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WORLD MARITIME UNIVERSITY

Shanghai, China

**Research on Distribution Program of
Food Cold-Chain Logistics in
Bright Speed Fresh Logistics Company**

By

HU ZE XIN

China

A research paper submitted to the world Maritime University in partial fulfilment of the requirements for the award of the degree of

MASTER OF SCIENCE

INTERNATIONAL TRANSPORTATION AND LOGISTICS

2010

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DECLARATION

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

.....
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ABSTRACT

Title of Research paper: **Research on Distribution Program of Food Cold-Chain Logistics in Bright Speed Fresh Logistics Company**

Degree: **Master of Science in International Transport and Logistics**

With the economy developing, quality of life keeping upgrading, people has transformed their concept for food consumption from purchasing single, traditional food to prefer the various, fast types, especially after the completeness of cold-chain development in food trade, which plays an extremely important role on food security and food industry development. The distribution of third party cold-chain logistics means a supplier or dealer accredits an external logistics company taking over the cold-chain logistics service but not by themselves, and this is the basic situation of cold-chain logistics industry in our country.

This paper will introduce distribution of frozen food in our country and overseas. By pointing out the major distribution problems we are facing in Bright Speed Fresh Logistics Company, then discuss the inevitable trend we need to go through. For instance, take a research on the distribution program of Bright Speed Fresh Logistics company in Shanghai, aiming to analyze the present condition of cold chain distribution developing process and attract more customers to make more profit. To learn how Electronic Tagging Technology could be using well in cold-chain logistics distribution, analyzing how to share the information better even under the order-to-driving model, how to manage the timing procedure well without any delay in entire supply chain system, and how to choose the proper transporting strategy, to find out the necessity of perfecting the cold-chain logistics distribution process which is based on the present technology.

KEYWORDS: logistics, cold-chain, distribution, transportation, electronic tagging, vehicle optimization

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LIST OF ABBREVIATIONS

| | |
|-------|--|
| CLTL | Cold less than truckload |
| DPS | Digital Picking System |
| EOQ | Economic order quantity |
| HACCP | Hazard Analysis Critical Control Point |
| ISO | International Standardization Organization |
| LTL | Less Than Truckload |
| LSP | Layered Service Provider |
| LED | Light Emitting Diode |
| LAN | Local Area Network |
| MIS | Management Information System |
| 3PL | Third party logistics |
| RGT | Refrigerated Transportation |
| RGD | Refrigerated Distribution |
| TMS | Transport Monitor System |
| TPL | Telecommunications Programming Language |
| VRP | Vehicle Routing Problem |
| VSP | Vehicle Scheduling Problem |
| VRPTW | Vehicle Routing Problem with Time Windows |
| WMS | Warehouse Management System |

Chapter 1 Introduction

1.1 Background of this dissertation

The food which has been processed by low-temperature technology and circulated under the low temperature environment, Always known as low-temperature food. At present, the low temperature food can be divided into two major types, frozen food and chilling food (Figure 1). This kind of food is usually frozen rapidly to -30 degrees in a short time, and always be storage and transported at -18 degree. But the chilling food such as chilling meat, vegetables, low temperature diary and other prepared food, people differ them away according to the catalogues and process and transport them via the different temperature between -3 to 15 degree.

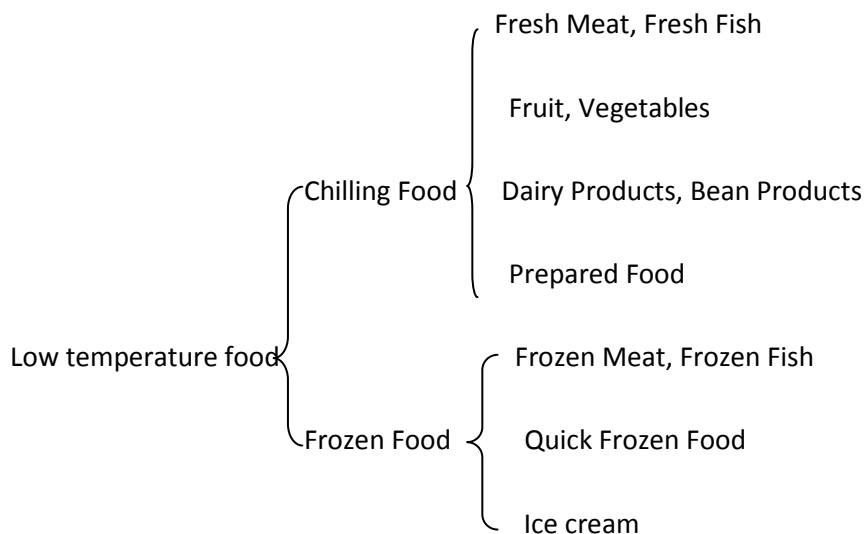


Figure 1-The classification of low-temperature food

Source: Tang Junjie, Liu Zhongbao, Yu Yuanyuan, (2007, March). *Distribution mode of third party cold chain logistics*, Refrigeration technology, 118(3), 9-10

The food cold chain is aiming to make all sorts of perishable products with different temperature requirements under the perfect monitoring. It can be maintained with the high quality level, wherever in the storage or the consumption stage, and it works through the entire storage and distribution process. The most important factors of the food are freshness and safety, the food cold

chain could ensure the every logistics stages work well in every teeny detail, which guarantees to satisfy the consumers better with the positive value and top quality.

Cold-chain logistics for food distribution is a engineering system which means keep all frozen food involved in manufacturing, storage, transporting and before-sale stages being in the low-temperate environment to ensure the food is fresh and avoiding the loss from the food deterioration(Andrew,2008). As the nature of fresh and perishable food, which it has to be kept under the appropriate temperature in the whole distribution process, and needs to be transported in time. Thus, Cold-chain logistics has to connect each links closely which include manufacturing, transporting, storage and sales, plus the appropriate facilities, unified management system, to guarantee the quality of fresh food. Food cold-chain logistics is a complicated and systematic project with advanced technology, large investment and developed logistic management.

As we know, the population in china is 1.3 billion and this number is increasing steadily. Agriculture is our base for economy developing, and we all know that food industry is the extending of agriculture. On the basis of data¹, food industry has become the largest industry in the world, the entire turnover for year 2000 reached 1700 billion dollars, way more than auto industry, space industry and IT industry. Back to china, we also could find that the development of food industry has proved the food industry is the most important mainstay for domestic economy. The total output of food in china is 1 billion ton, take 15% of the whole world. Output of meats, fruits and marine products are most in the world. People tends to purchase the food which is more diverse, smaller amount and non-polluted. So how to exchange the original logistics to food supplied logistics, building cold-chain logistics to aim at perishable goods (Table 1), developing the traditional distribution mode, all of them will be our task in the coming stage.

¹ Meng Fansheng, Jin Minghua. (2007). *The research on the reason of logistics of agriculture products lagging*. Unpublished lecture handout, Northeast agriculture university, Harbin, China.

Table 1 Annual production of major perishable food in China /10⁴ton

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | increasing rate |
|------------------|-------|-------|-------|-------|-------|-------|-------|-----------------|
| fruit | 6238 | 6225 | 6658 | 14375 | 15341 | 15341 | 16120 | 17.1% |
| vegetable | 39498 | 42400 | 48337 | 52909 | 55065 | 55065 | 56284 | 5.8% |
| meat | 5821 | 6125 | 6334 | 6587 | 7245 | 7245 | 7743 | 4.9% |
| milk | 807 | 919 | 1123 | 1400 | 2368 | 2368 | 2865 | 23.5% |
| poultry and eggs | 2135 | 2243 | 2337 | 2463 | 2880 | 2724 | 2880 | 5.1% |
| aquatic product | 4122 | 4279 | 4381 | 4565 | 5108 | 4902 | 5108 | 3.6% |
| total | 58621 | 62191 | 69170 | 82299 | 88007 | 87645 | 91000 | 10.0% |

Source: Liu Guanghai, Xie Ruhe, Chen Baoxing. (2007). *Management and innovation of railway refrigerated transportation*. Unpublished lecture handout, Business school, Guangzhou University, P.R. China.

Frozen food which is controlled under the cold-chain would not only keep the fresh for food, but also bring bunches of convenience to modern urban life. And the fact is, cold-chain food (frozen food) has become the major source for profiting. Lots of concatenate store are willing the sell the cold-chain food but not only the traditional food, and building up their own cold-chain logistics center, to improve their competitiveness and grab more profit from this technology². Concatenate store operation is the inevitable outcome under the market economy, it is also the major operating procedure in most developed countries in the world. By using the scale merit, central purchasing, dispersive selling, normalized operating, the concatenate store company might reduce the purchase cost evidently while attracting more customers and winning more market share, and the last but not the least, concatenate store operation is absolute the effective path to get involved into the competition in the international market. The foregone experience has told us clearly, the efficient distribution of food cold-chain logistics model what we are going to talk about which is based on the top-speed-developing concatenate store operation. With the supporting push from the efficient distribution of food cold-chain logistics model, plus the existing mature technology and skilled managerial approach in concatenate store's distribution, we will get more advantage in the competition.

² *Global Cold Chain Logistics 2008-2009 Report*, Journal of Commerce, Retrieved from <http://www.transportintelligence.com/market-reports/report-global-cold-chain-logistics-2008-2009-report/230/>

The traditional cold-chain logistics distribution mode in china is perishable product manufacturers undertake the distribution work by themselves. This mode causes high cost of distribution, construction repeatedly and wastes a lot. In some place with less customers and facilities, company cannot ensure the temperature control upon the entire cold chain logistics process, and the quality of products might not be guaranteed at all. Compare with the situation in china, there are two major sorts of co-distribution mode in developed countries. The core of joint distribution is establishing the enterprise union which is based on the resources sharing principle. Different enterprises reach a same consensus by good communication, and based on the basis of mutual trust, to share the finite resource through the integrating on horizontal, vertical, same industry and different industry, and by strategic coalition, synergy combination and joint logistics operation. So that companies will be more integrated for logistics distribution, reducing the cost of operation, improving the capacity of making profit, then upgrading the circulation of commodities more efficient, promoting the modernization of business environment and making the utilization of all society resources more effective.

