

Cold Chain Logistics Management

(Full Paper)

Chih-Chung Tai*, National Chengchi University, Taiwan, michaeltai.1958@gmail.com

Wei-Hsi Hung, National Chengchi University, Taiwan, fhung@nccu.edu.tw

ABSTRACT

Cold chain logistics is a very complicated issue. Many foods are picked up when meat is slaughtered from animals, there is a certain S.O.P. to save. But because the whole industry chain is very long, many step will affect the safety of food. Whether it is eating fresh food, or using vaccine drugs, it needs to be transported through the cold chain.

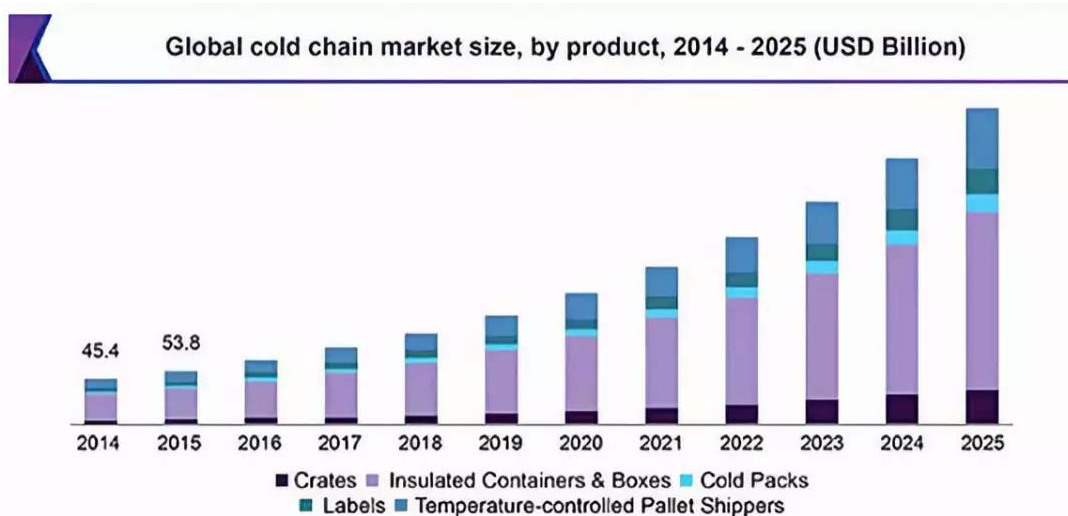
Keywords: Cold chain logistics, fresh e-commerce logistics, halal logistics, ASEAN cold chain logistics, cold chain globalization

*Corresponding author

INTRODUCTION

How big for the market?

In 2017, the global cold chain market shown in Figure 1 is valued at \$147.55 billion, and will reach \$447.05 billion by 2025, with \$18 billion coming from the food and grocery markets and more than \$17 billion from health care products. And the biopharmaceutical cold chain is a product that is estimated to be \$16.6 billion by 2021. The market is expected to continue to grow at a rate of 15.0% per year at a compound annual growth rate. Take example: Fresh E-commerce Logistics: Amazon Acquires US Organic Fresh Food Whole Food Supermarket for US\$13.7 Billion, Fresh e-commerce is the last major retail battlefield that Amazon has yet to conquer. Global fresh-keeping e-commerce still lacks high-quality and efficient cold-chain logistics service solutions.



Source: This study.

Figure 1: Global cold chain market value.

Halal logistics

According to estimates by the World Bank, halal foods have a global business opportunity of \$600 billion a year. It accounts for 16% of the global food market. The halal market is huge, but there are relevant norms and standards to be observed from raw materials, processing processes, logistics, storage and sales.

ASEAN cold chain logistics

Southeast Asia has a tropical climate. In the summer, the demand for cold chain logistics is urgent. The cold chain foundations in Southeast Asia are mostly poor, and the space for improvement is large. The expenditure on food in Southeast Asia is increasing by more than 10% every year.

