The state and improvement of researching the grain direct subsidy policy of our country[D]. Guangxi: Guangxi Normal University Library, 2009. (in Chinese).
- [3] SUN ZC. We must insist on "heart food, hearts do not panic"[N]. People's Daily, 2008. (in Chinese).
- [4] MA YL, YANG Y. The direct subsidies to grain producers: The policy's impacts on farmers' willingness to grow grain crops, their income and inputs—A case study in Hebei Province[J]. Journal of Agrotechnical Economics, 2005(2): 7–13. (in Chinese).
- [5] YANG YX, LUO AJ. Theoretical analysis of direct grain subsidy policy in China[J]. International Economics and Trade Research, 2006, 22(4): 35–39. (in Chinese).
- [6] HAN XP, MAN L. An economic analysis on the policy for direct subsidy to grain growers in China[J]. Journal of Agrotechnical Economics, 2007(3): 80–84. (in Chinese).
- [7] SHEN SX, TONG DX. Analysis on the effect of the policy to subsidize directly to the grain producers in Jilin Province[J]. Problems of Agricultural Economy, 2008(8): 12–16. (in Chinese).
- [8] LP, TAN XY. The policy to subsidize directly to the grain producers and its impacts on the farmers' income growth: A case of Anhui[J]. Journal of Agrotechnical Economics, 2006(1): 44–48. (in Chinese).
- [9] Research Group of Empirical Analysis on Implementation Performances and Policies Suggestions of Grain Direct Subsidy Policy. Analysis on implemen-

References

- [1] LIU BL. Food –preserving and cold storage chain[M]. Beijing: Chemical Industry Press, 2004: 163. (in Chinese).
- [2] FANG X. Current condition and reflection about China's food cold chain logistics[J]. Logistics and Material Handling, 2004, 9(11): 54–59. (in Chinese).
- [3] Francois. New development in the cold chain: specific issues in the warm countries[J]. Ecolibrium, 2003(7): 10–14.
- [4] DING SJ. To positively develop the "cold chain" logistics of fresh food in China[J]. China Grain Economy, 2007(9): 37–40. (in Chinese).
- [5] ZHANG Q. A study on security monitoring of agricultural products cold-chain logistics in China[D]. Wuhan University of Science and Technology, 2012: 9. (in Chinese).
- [6] PENG LX. Study on the development situation of cold chain logistics and the countermeasures[D]. Hebei University of Engineering, 2011: 4. (in Chinese).
- [7] BAO CS. Study on the operation and management of cold chain logistics [D]. Tongji University, 2007: 6–7. (in Chinese).
- [8] WU QG. The current situation and the countermeasures of China's cold chain logistics development[J]. China Business and Market, 2011, 25(2): 24–28. (in Chinese).
- [9] TIAN F. Evaluation research on performance of agricultural products cold-chain logistics enterprises[D]. Hunan University, 2012: 6–8. (in Chinese).
- [10] HAN YH. Study of countermeasures relating to develop Chinese cold chain logistics[J]. Nongchanpin JIagong. Xuekan, 2006(6): 29–32. (in Chinese).
- [10] XIAO GA. Research on tight equilibrium model of food supply-demand and index measurement[J]. Journal of Xiangtan University: Philosophy and Social Sciences, 2011(2): 47–51. (in Chinese).
- [11] ZHANG XB. Policy analysis on high-quality seed subsidy in China[D]. Beijing: The Chinese Academy of Agricultural Sciences (CAAS), 2008. (in Chinese).
- [12] HOU ML. The theoretical and empirical study on China grain subsidy policy[D]. Wuxi: Jiangnan University, 2009. (in Chinese).
- [13] YANG YX, LUO AJ. Theoretical analysis of direct grain subsidy policy in China[J]. International Economics and Trade Research, 2006, 22(4): 35–38. (in Chinese).
- [14] Kym Anderson, Yujiro Hagami. The political economy of agricultural protection[M]. Beijing: China Agriculture Press, 1985. (in Chinese).
- [15] A. Bstoeck. The result of agriculture supporting policy from the perspective of macro-economics[M]. Beijing: China Agriculture Press, 1981. (in Chinese).
- [16] G. Miller. Political economy of international agricultural policies[M]. Beijing: China Agriculture Press, 1986. (in Chinese).
- [17] Eric A. Monke, Scott R. Pearson. The policy analysis matrix for agricultural development[M]. Cornell University Press, 1989.
- [18] Agricultural Policies in OECD Countries—Monitoring and Evolution
- [19] Fred Gale, Bryan Lohmar, and Francis Tuan. China's new farm subsidies [OL]. Economic Research Service/USDA. 2005, 5(1): 1–6.