1.2 Literature Review

Basically, cold-chain is a branch of the entire logistics system, which helps in maintaining and providing a series of facilities for ensuring ideal storage conditions for the perishables from the location of origin to the location for sale. A well developed and efficiently organized cold-chain could be providing large help on reducing wastage, spoilage and keeping the perishables intact (Costello, 2009) . Thereby, it's not difficult to find that, the cold-chain logistics could help to maintain the quality of the harvested food products ultimately, to make the whole system cost effective to the farmers, to ensure the top-notch quality kept to the end user. With the development of this kind of advanced and refrigerated technology, cold-chain logistics will become more usual in food distribution industry.

1.2.1 The type of distribution

Private distribution means every single linkage within the distribution process are all designed, built, organized and managed by enterprise itself, and the distribution system is supposed to serve not

only the internal but also the external environment (Nevin B, 2008). Private distribution is good for coordinating and cooperating among each links, and will be much easier to monitor the entire distribution process. Another major advantage of this mode is reducing the transaction cost, while avoiding leaking the business secret. But the negative side is also obvious, that is the whole project of distribution needs to be invested lots of money in the beginning stage, then it may not be doable and reasonable to most small companies.

The concept of Joint distribution was born of Japan in 70s. The Joint distribution is always being defined as: “Under the cooperation between several consignors which need to delivery the goods at fixed time, by using a Joint vehicle or a Joint delivery system, to make the logistics being more reasonable ” (Liu Zhiyong, Wangkan, 2007). The core of Joint distribution is integrating, whatever the facilities or the technologies, to integrate all of them and establish the concatenate company league, with the basic notion as sharing information, doing cooperation, upgrading service, being more efficient, increasing the competitiveness, to help the company achieving a higher level (Figure 2).

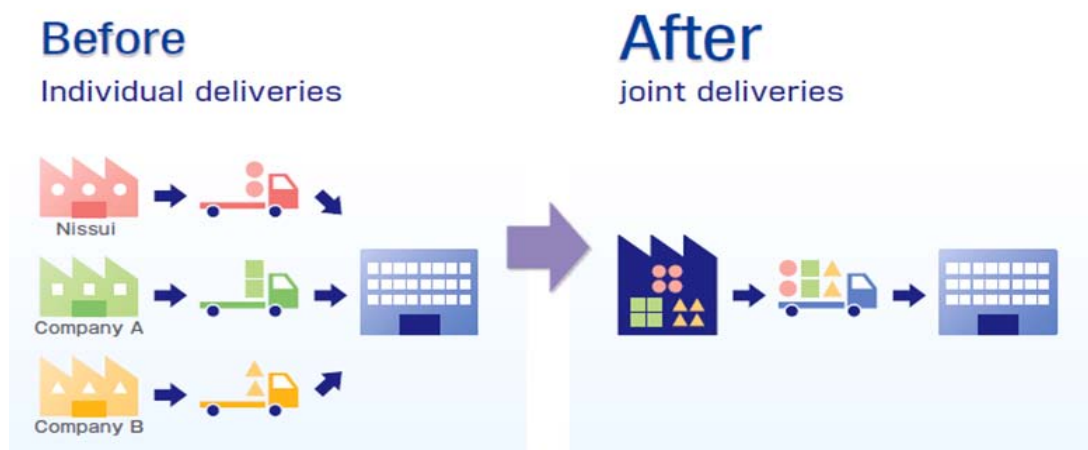


Figure 2-Joint distribution of frozen foods

Source: Ludwig, B (2002). *Joint distribution of frozen foods*, Retrieved April 3, 2009, from http://www.nissui.co.jp/ir/download/annual/2009_en/annual_report_06.pdf

The 3PL is not a new concept anymore, the external 3PL could offer the high level distribution service to the concatenate company. Depends on its scale and function design, 3PL takes charge of part or all logistic service operating to both sides of logistic activities (Xiong Hui, LI Jing,

2008)(Figure3). We all know that, under the globalization of supply chain development, the logistic activities trend to be more complicated, logistic costs trend to be higher and more capital-intensive. If concatenate company could make concentration on their major business area, and outsource their logistic distribution business to external professional 3PL company, that will directly result as saving the logistics cost, improving the service level and meanwhile promoting the development of 3PL companies.

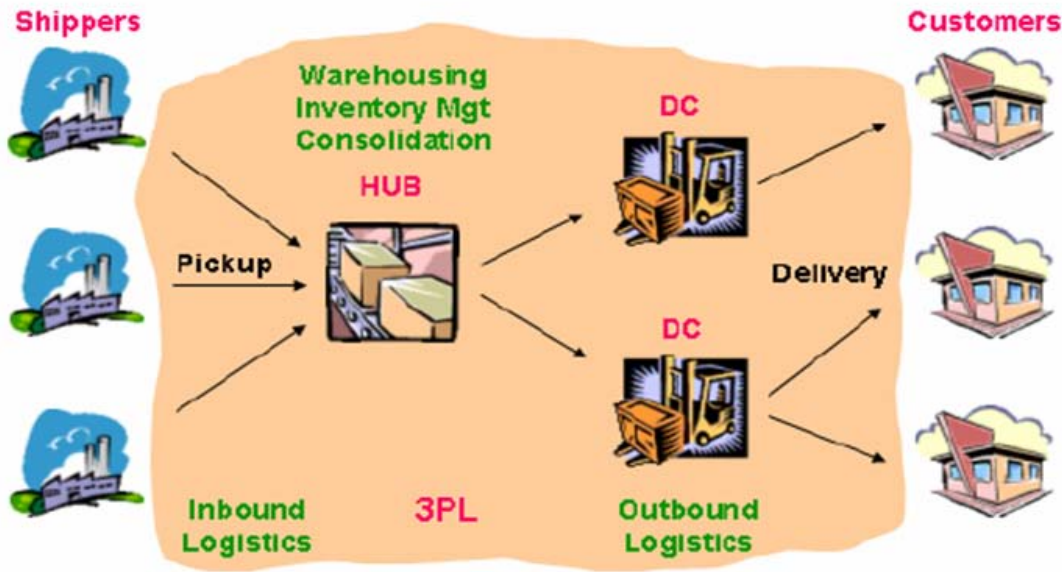


Figure 3-Typical 3PL arrangement
 Source: Michelle L.F, (2008). *Logistics outsourcing and 3PL challenges*, Singapore-MIT Alliance, N2-B2C-15, Nanyang Technological University, Nanyang Ave, Singapore.

1.2.2 Overview of developed country & China

During several decades, different sorts of refrigerated food cold-chain had been developed completely in overseas. At present, the frozen food distribution is one of the fastest growing food industry in the some developed countries. In America (*Global Cold Chain Logistics 2008-2009 Report, Journal of Commerce, 2009*), the amount of quick-frozen food production is 1397 times more than 50 years ago. Compare with America, frozen food production in Japan grew 53 times more in nearly 20 years. Even in some Western Europe which is in depression, the frozen food industry also can be growth steadily (*International Journal of Production Economics, 2009*) (Figure 4). The incredible

development about frozen food industry in developed country, which largely depends on its advanced cold-chain logistics distribution's working well.

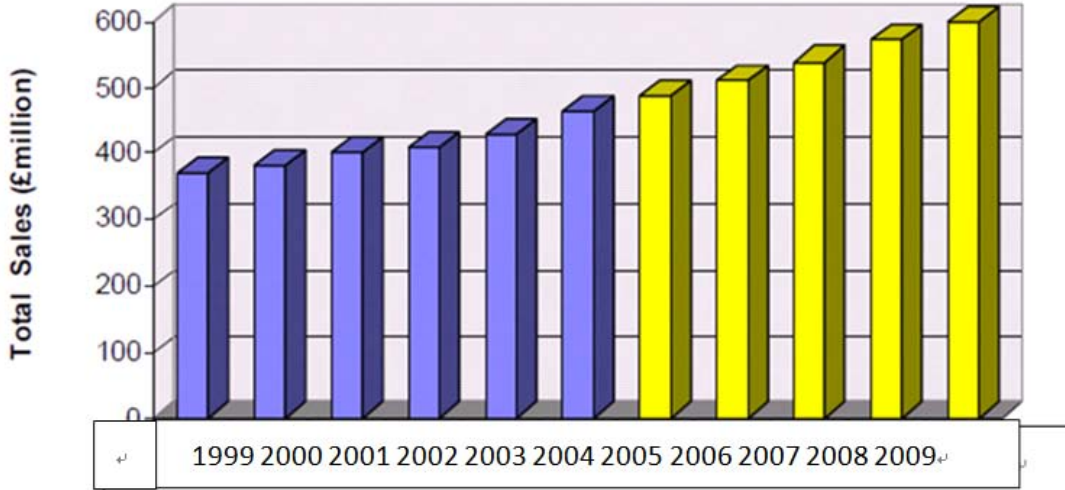


Figure 4-Total UK Sale of Frozen Food
 Source: Keynote 'Frozen Foods 2007.' London, 2007

However, in china, cold chain is not given the attention. But with the development of economy and further demand to food, people lay more and more attention on the development of food cold chain (Liu guofeng, OU YANG Zhongzhi, 2007), because in the food produced, circulation and consumed, the backwardness of the system of Chinese cold chain results in large economic losses and threat to food safety. The total value of agricultural products because of non-refrigerating is nearly 92.5 billion dollars, which could feed 2 billion people for basic living 7(International Journal of Production Economics, 2009). Nowadays, Distribution of food cold chain logistics always has been set up and managed by factory itself. They build up their own refrigerated warehouse and transfer their refrigerated food products by refrigerated trucks to the dealers or stores, and ask them separating and distributing by themselves. Thereby, the Distribution of food cold-chain system in china is just on the stage of "Storage and Transporting".