Cold chain globalization

As more and more food and medical product manufacturers are globalizing, their supply chains must be global. As manufacturers move around the world, these manufacturers must increasingly focus on their products because their products are sold all over the world. If the product goes wrong, it will seriously affect the operation of the entire enterprise. The globalization of the cold chain, and food safety, have prompted governments in the streets to strengthen their regulation of production and supply chains. And various preventive measures and regulations have been established. Take the pharmaceutical industry as an example. For many years, pharmaceutical requirements in most countries have to keep products in the guidelines developed by manufacturers. In 2011, United States passed "The Food and Drug Safety Modernization Act". This mainly for recording every step of the food supply chain, and the product must be traced back to the original point. And its recycling system must be reliable and efficient, and all products listed are the rule must be observed.

In Nov, 2013, the EU has also officially implemented drug regulation, including so-called over-the-counter drugs. The temperature requirements will be extended throughout the delivery process. In the European Union, 80% of medicines require temperature-controlled transportation. Therefore, many drug manufacturers take the same approach when exporting invitations to the United States. Under such circumstance and supervision, logistics is a common issue. Manufacturers are also setting more stringent requirements, so their third-party logistics and other suppliers are adding additional investments to be certified by all relevant agencies by 2020.

BACKGROUND

China Federation of Logistics and Purchasing and Planning Institute, http://www.cflpla.com/index_en.asp, this organization was incorporated in 2002, to provide professional logistics consulting services to governments and businesses. Headquartered in Beijing. Since its establishment ten years ago, it has successively worked with various government ministries (such as the National Development and Reform Commission, the Ministry of Commerce, the Ministry of Communications, the Ministry of Science and Technology, the Ministry of Agriculture, the Forestry Bureau, etc.), local governments, large and medium-sized enterprises, logistics enterprises, and international organizations (Asia Development Bank, APEC, etc.) Research institutions in other countries have formed close partnerships with more than 600 cooperative projects. The Planning Institute has continuously developed and expanded, and has developed into a leading domestic logistics planning consulting company with a wide range of business, strong professional technology and strong social influence. Under China government, we established "Cross-Strait Cold Chain Logistics Alliance" in two years ago. I am the current chairman of this organization.

The main purpose of establishing the "cross-strait cold chain logistics alliance" is because China's cold chain logistics is generally backward, China has a large market demand, and Taiwan has mature cold chain technology. At this moment, China's cold chain logistics is still in its infancy, and there is still a big gap between the level of cold chain logistics and European and American countries. According to the research report, at present the cold chain circulation rate of advanced countries such as the United States and Japan is over 95%, the loss rate is less than 5%, and the profit rate of the cold chain can reach 20% to 30%.

But Chinese cold chain logistics is still transported at normal temperature. The integrated cold chain circulation rate is only about 20%, and the loss rate is more than 20%, the cold chain profit margin is only about 8%, lower than the normal temperature profit rate is only 2%, showing a low proportion of cold chain circulation, loss Large, high-cost situation. In 2014, China's cold storage area was 0.058 cubic meters per person, compared with USA, 0.357 cubic meters per person in the same period. In the same year, China's road refrigerated trucks were 76,000, Japan was 150,000, and the United States was 250,000. The total population of Japan is 126.8 million, the total population of the United States is 325.7 million, and the total population of China is 1.386 billion. These figures can relatively describe the size of China's cold chain, so there is no doubt that China will be the world's largest cold in the future. Chain business Third-party logistics providing cold chain logistics is already emerging opportunities.

Third-party cold chain logistics service providers to the professional logistics mode that is specially developed for the needs of the cold chain logistics industry. It specializes in providing professional high-performance cold chain logistics services and solutions.

Responsible for third-party cold chain logistics service providers, which enables production, processing, sales and other enterprises to focus on their own operations, without using a large amount of fixed assets, manpower and material resources, to enhance the competitiveness of enterprises, so that enterprises can concentrate on improving their own fields. Market. Especially for small-scale, relatively weak or newly established enterprises, due to limited logistics resources and insufficient logistics personnel, it is necessary to outsource the logistics business to professional units for implementation. According to research data, although the third-party cold-chain logistics service providers in the market currently account for less than 25% of the logistics market, third-party cold-chain logistics service providers are developing rapidly, and more manufacturers will choose in the future. Outsourcing its own cold chain logistics business to third party cold chain logistics service providers.