1. Comparison of implementing standard in cold chain logistics (Gao Lingyun, Cheng Fengyu, 2009)

To control the quality and safety of food operated and processed under the cold chain logistics, some developed countries such as Canada government issued a series of law and made the

regulation and standard, like the strict temperature controlling standard in food processing, storage and transportation. And in the other side, promoted the precise certificated program with highly professional and execute market access plan. There are more than 2500 organic farms, more than 150 organic food processing enterprises and 46 organic products certification authority in Canada nationwide. For instance, the manufacturer of meat production should meet the HACCP³ authentication system to monitor and control the entire process of processing, to complete and perfect the related laws, regulations and standards, to push the development of the organic products, HACCP, ISO and other professional authentication system, source area protection and geographical indications management, all of them mentioned before are significant guarantees to ensure the Canadian agricultural commodities could develop healthy and competitive. But in China, similar laws and policies are relatively less and also looser, for instance, most of meat productions are being processed under the normal temperature environment, and this is leading a large amount of perishable foods with poor quality flowing into the market directly.

2. Comparison of technology in cold chain logistics

Application of cold chain technology plays an important role to guarantee the quality of food and has a very close connection with food safety to customers. The wastage rate of fruits and vegetables only accounts for 1% to 2% in the cold chain transportation, it could extend the preservation period to a wider extent. Technology of cold chain keeps the value of food and also it's a precondition to development of cold chain logistics. The development of cold chain logistics is relatively mature in some developed countries, perishable food has mostly been operated by auto temperature-adjusting facility and auto temperature-controlling facility. During the transportation activity, those temperature managing facilities monitor the change of temperature in the cold closet any time and ensuring the food in the transportation process could be kept in a high freshness and quality. Compare developed countries with China, the most significant gap between two is the required equipments which guarantee the regular routine of cold chain operation is largely wanting in China. Most of the old-pattern equipments in China are outmoded, which directly leads that could not ensure keeping the transporting temperature low for circulation system of perishable food. Up

³ HACCP: Hazard Analysis Critical Control Point

to now, our technology of cold chain is way lag behind developed countries. That is also the major reason for why our country's food logistics cost accounts for 70% of total logistics cost.

3. Comparison of marketization activity in cold chain logistics

The marketization of cold chain logistics is a activity that estimates the participating level among third party cold chain logistics companies, in China, majority of frozen food are transported by manufacturers or retailers directly. Compare with developed countries, which already have established the high level marketization of cold chain logistics, for instance, the cold-chain logistics industry serves for nearly all perishable goods manufacturer industry, which outsources their distribution or transportation work to some large and qualified cold-chain logistics companies, this trend makes the marketization activity being more specialization, in the mean time, this trend also saves a large number of cost for cold products circulation, improving the value and safety of perishable goods.

4. Comparison of Refrigeration plants in cold chain logistics

Transportation is a key factor to the entire cold chain logistics for perishable foods, at present, the transportation rate of frozen food is about 10% in China, however, this ratio in United States, European area and Japan is high to 80 percent to 90 percent, the reason for this phenomenon is the cold chain logistics system majority of refrigerating plants have is not perfect and advanced enough (Figure 5 & Figure 6).

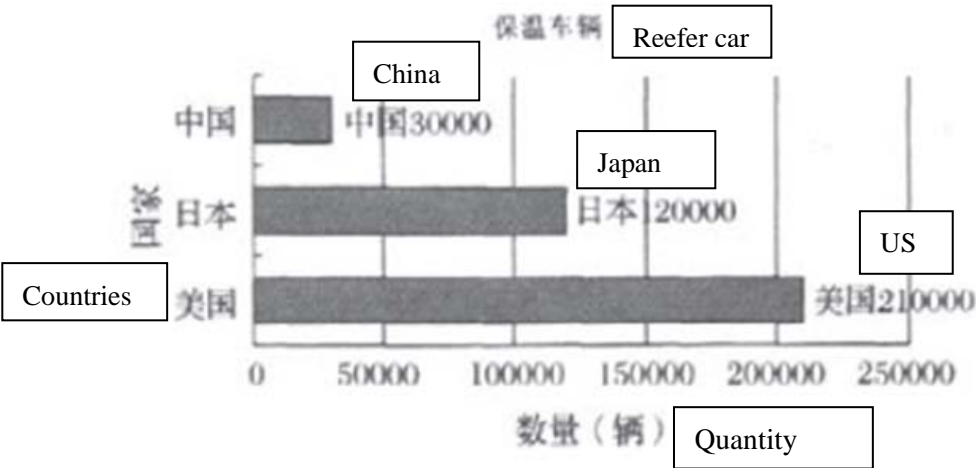


Figure 5-Comparison of Reefer car quantities in different countries

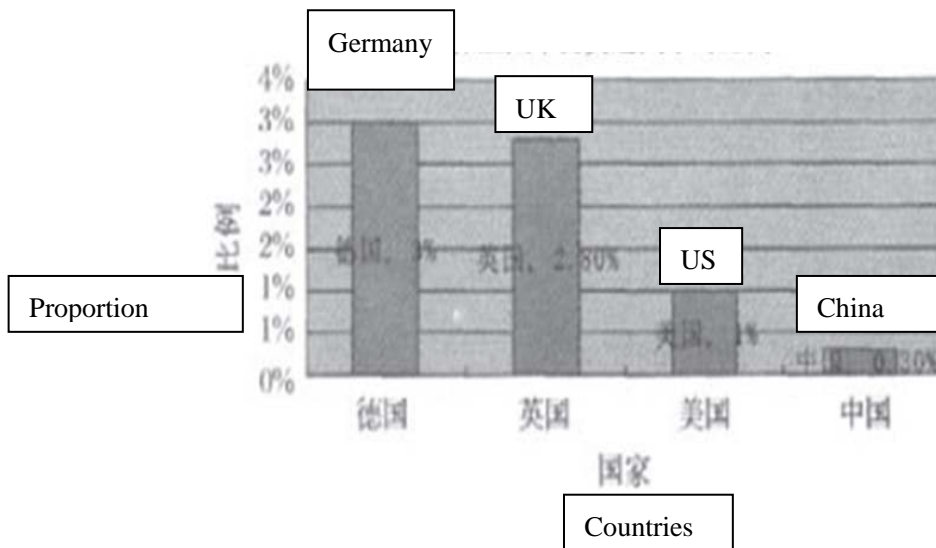


Figure 6-The proportion of Reefer car to all transporting vehicles

Source: Yingming, (2008), *The problem of food Cold chain construction in China*, Logistics Sci-Tech, 32(3), 23-25

The picture shows that a small amount of refrigerating truck in China which compared with in developed countries has a obvious difference. Because of old pattern facilities that leading the perishable foods loss a lot, and the logistics cost is pretty high even accounts for 70% of the total, at the same time, the food from cold in our country has the quality and safety problem.

5. Comparison of service network and information system

Service network and logistics information system are vital segments for logistics cold-chain's development. If the service network and information system are not perfect, that would influence the accuracy and timeliness within the whole cold chain food logistics process, and will probably bring the high cost lost. Although our logistics system in China has been developed well step by step in recent years, compare with other developed countries there is still an obvious gap existing between us, for instance, a big Canadian logistics company, Thomson Group Inc⁴, has the most advanced technology of refrigerating truck which could transport three kinds of food under the different temperature controlling. Thereby, our country's logistics system needs to be developed in those areas I mentioned above.

⁴ **The Thomson Corporation** was one of the world's largest information companies. Thomson was active in financial services, healthcare sectors, law, science & technology research, and tax & accounting sectors.

1.2.3 The problem of cold-chain in China

“Overall, China’s food cold-chain hasn’t formed a standardized system” (Zachry,2009).

China has large scale of perishable food and without paying enough attention about it, and lack of given standard to accelerate on cold-chain logistics developing. About 90% of meat and 80% of the aquatic products, vegetables and fruit should be guaranteed keeping fresh under the cold-chain system while in distribution. The construction of service network and information system are insufficient, and the accuracy, speed, and time efficiency of refrigerated food transportation is still not well-constructed in our cold-chain food market.

“The marketization level in the distribution of food cold-chain is not high enough” (Chen Jin De, 2008).

Our cold-chain logistics is still the beginning stage, the market scale is small. Most of fresh and perishable food is distributed by manufacturer and dealer in domestic market. The third party logistics provide comprehensive service which is less than 5% in total demand, not to speak of specialized logistics services in fresh and Perishable agricultural products. Hence, it caused high loss of cold-chain cost and affect the manufacturer's positiveness and break the rules in this industry.

“At present, the distribution of refrigerator plant and frozen technology is still relatively lag behind” (Huo Hong, 2008).

The equipment for refrigerated operation need to be upgraded and improved. 70% of transportation cars are designed as open-type, only about 30% is sealed design, and even the cars who equipped the refrigerator is below 10%. To railway transportation, the railway transport facilities are very old, and most of them are lack of standard fresh refrigerated container. The volume of frozen food accounts only 1% of total amount. The perishable food refrigeration transportation take up 20% of the total transportation, but the 80 % of the meat, marine products, fruit, vegetables use the ordinary trucks for transporting. Because of low efficiency of refrigerating transportation and high loss of perishable food, the whole logistics cost accounted 70% cost of the fresh and perishable

foods. According to the international standards, Food logistics cost should not exceed over 50% of the total cost of food.

1.3 Purpose & Methodology

The purpose of establishing the distribution center using food cold chain is monitoring, identifying, locating and dealing with the problem. Under the low-temperature environment the food cold-chain logistics system where the perishable food is distributed is controlling the environment condition, and preventing the food in high quality and safety. In present stage, how to develop the distribution mode of food cold-chain logistics should be based on the level of operation and management, characteristic and scale of company and the need for development. To analyze the status quo of the company, to make clear the capacity of distribution and management, and combine them with long term development plan, to choose the right logistic distribution mode prudently. An advanced food cold-chain logistic distribution mode will play an important role within the developing process for Bright Speed Fresh Logistics Company. The benefits from food cold-chain logistics distribution such as low-cost, low-pollution, always be concluded as “green logistics tendency”, which is keeping us being competitive and is also the certain trend for globalization.

In my paper, I choose the Application of Electronic Tagging Approach and Vehicle Routing Optimization approach to analyze & develop the distribution program of Food Cold-Chain Logistics in Bright Speed Fresh Logistics Company. Reducing the inventory and cost, improving the quality, it seems like a great way to release enterprises’ competitiveness in this energy-short world. Today, with the two basic ways for managing the supply chain that not be used only on manufacturing area but also on sales area, especially the cold-chain logistics distribution for fast-moving consumer goods, it has become the major path to create the advantage and profit for retailers.

The distribution of food cold-chain logistics is the key linkage within the whole logistic management process in chain store. The reasonable and advanced distribution in food cold-chain logistics system helps the chain store achieving centralized purchasing, centralized ordering and centralized setting the price. Because there are variety of external factors will impact the company’s operating, such as

scale of chain-store operation, geographic location, market positioning, development planning and the capability of logistic operation, then we need to choose the suitable distribution mode of food cold-chain logistics according to internal conditions and strategic development planning.

The foregone experience has told us clearly, the efficient distribution of food cold-chain logistics model what we are going to talk about which is based on the top-speed-developing chain-store operation. With the supporting push from the efficient distribution of food cold-chain logistics model, plus the existing mature technology and skilled managerial approach in chain-store's distribution, we will get more advantage in the competition. How to design and set up the distribution mode of food cold-chain logistics on chain store should be based on level of operation and management, characteristic and scale of company and the need of development. An advanced food cold-chain logistic distribution mode will play an important role within the developing process of Bright Speed Fresh Logistics Company.

1.4 The Framework & Content of this Dissertation

Chapter 1 is formed by four individual parts, the first part is the brief introduction of the value of food cold-chain logistics on distribution and how important it is. And then, the literature review part focuses on what is the recent development of food cold-chain logistics in distribution, introduce the different kinds of operating methods in distribution, and the whole industry overview in developed countries & China. Afterwards, analyze the thesis's purpose, objective and methodology used to design & organize the paper. And finally, I will record the framework of this dissertation in detail at the end of this chapter.

Chapter 2 This chapter is briefly constructed by three parts, the first part introduces the basic condition of the Bright Speed Fresh Logistics Company, after that I will analyze the distribution mode of the Bright Speed Fresh Logistics Company. Finally, I am going to analyze the detailed situation of how Bright Speed Fresh Logistics Company applies the Digital Picking System (DPS), Warehouse Management System (WMS) and Transport Monitor System (TMS) in their distribution process.

Chapter 3 This part is mainly introducing the Electronic Tagging System.

At the beginning, I mention the previous development of the Electronic Tagging System in this industry and list all potential advantages and benefits of this system. Then I suggest Bright Speed Fresh Logistics Company could introduce this system with three key steps: establish the specific unpicking zone, make a good classification for products and develop this electronic tagging system being suitable for full container products. At last, according to the past sales condition and statistics data, I make an assumption for the probable expected yield in the future and map out a doable investment budget plan for the company.

Chapter 4 I am going to pick up the Vehicle Related Problems as my second research area. By list all features which could influence the efficiency and productiveness in the delivery process, I bring forward there are possibly two major solutions could solve the existing Vehicle Related Problems in the company. The suggestion one needs us focusing on the order management, from order management improvement to benefit both the company itself and its customers. The suggestion two can be concluded as enhancing the cooperation process and continue expanding business scale. I put forward that the reputation, market share and positive strategic relationship will determine where the company will go.

Chapter 5 Conclusion

Chapter 2 Distribution of Bright Dairy Food

Cold-Chain Company

2.1 Introduction of Bright Speed Fresh Logistics Company

Bright Dairy Company had been founded in 1996 which was the largest dairy products manufacturer in dairy sales industry in China (Huang He, 2008). Last year, Its main income had exceeded 50 billion (RMB) and sales & profits were in a stable growth which is over than 30% increasing ratio for last 6 years. In order to support and expand its core business, Bright Dairy Company has been improving its refrigerated logistics for many years. Before the birth of Bright Speed Fresh Logistics Company, the Bright Dairy Company had changed its logistics organizational structure several times, at the earliest stage they organized its own logistics team and then renamed it as Bright Dairy Transportation Company, afterwards they started to establish its individual logistics department. The year of 1992 is a landmark in Bright Dairy Company's history and the goal is extending to Eastern China. The transportation company has been established by a series of departments between different enterprises, however, in most time the logistics is still working as the simple storage operation with the simple teamwork mode. In 1996, company formally established and began to develop nationwide, then, Bright Dairy Company set up the logistics centre that systematically integrated enterprise's economic resources and social resources. The trend of Bright logistics system's development is outsourcing their transportation job out to the third party logistics enterprise, that means the transportation job will be transferred from one enterprise inner department to another professional logistics enterprise. In 2004, Bright Speed Fresh Logistics Company formally took over all logistics operating job and reasonability for all dairy products from Bright Dairy Company, and it was identified as an independent third party logistics enterprise to Bright Dairy Company itself. At present, the total revenue of food cold chain logistics in Bright Speed Fresh Logistics Company is more than 11 million (RMB) and it also provides the professional logistics service to Tyson Foods Industry, Maverick Food Company Limited and Jiangsu YuRun Food Industry Group Co. Ltd etc⁵.

The business of Bright Dairy Company is growing rapidly and needed to satisfy a higher logistics demand. In the past, Bright Dairy Company applied the private distribution mode which covered the entire shanghai area by the established logistics distribution information system. Because the development of company is so quickly, the number of orders are increasing sharply and could imagine that will continue increasing at least 40% per year in the coming days. The quantity of

⁵ Source: Anonymous, (2007). Overview of Bright Dairy Company. From the World Wide Web: <http://www.hudong.com/wiki/%E5%85%89%E6%98%8E%E4%B9%B3%E4%B8%9A>

workforce and working hours in logistics department also increased greatly. Because of regional causes, Bright Dairy Company often difficult to control the regional distribution and total inventory quantities, moreover, getting hold of the market orders is not equaling to really understand about the market. To the Bright Dairy Company's condition, they must implement the production plan strictly and complete every steps following the production plan timely. According to company's product structure, network distribution, chain-store expanding and the third-party logistics demand etc., the company needs to concern about these factors to make the decision for adjusting the logistics system.

The Bright Speed Fresh Logistics Company manages their company according to the head office's logistics development strategy, which is aiming to upgrade present business and develop the logistics business which is related with the high value-added chain. In only five years, it becomes the number 1 cold chain logistics company in Eastern China, and we can see that, in five years later, it will be the top 10 logistics company nationwide. Bright Speed Fresh Logistics Company designed three stages to implement their strategy⁶, the first stage, The Bright Speed Fresh Logistics Company will reform and improve the service system, set up the logistics network, integrated organization, strengthen productiveness and establish the solid infrastructure to get the dominant position competed with other competitors in this industry. In the second stage, try to grab the priority in this immature 3PL market, to strengthen the quality of service and create high value-added logistics mode to be more profitable. In the final stage, based on the east part of China, distributes the network service and promotes the sales system to nationwide, consolidates the domestic leading position in cold chain industry and high value-added chain Industry, afterwards, keep on striving with international cooperation development and growing be a comprehensive 3PL service providers

The Bright Speed Fresh Logistics Company's operational objective includes to be the leader of regional logistics & food logistics specialist, and holds on implementing their enterprise philosophy, which is fresh, speedy, accurate and passionate. They constantly strive to provide the excellent products and customer service to satisfy their customer. According to Bright Dairy Company's normal-temperature food logistics operating experience and customer service experience, until 2006,

⁶ The present data of Bright Speed Fresh Logistics Company

the Bright Speed Fresh Logistics Company has set up several modern refrigeration distribution centers in Shanghai, Hangzhou, Shaoxing, Jiaxing, Huzhou, Ningbo, Jinhua, Nanjing, Nantong, Wuxi, Zhenjiang, Yangzhou, Yancheng, Taizhou, Hefei and Wuhu etc. That is almost covering the whole nationwide food logistics network, especially in Shanghai area and east part of China. Those modern distribution centers provide the “door to door” service to more than 16,000 customers. In the meanwhile, they also develop a advanced information management system, Bright Speed Fresh Logistics Company cooperate with professional logistics software developer to develop WMS⁷, DPS⁸, TMS⁹ and vehicle thermal controlling system to offer effective food logistics service.

2.2 The distribution mode of Bright Speed Fresh Logistics Company

The concept of third-party logistics came from outsourcing part of enterprise’s business, which meant using the external resources to manage and operate the company. As the Bright Speed Fresh Logistics Company, this business cooperation is involved in some certain links of the whole producing process by contracted with third-party enterprise. Some enterprises outsources its own logistics function to Bright Speed Fresh Logistics professional logistics company, which based on the cooperative contracted relationship, Bright Speed Fresh Logistics Company is defined as the typical third-party logistics company. So-called third-party logistics is the professional logistics which is contracted to both the buyer and seller. In general, because the form of treaty pattern restricting the two parties involved in a contract with the obligation and responsibility, therefore, third-party logistics has also been described as the contract logistics.

Bright Speed Fresh Logistics Company distribution of food cold-chain logistics is refrigerated and frozen food from production, storage, transportation and sales to before each link of consumption always under condition of cold environment to keep quality of food and reduce loss of food (Figure 7). Food cold-chain is logistics phenomenon, which has been established with the science & technology progress and refrigeration technology development, based on freezing technology and operated by refrigeration technology under low temperature condition. Thus, construction of cold

⁷ WMS: Warehouse Management System

⁸ DPS: Digital Picking System

⁹ TMS: Transport Monitor System

chain is required involved different problems, which is production, transportation, marketing, economic and technical and coordinate the relationship between each other to ensure the perishable food safety of processing, transportation and sales process, it is a high-tech content of a low temperature system engineering. Because of fresh food will be perishable characteristics that food keep the proper temperature in the whole process of circulation and rapid turnover, so cold chain logistics must make every stage closely link and use the right equipment and unified management to guarantee the quality of fresh product.