The problems encountered by the development of cold chain logistics service providers:

- 1) Cold chain logistics costs are too high.
- 2) Large refrigeration demand.

- 3) Customers do not pay attention to cold chain transportation, which makes the whole process of cold chain monitoring difficult to achieve.
- 4) Insufficient cold chain logistics infrastructure in the current market.
- 5) Product market standardization is not yet fully standards.

Improvements:

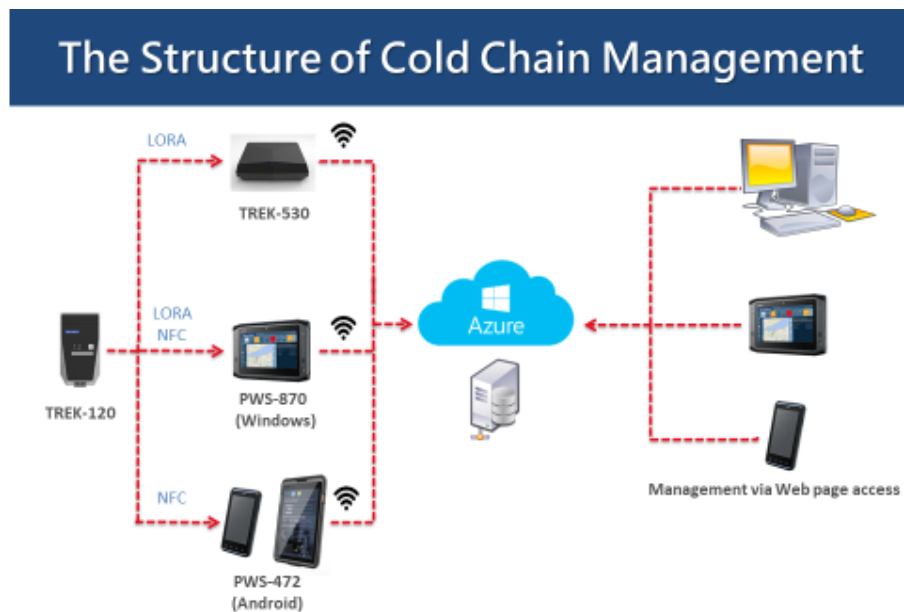
- 1) Strengthen cold chain logistics management.
- 2) Establish and promote product traceability management.
- 3) Strengthening technological innovation of cold chain logistics.
- 4) Public companies must enforce product standardization.
- 5) Strengthen the promotion of cold chain logistics knowledge.

RESEARCH METHOD

Our research is happening at this stage, Using Analysis level program method (AHP) analysis, The key success factors of the current successful operation of the low temperature logistics center.

EMPIRICAL RESEARCH AND RESULTS

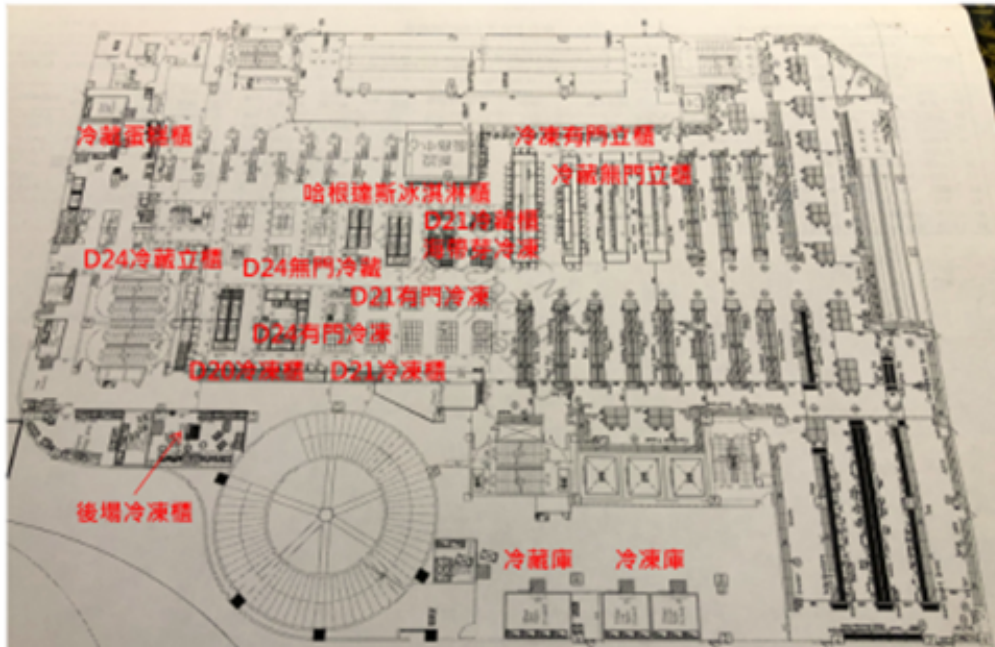
The following case is a supermarket installation temperature SENSOR to control the temperature. The structure of cold chain management and its related works as show in Figures 2 to 10.