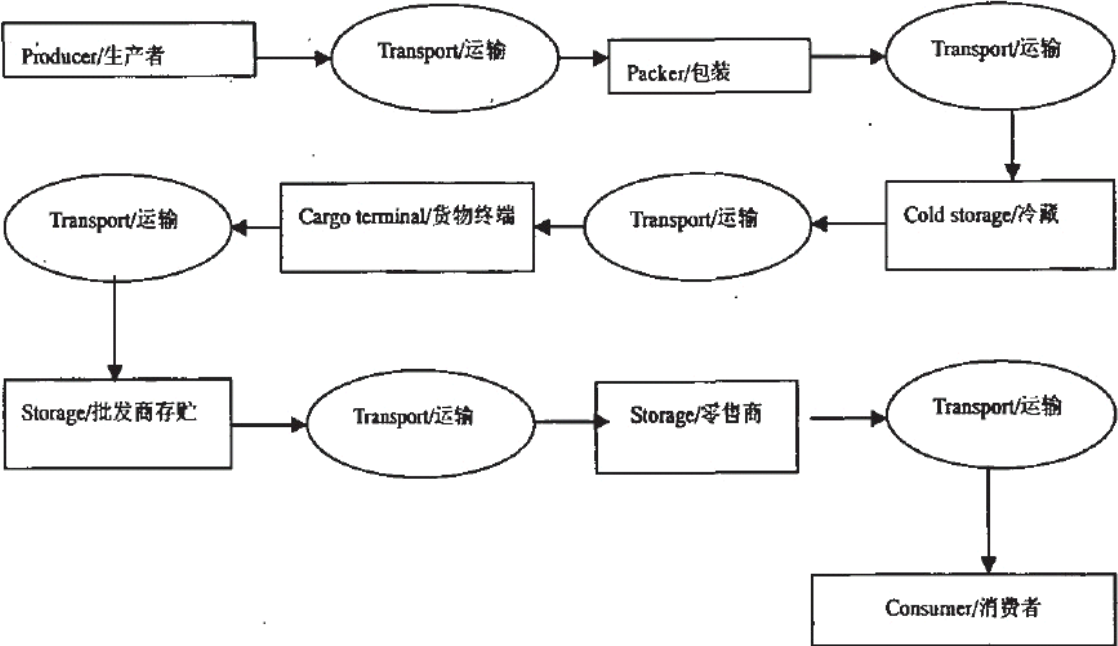


Figure 7-Cold Chain

Source: Li Hong, (2006). *The research of distribution in city cold chain logistics*, Unpublished master’s thesis, Changsha University of Science and Technology, Hu Nan, China

Bright Speed Fresh Logistics Company’s distribution is professional cold chain logistics enterprise which offer logistics service business mode except for the supplier and buyer (Figure 8). The whole logistics according to perfect service network, effective control ability of out sourcing, implement ability of optimize logistics enterprise and application ability of personalized logistics information system to construct complete third-party service ability. Assist Bright Speed Fresh Logistics Company create market competitive advantage and became enterprise sustainable development of ideal strategic partners, based on for-hire transport of development value-added services included logistic

guarantee, stowage plan, rental of warehouses, storage and distribution and wrapping, distribution processed etc. On the basis of information technology and service support to carry out supply chain management, which is represents a kind of emerging market forces that is the transformation of the traditional industries management concept, service projects, the mode of operation. Summary of Bright Speed Fresh Logistics Company logistics practice, third-party cold chain logistics distribution has been description that economic relations and management methods by external organizations use modern technology foundation and offer to user or consumer cold chain logistics service, which content include process of logistics strategy, logistics system planning, design, operation and management activities. The generation of third-party cold chain logistics distribution is not an isolated thing, which is the combination economic system of marketing, electronic information technology and operating management mode and development process that will be influence and promotion by each other, in the mean time, local government department of industry development also has important implications.

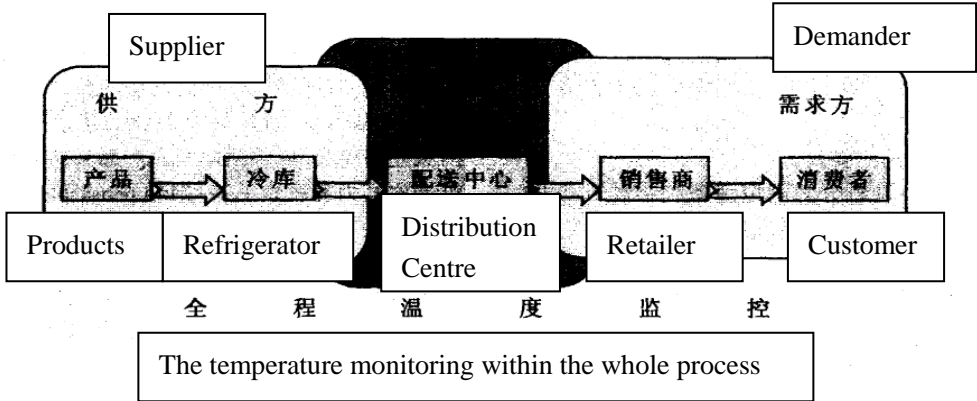


Figure 8-Distribution mode of third-party cold-chain logistics
 Source: Tang Junjie, Liu Zhongbao, Yu Yuanyuan, (2007, March). *Distribution mode of third party cold chain logistics*, Refrigeration technology, 118(3), 20.

2.3 Three major stages in distribution

In the case of 3PL Company which we study, the distribution and delivery services primarily include less than truckload (LTL) transportation, cold less than truckload (CLTL) transportation, express service, home delivery, cold distribution and ambient temperature distribution (Ju-Chia Kuo, Mu-Chen Chen, 2010). In general, these logistics services are independently provided as shown in

Figure 9. With respect to various customers and distribution channels, the distribution and delivery services can be categorized into four divisions: cold logistics, ambient temperature logistics, express and home delivery, and scheduled shuttle transportation.

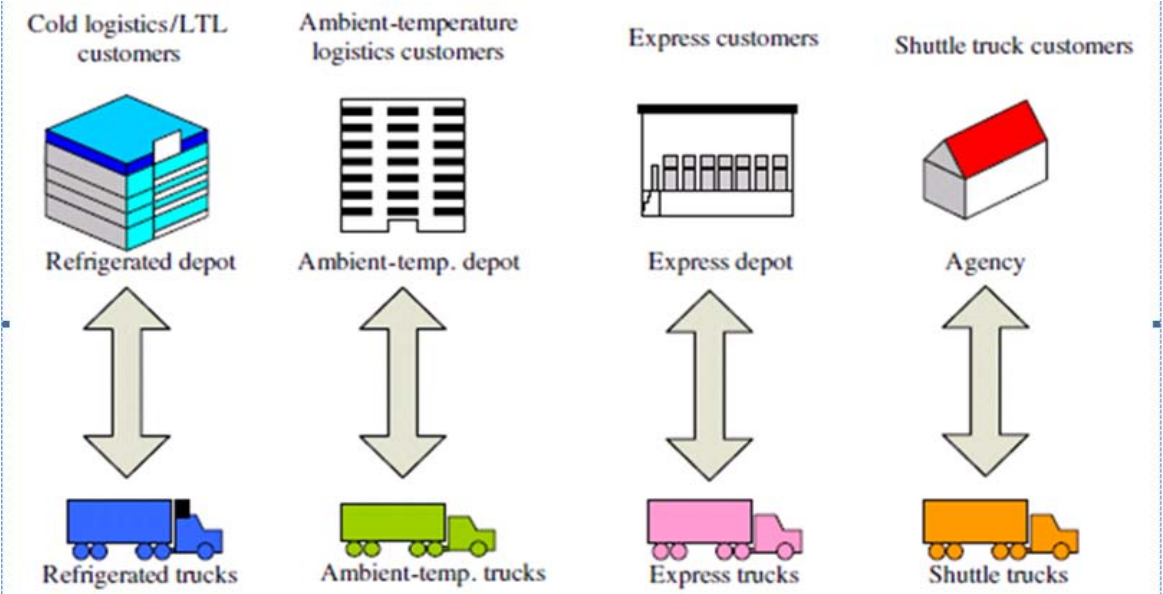


Figure 9-Four division of logistics services
 Source: Ju-Chia Kuo, Mu-Chen Chen, (2010). *Developing an advanced Multi-Temperature Joint Distribution System for the food cold chain*, Food Control 21, 559–566, Received 17 February 2009, Received in revised form 13 August 2009, Accepted 18 August 2009, from World Wide Web: Journal homepage: www.elsevier.com/locate/foodcont.

2.3.1 Digital Picking System (DPS)

“The use of a DPS (Digital Picking System) means all paperwork is eliminated and movements are controlled electronically. Existing information on all the order systems within the company is used, replacing the printed information with electronic data transmission to the warehouse, and the picker is directly notified of the work to be done at each of the shelves where the products are stored. Pick-To-Light technology enables the worker to find the location and exact amount for the pick/put operation quickly and intuitively by means of lights and LED displays”. (Journal of Pick to Light)¹⁰(Figure 10)

¹⁰ Source: Journal of Pick to Light, from World Wide Web: <http://www.ptlsystems.com/eng/articulos/articulo3.html>

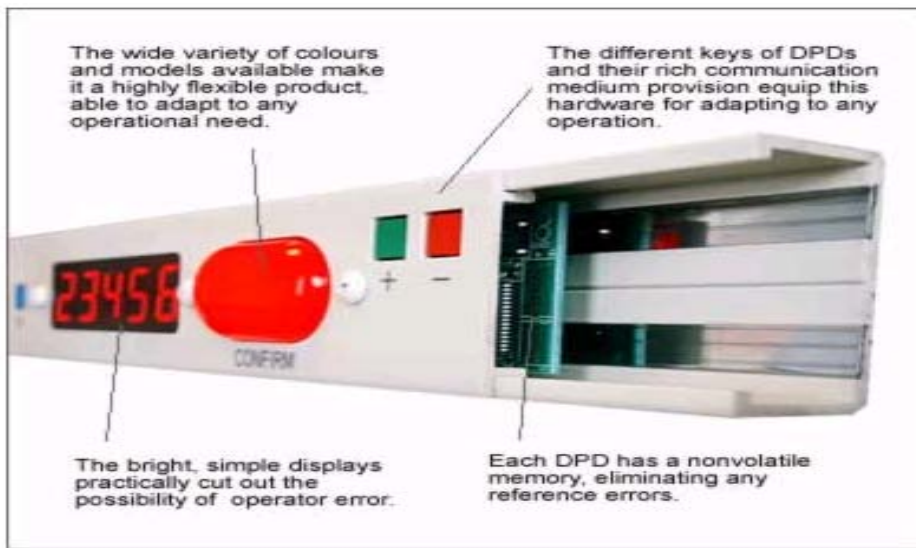


Figure 10- Digital Picking System

Source: Source: Journal of Pick to Light, from World Wide

Web: <http://www.ptlsystems.com/eng/articulos/articulo3.html>

Pick-To-Light technology enables the workers can find the location and the exact amount for the pick/put operation quickly and intuitively by means of LED light displays (Folinas, D., Manikas, L. and Manos, B., 2006). The main advantage for this technology is obvious error reduction. This system prevents product recognition-related errors, it confirms the locations and adds accuracy to the operations and combines them as a whole. The system uses lights to guide the worker to the exact product location, showing him the amount ordered and demanding confirmation. Then at the same time, system interactivity also means that the worker can carry out inventory checks and replenish stocks directly under this module. This information enables constant and fixed process control, increasing handling capacity greatly, achieving fulfillment of order monitoring, and reducing the worker's workload and necessary for retraining.

The separation & distribution flow in Bright Speed Fresh Logistics Company¹¹

Premise: 1. the transported products have to be marked the laneway identification number; 2. the identification devices have to be equipped well in each laneways; 3. the displays located in each laneways have to connect to the central mainframe of logistics center; 4. operators in laneways

¹¹ Source: The present Data of Bright Speed Fresh Logistics Company

should know what are the transporting products, and stick exit laneway number on them according to computer's guiding; 5. the identification device in exit laneways must be equipped well.

The entire separation & distribution flow could be divided into three separate parts,

(1) Separation Stage.

When the products marked with laneway identification number are transported into separating laneway from access lane, then scanned by identification devices which are installed at the entrance of the laneway, then being separated and transported into different unpowered laneway, from A1 to A9, and at this stage, the laneway operators according to the request dividing the products into different shelves.

When operator in laneway B according to computer's guiding and lifting down the products to the products container, after the distribution job finished, according to the guide from the computer, sticking the exit laneway number and stores identification code on products, and lifting the products with two identification marks up to the powered laneway, make the products need to be transported delivering out from B1 to B10 separating powered laneways.

(2) Full Container Stage.

When the products marked with laneway identification number are transported into full container powered laneway from access lane, then scanned by identification devices which are installed at the entrance of the laneway, then being separated and transported into different unpowered laneway, from C1 to C5, and at this stage, the laneway operators according to the request dividing the products into different shelves.

When operator in laneway D following the computer's guiding and lifting down the products and put them on the unpowered laneways, after the distribution job finished, according to the guide from the computer, sticking the exit laneway number and stores identification code on products, and lifting the products with two identification marks up to the powered laneway, make the products need to be transported delivering out from D1 to D5 full container powered laneways.

(3) Delivery Outlet Stage.

When the products with both exit identification number and stores identification code reaches delivery outlet powered laneways from the separating powered laneways and full container powered laneways, and all products are gathered together inside warehouse, then scanned by identification devices which are installed at the entrance of the laneway, then being separated and transported into different unpowered laneway, from E1 to E8, and at this stage, the laneway operators according to the request carrying these products to the trucks.

2.3.2 Warehouse Management System (WMS)

Bright Speed Fresh Logistics Company has distribution centers located in more than 16 cities in Shanghai area East China, the total area of refrigeratory is over than 14,000 square meter¹². Except the basic traditional storage service, Bright Speed Fresh Logistics Company also could provide more value-added service to their customers, such as lot number management, storage location management, inventory report forms customized, classify, select and arrange the merchandises, secondary operation, packaging service etc. To cause the distribution center to be a distribution & circulation center which is combining the trade and business flow, logistics and information flow together.

According to the request standard in China (LIU Guofeng, OU YANG Zhongzhi, 2007), to the refrigeratory that mainly stores the deeply frozen food, is always called congelation refrigeratory, the temperature in there should be controlled under -18°C , the acceptable deviation is supposed to less than $\pm 1^{\circ}\text{C}$. In some seafood storing refrigeratory even needs the lower temperature environment, like storing tunny requires the temperature keeping under -45°C or lower. To those refrigeratory which store the refrigerated fresh food, which is always known as frozen food refrigeratory, the temperature environment there should be between -3°C to 15°C , which depends on country of origin, breed variety and ripening degree of the food.

In the warehouse of chilled and frozen food, the cold chain has different cold stores, which play a

¹² Source: The present data of Bright Speed Fresh Logistics Company

very important role for guaranteeing the food quality (Sampson.K). It begins at the manufacturer’s cold store, includes the central and distribution cold stores and ends at cold stores belong to concatenate retail stores. After the producing stage, chilled or frozen foods are stored in the cold stores of the manufacturer, where the quality of product is strictly controlled and then transported to central cold stores, where the products are supposed to be divided into two types, seasonal products and non-seasonal products. Usually the seasonal products are stored for 6–12 months and to the non-seasonal products, there is no fixed time for storing, but the distribution cold stores would be guaranteed to receive a continuous supply from central cold stores. The distribution cold stores are always designed for products rapid distribution to the markets. (A rough scheme of the structure of the frozen-food chain is given in 11.)

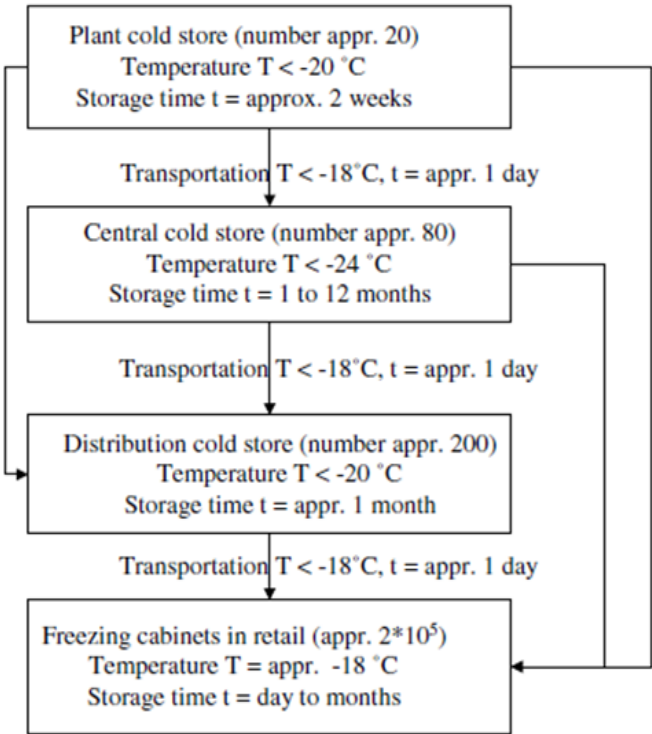


Figure 11-Structure of the frozen food chain in Germany
 Source: Sampson.K. (2008). *Improving the structure of deep frozen and chilled food chain search procedure*. Logistics technology, 112(27), 17

There are also existing some dissatisfactions about the cold storage facilities (Linda K. N, Mark A. T., 2001), such as the available capacity and the nature of the racking and handling systems.

Approximately 38% of the firms thought that a lack of cold storage spaces would lead a serious problem. Curiously, a similar proportion did not consider this as a problem in the Bright Speed Fresh Logistics Company and It is hard to generalise about this issue for several reasons:

(i) Storage requirements can vary largely during the year, as a result of seasonal fluctuations, promotional activities and even the weather conditions. For many firms, the problem is that they think the peak volumes are kind of fixed at the particular times of every year.

(ii) Different firms will be at different stages in their own cycle of warehouse investment. Those companies have recently invested in new facilities will have excess space relative to current needs, whereas those at the end of the cycle will be working at full capacity.

(iii) Firms vary in the relative extent to which they contract out their cold storage.

(iv) There are geographical variations in the availability of cold store spaces, with some firms reporting difficulty in finding adequate third-party refrigerated warehousing service in particular areas.

A shortage of storage space can impose a physical constraint on stock levels and thus have the beneficial effect of promoting tighter inventory management. Working too close to full capacity can, however, impair the efficiency of the materials handling operation. It may also affect the use of the transport fleet indirectly. To use refrigerated trailers as overspill storage space is very common practice in the frozen food industry. This partly explains why in a recent survey of 1300 refrigerated trailers over a 48 hour period, it found that roughly a fifth of their time was spent on loaded and stationary. The logistics director of a company which makes heavy use of trailers for this purpose admitted that expensive transport assets were used to compensate for deficiencies in the warehouse system. Often there is inadequate space at the despatch bay to accommodate them, in which case they are loaded straight onto trailers. This removes the need for double handling, but results in products spending much longer in the trailer, which takes much more money and less energy efficient upon their cold storage unit.

2.3.3 Transport Monitor System (TMS)

This division provides logistics services of sorting, distribution and LTL transportation for cold, chilled, frozen and fresh goods to individual and enterprise consumers (Ju-Chia Kuo, Mu-Chen Chen, 2010). Figure 12 illustrates the service process of CLTL. The trucks will be dispatched by an LSP's agency, then transport the goods from customer's warehouses or plants to a shipping refrigerated depot. After sorting stage, the refrigerated goods are transported to the destination depot by refrigerated shuttle trucks. Figure 13 illustrates the existing service process of cold distribution for retailing. The refrigerated trucks transport goods from customer's warehouses or plants to a refrigerated depot. After sorting with respect to retail stores' orders, then the refrigerated goods are transported to the convenience stores, supermarkets and retail chain stores by refrigerated distribution trucks.