Source: This study.

Figure 2: The structure of cold chain management.

Sensor Map



Source: This study.
Figure 3: Sensor map.

2018-03-20 DC 2F00 Freezer area



Source: This study.
Figure 4: Freezer area.

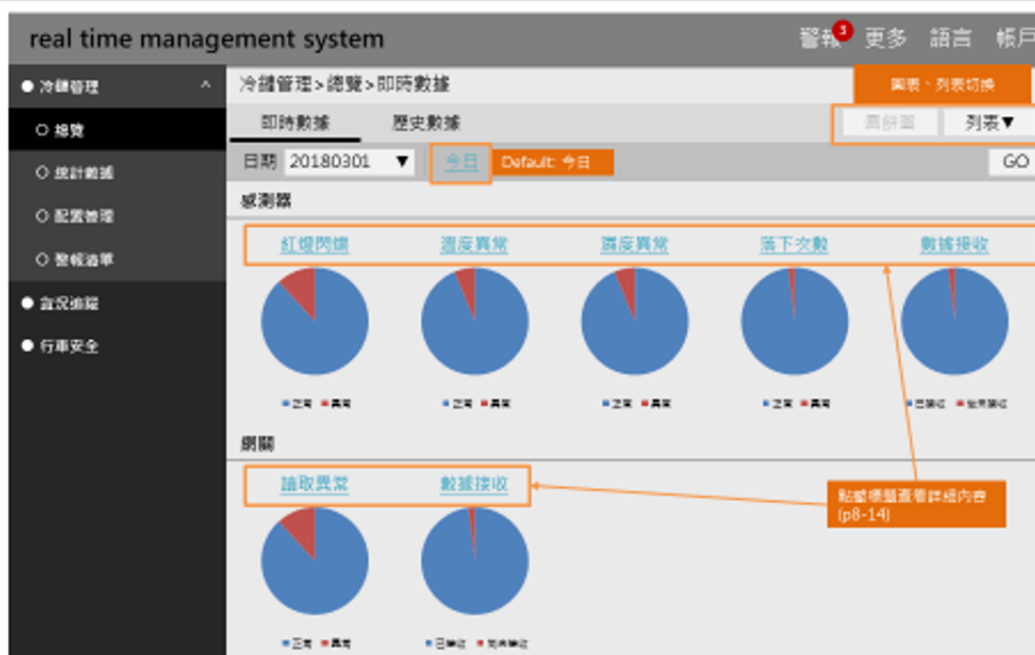
2018-03-18 Replace the sensor



Source: This study.

Figure 5: Use sensor to monitor temperature for cold chain management.

Cold chain management real time data



Source: This study.

Figure 6: Use IoT cloud platform for cold chain management.

Figure 7: Use IoT cloud platform for cold chain management.