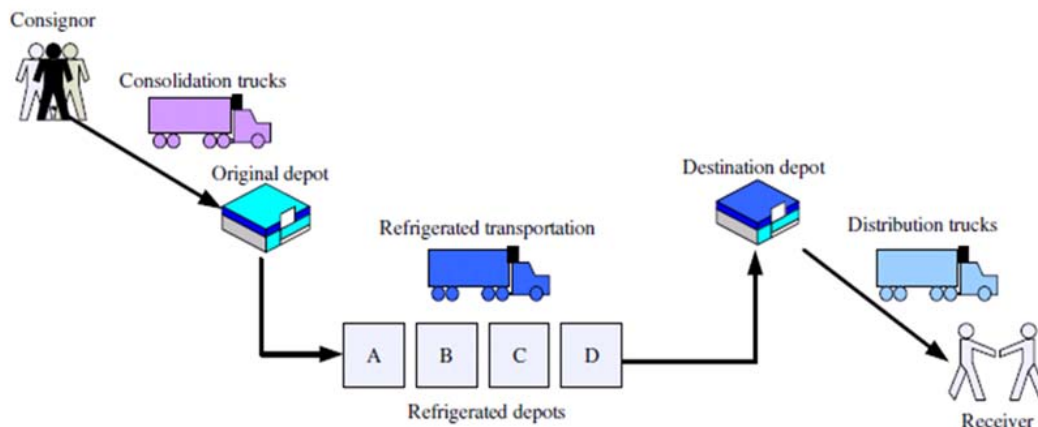


Figure 12-The service process of CLTL

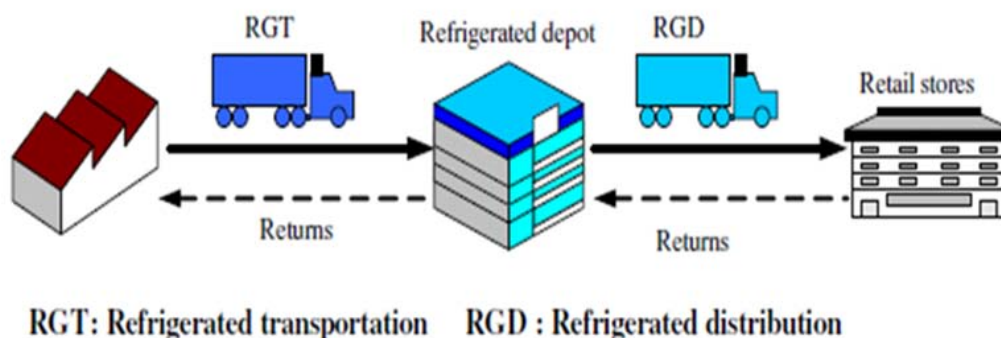


Figure 13-The service process of cold distribution

Source: Ju-Chia Kuo, Mu-Chen Chen, (2010). *Developing an advanced Multi-Temperature Joint Distribution System for the food cold chain*, Food Control 21, 559–566, Received 17 February 2009, Received in revised form 13 August 2009, Accepted 18 August 2009, from World Wide Web: journal homepage: www.elsevier.com/locate/foodcont.

The completed bifarious distribution network could totally provide B to B, C to C service whole day in East of China. The first level core network covers from Shanghai to Beijing, Jiangsu, Wuxi, Nantong, Hangzhou etc. The second level takes in charge distribution in the city, from each city to supermarkets, Stores, convenience stores, milking station and other channels etc. Bright Speed Fresh Logistics Company owns more than 200 refrigerator vehicles and chilled vehicles in total (26 have frozen/chilled two temperature controlling systems), the capacity of cold chain logistics is over than 1,000 tons per day, which is capable to satisfy customers customized request totally. Company has established a intensive service network in Shanghai area and East China, and formed a advantaged 365days-24hours-Door-to-Door distribution service system. Just in Shanghai area, company will distribute to more than 6,000 spots per day, including more than 4,300 convenience stores, 2,000 supermarkets, 100 local stores and 500 community distribution centers. To the entire East China, relying on company's strong logistics service network, the whole coverage is more 16,000 spots, which includes the traditional retailers like supermarkets, convenience stores and local stores, and also range over restaurants, schools, hotels, air companies and other special channels¹³.

2.4 The existing problems in distribution

1. The awareness and operation of 3PL is relatively under-developed, and lack of modern logistics knowledge and professional logistics managing method. At the beginning, the basic form of distribution system in Bright Speed Fresh Logistics Company is self-managing. Bright Speed Fresh Logistics Company's logistics department also has experienced several changes. In the past, manufacturers worried about both losing control on the purchase & sales and other competitors gets the rest profits, then leading them has to build their own logistics system but not outsourcing this service to outer professional logistics company. This situation causes the delaying start of third party cold chain in logistics enterprise. At present, this company is still in the groping stage. Most of

¹³ Source: The present data of Bright Speed Fresh Logistics Company

logistics theoretical knowledge comes from developed countries. In recent years, logistics personnel training is an important factor to accelerate the development of the logistics in this company, but most of staffs are from management professions, engineering professions and transportation professions but not the professional logistics management talents. So we can say, Bright Speed Fresh Logistics Company is still on an exploratory stage.

2. Due to absence of advanced technology that leads to part of equipments are still backward. At present, lots of infrastructures are simple and not in high level of mechanization. The intellectualization and automation of storage is relatively undeveloped, in additional, informatization construction is kind of lag behind in Bright Speed Fresh Logistics Company. The directly causes the efficiency of storage is low, the information flow always could not work well, and there is no easy way to guarantee monitoring the entire logistics service process in time, also hard to understand the logistics market's demand.

3. The functions of logistics service are incomplete constructed in Bright Speed Fresh Logistics Company that only provides single logistics service. The function of logistics is performing as storage, transportation and city distribution, thus the relevant value-added services of packaging, processing and distribution is not much so that cannot organise the complete logistics supply chain. According to CAWS investigation report, among the enterprises which are willing to implement the third party logistics strategy (always known as outsourcing strategy), most of them are not feeling totally comfortable and satisfy well by the present third party logistics service, which includes nearly 23 percent of manufacturing enterprise and 7 percent of commercial enterprise.

4. Temperature Changing Influence

The distribution of food cold chain is generally composed of some different steps, and thereinto the consumption and traceability is pivotal today. The distribution system of chilled and frozen food works for keeping the products' quality which is depending on accurate time and appropriate temperature in the storage and transportation. There are three levels of distribution systems have been concerned with fixed plant locations, potential central and distribution warehouses, and at last,

as well as integrated customers. Each stakeholder in the food cold chain needs to receive exact information of the time-temperature history of the products. In cold chains, temperature conditions affect the potential risks, the shelf life and final quality of frozen and chilled products (Mon tanari, 2008). For many pathogens, the maintenance of low temperature is an effective method of control. Throughout transportation, each step must effectively maintain the needed temperature. Also, documentations and records of the cold chain history & control are critical components of performance for both quality and safety. Modern dataloggers have simplified the process of monitoring the performance of the refrigeration unit in transit, and indicators will demonstrate when a critical point has been exceeded (Figure 14). Bright Speed Fresh Logistics Company haven't developed a advanced temperature controlling system yet, and under the existing technology condition, they are able to deal with this problem with system modification and upgrading, and that will be good for company's further developing.

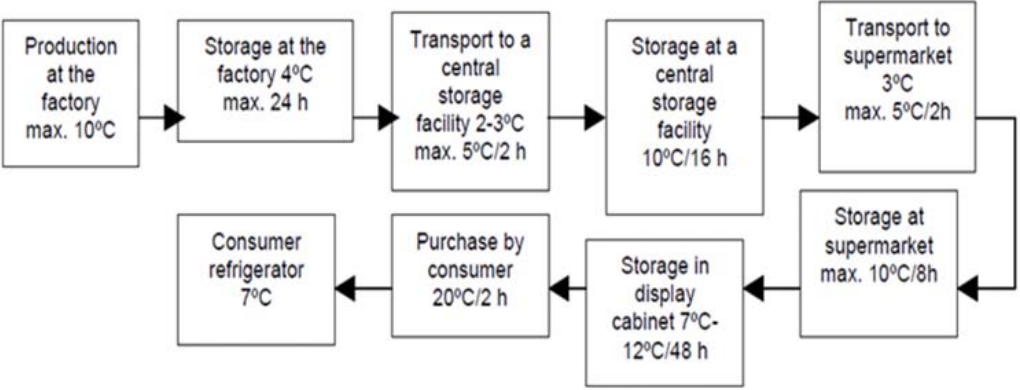


Figure 14-Simulated distribution chain of fresh processed fruit and vegetables
 Source: Stopford, M. (1997), *Refrigeration for Preserving the Quality and Enhancing the Safety of Plant Foods*, European Journal of Operational Research 129(23), 362, Retrieved August 10 2000.
 From the World Wide Web: www.elsevier.com/locate/dsw.

5. Because the company is in the beginning period, and introducing some advanced technology and vehicles, but back to the start point, the managing method and operational system are not well-designed and professional to meet the trend. We also should consider about the maintenance cost of the vehicles, routing innovation and further cooperation with other supportive companies.

Our regular business is basically based on the vehicles transferring and goods delivering. And there is

no doubt that the cost of vehicles maintenance accounts for majority operating expenses in the whole process. Bright Speed Fresh Logistics Company has not established the cooperative relationship with other companies, that directly leads the vehicles maintenance expenses cost a lot, company needs to prepare more budget to cope with this problem, the cash flow of company will be more tense, and there is a less room for company investing other new projects to enhance their present business, or introducing more vehicles to expand their business scale for grabbing a bigger market share.

From the other side, the undeveloped and backward routing design must impact the efficiency of the delivery and make some unnecessary waste. This vehicles routing system is not totally connected with the order receive & dispatch system, that makes there is a gap and delay between company received the orders and sent the vehicles out. This gap & delay must lead the vehicle loads nothing in some period or there are more stuffs need to be delivered but no loading room for that. This situation sharply reduces the service level of the company, and might hurt the reputation of the company. Customer might argue about the delivery delay because of the bad vehicle routing design, that virtually restricts company's strategy making and market expanding.

Chapter 3 Electronic Tagging Plan

In modern times, the distribution and logistics center is trending to be more advanced and highly tech-combined. The main problem that most of modern logistics companies have to face is from the restriction of facilities or plants. A lot of logistics companies have no more room or funds to develop their potential capacity of logistics because the lack of proper and enough equipments to guarantee their expanding successful. The entire logistics industry is entering into a new era that needs to be innovated and upgraded very soon to improve the whole industry's competitiveness. As the dairy manufacturer leader in China, Bright Dairy Company always seeks to be more profitable with less source waste, to output more with a higher efficiency, to manage better with the optimal way, all of

those are also what the Bright Speed Fresh Logistics Company is seeking for. According to observe Bright Speed Fresh logistics Company's entire cold chain system, based on the profit-first & cost-lowest principle, and combined with company's developing direction and strategy, too reach the ultimate goal "enhance the productiveness and upgrade the efficiency", I think the following two major methods will be helpful to locate the problems, analyze the present situation, escalate the entire chain system and accelerate Bright Speed Fresh Logistics Company's development.