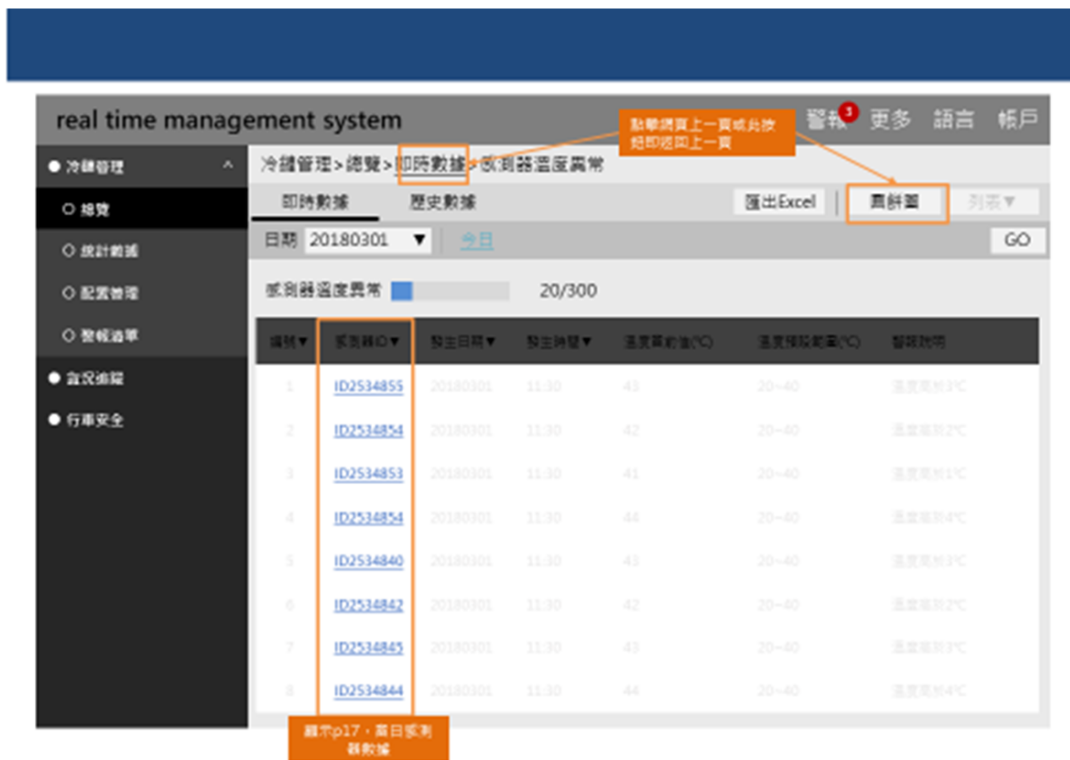
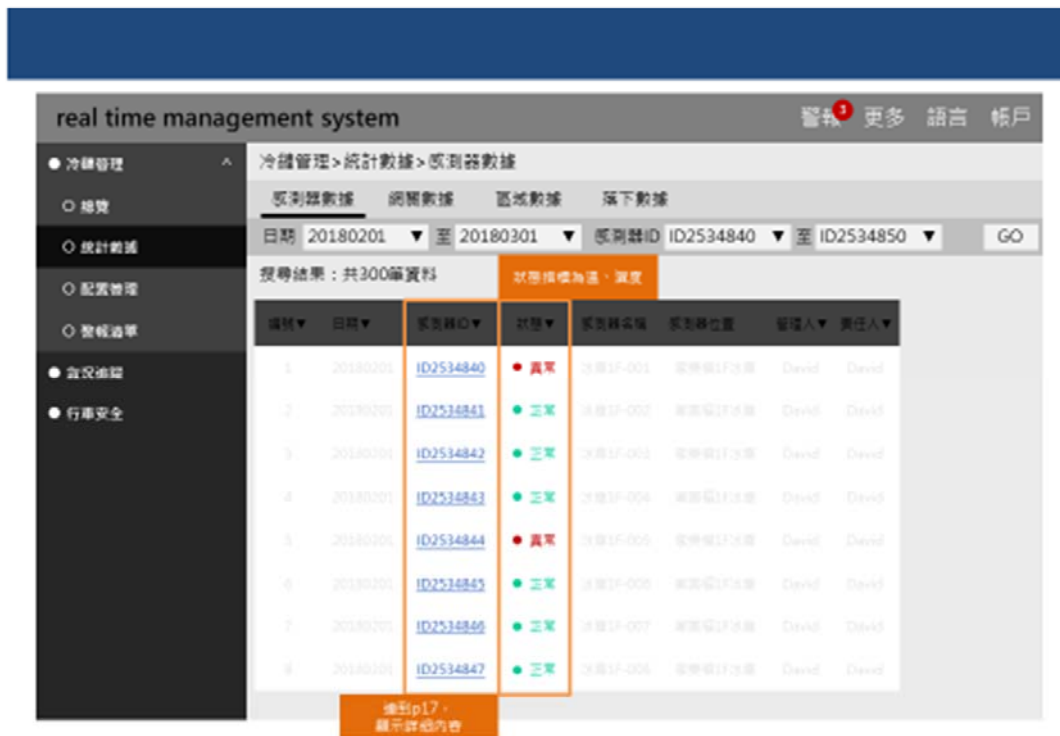


Figure 8: Use IoT cloud platform for cold chain management.

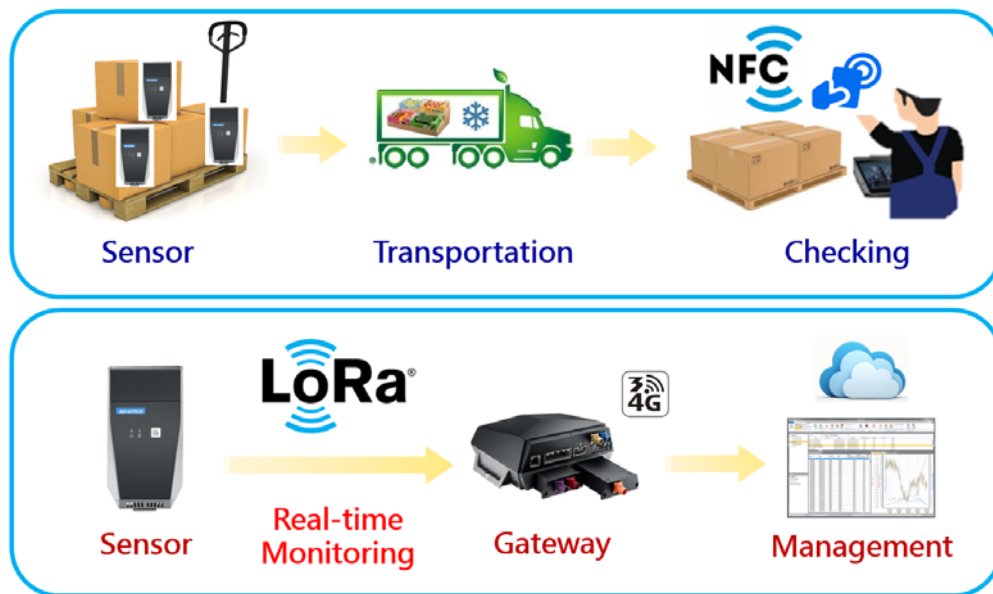


Source: This study.

Figure 9: Use IoT cloud platform for cold chain management.

CONCLUSION

- The cold chain is globalizing.
- Product sensitivity and quality requirements are getting more and more attention.
- Various rules are changing and improving.
- More and more outsourcing more and more processes to third-party logistics companies.
- Cold chain is undergoing mode conversion.
- Market forcing cold chain more efficiency.
- Packaging is evolving to meet new demands.
- Customer behavior are still the most difficult part of the cold chain.
- Financial support is very important.



Source: This study.
Figure 10: Cold chain user scenario.



Source: This study.
Figure 10: Cold chain solution.

REFERENCES

- [1] Cold Chain Logistics Taiwan. (2018). Retrieved from <http://cold.logistics.org.tw/> (September 30, 2018).
- [2] The Apex Group. (2018). Retrieved from <https://www.apexshipping.com/> (September 30, 2018).