- (1) Less waiting---More fluent operation among each links, reduce the idle time.
- (2) Less moving---Trying best to reduce the production transferring times.

3.1 Brief introduction

Distribution is a key part in entire logistics process, and specific in Bright Speed Fresh Logistics Company, it occupies at least 50 percent workforce need of the total workforce need in whole logistics activities, and occupies 30 percent to 40 percent operation time of the total operation time in whole logistics activities, and cost 15 percent to 20 percent of the total workforce cost within company's whole logistics system. Thus we can see that, the distribution stage could influence the whole logistics system a lot. To upgrade this key process, I suggest Bright Speed Fresh Logistics Company to use electronic tag technology to improve the efficiency in this stage.

3.2 Definition and development of Electronic Tagging Technology

Electronic tagging is an emerging market, and awareness is growing internationally of the efficiencies and cost savings that can be achieved by adopting this new e-tag technologies. Electronic tagging is a form of non-surreptitious surveillance consisting of an electronic device attached to a person, vehicle, or productions. In general, devices locate themselves using GPS and report their position back to a control centre. Indeed, electronic tagging is one of the world's fastest growing market sectors. Global shipments of radio frequency identification tags are projected to increase from US\$890 million to US\$2.5 billion by 2005¹⁴. This 24% growth per annum is, in part, being driven by the introduction of new legislation.

¹⁴ Roy, W., Daniel, M.R, (2000), *Ubiquitous Electronic Tagging*, Submitted to IEEE Concurrency.

3.3 Benefits and potential advantages

An advanced electronic tagging system could help Bright Speed Fresh logistics Company speeding up the distribution process, decreasing the fault rate during the distribution, eliminating the paper-forming cost and lessening the training budget. From the previous experience, a well-designed electronic tagging system will be able to develop the entire logistics system's potential capacity as 2 even 3 times higher than before.

Because invest on electronic tagging system is a huge and long term project and need to be completed step by step to release all of its benefit, then at the very early stage, with the same facilities and management system, the major advantages of electronic tagging system bringing to Bright Speed Fresh Logistics Company could be concluded as the following two sides:

3.3.1 Upgrading the distribution quality

In the old distribution operation mode, there are lots of factors could influence the distribution quality. If the distribution activity needs the operator to make a decision about where to storage the production by their personal experience, if the inventory history data is uncontrollable and causing the mistakes, if the operator is not familiar with the storage spaces with different productions, if the order is not printed clearly enough to recognize, all of above situations will affect the quality of the distribution process. But the electronic tagging system could solve these problems well. Combined with the information collecting and analyzing system, operator will not need to make the man-made distribution decision, instead of following the information system order and make the right operation. Operator can be able to know the exact situation of inventory of every single product, and that is good for Bright Speed Fresh Logistics Company managing the warehouse and ordering process.

3.3.2 Increasing the distribution speed

The traditional distribution process which is used by most of the companies should be summarized as the follows: (a) Receive and confirm the order (b) take the empty circulating box (c) determine where

is the storage room for the distribution product (d) walk to the storage room area (e) find out the available storage room in that area (f) check out the exact number of products need to be stored/distributed (g) Record the storage room/shipment circumstances (h) Put the products in/away and make a confirmation (i) Record the order. But if we can adopt the electronic tagging system to support, the whole process will be simplified to (A) Check against the circulating box No. and order No. (B) According to the guide light walk to the storage area (C) According to the guide light displays to confirm the products information (D) Store/Distribute the products then make a confirmation. It's not difficult to find that if we use the electronic tagging system, the distribution chain will be shorten and the operation speed could be improved a lot. Based on the conservative estimate, I assume that the distribution speed of Bright Speed Fresh Logistics Company could probably increase 40 percent to 50 percent after optimizing the distribution chain. If conjoin it with more developed management method, that will bring larger benefits in a long durative time.

3.4 Specific implementing method

According to my understanding of how the logistics chain works, and how urgent they need to upgrade their distribution system, I suggest to promote the next three steps to innovate and perfect Bright Speed Fresh Logistics Company's distribution system:

Stage 1:

In this stage, we could briefly divide this stage into three major steps:

Step 1: Establish a special unpicking zone with the supporting from the electronic tagging subsidiary system. (According to ABC productions classification method, use one-to-one method with A type goods, and one-to-many method with B and C type goods.)

Step 2: Modify and adjust the information flow coordinating with the electronic tagging system.

Step 3: Modify and adjust distribution strategy to be suitable for the electronic tagging system.

There are also three main reasons that could prompt us to make this development. Firstly, developing and innovating the logistics center is a gradual process, we should operate it smoothly and avoiding to affect the regular routine business operation. Reformation and well operation are supposed to happen at the same time. Secondly, if we can increase the distribution speed

significantly, that will solve the key distribution problem which would possibly restricts the total logistics center's working efficiency. Finally, company will have enough time to make a good preparation for further improvement on logistics center's working efficiency in the future.

The benefits from the stage one's implementation are also obviously. This electronic subsidiary tagging system will not only increase the distribution speed but also reduce the fault rate in distribution process. And via this electronized, highly integrated and systemic management will increase the managing level, and achieve paperless management. To satisfy the explosive distribution need with the expanding developing trend. And after the completeness of this electronic subsidiary tagging establishment, which will help Bright Speed Fresh Logistics Company to be built as the first company which is high informationization, automation and mechanization.

Stage 2:

It also could be separated to three parts:

- (1) Perfect the electronic subsidiary tagging system, to alter the old operating method of B and C type goods (one-to-many) to new method (one-to-one) in the unpicking zone.
- (2) Comprehensive planning the whole logistics project and complete each parts of operation systems, inputting related facilities and new technology.
- (3) Establish and optimize the WMS (Warehouse Management System) system, to implement computer managing to the entire logistics center's operation.

Based on other successful enterprises' previous experience, this stage is the fast growing section in logistics center's developing process. Most of companies could get the best performance price ratio between the input and output. After the stage two is projected and completed, the business is tending to be expanded a lot and the competitiveness is going to intensify. And the way of management will transform from extensive growing to intensive controlling in detail, the further decline of logistics cost becomes imaginable. The unwanted workforces from modified distribution system could be transformed to other working spots to increase the entire efficiency of logistics center and developing to be a virtuous cycle.

The potential advantage from this stage is further satisfy the deep need for Bright Speed Fresh Logistics Company's expanding expectation, to guarantee the increasing ratio of logistics cost is less than increasing ratio of turnover and establish the advantage of "cost leadership", and make it possible for providing the distribution service to other companies.

Stage 3:

The only task in this stage is establishing the electronic subsidiary tagging system upon the full container products, to achieve the standardization of unpicking zone finally. Through the previous two stages' development, the managing mode of logistics center is trending to be more reasonable, more doable and maturer, and that will be easier for us to make company purchasing, storing and distributing getting integrated, causes the management optimization is possibly to happen.

3.5 AblePick System¹⁵

The truth is some giant companies have adopted this electronic subsidiary system within their distribution process. The most famous electronic subsidiary system is always known as AblePick system. In China mainland and Taiwan area, like Rock Records¹⁶ & Tapes Inc, , Mary Kay Inc¹⁷, 7-Eleven Inc¹⁸, Acer Inc¹⁹, etc., they all have got some benefits from this system.

The following chart shows us clearly how the AblePick system works, and how this system could help a company to increase their logistics operation speed and perfect their distribution process (Figure 15&16) .

15 Source: *Shanghai Shangshang Auto technology Company Ltd.Co.* From world wide web: <http://WWW.ATOP.COM.CN>

16 Source: **Rock Records** is a Taiwanese record label founded in 1980 by Sam and Johnny D. It is now Asia's largest independent record label.

17 **Mary Kay Inc.** is a multi-level marketing company that sells skin care and cosmetics products. It founded Mary Kay Inc. on Friday, September 13, 1963.

18 The brand name **7-Eleven** is now part of an international chain of convenience stores, operating under Seven-Eleven Japan Co., Ltd., primarily operating as a franchise. It is the largest chain store with more than 36,842 outlets operating around the world.

19 **Acer Incorporated** is a Taiwan-based multinational computer technology and electronics corporation.

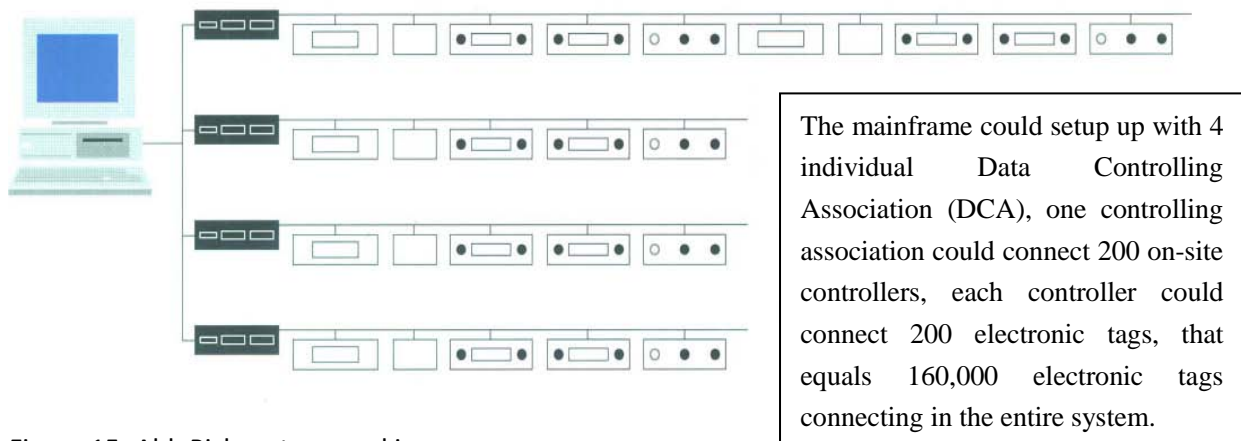


Figure 15- AblePick system working process

Source: *Shanghai Shangshang Auto technology Company Ltd.Co.* From world wide web: <http://WWW.ATOP.COM.CN>

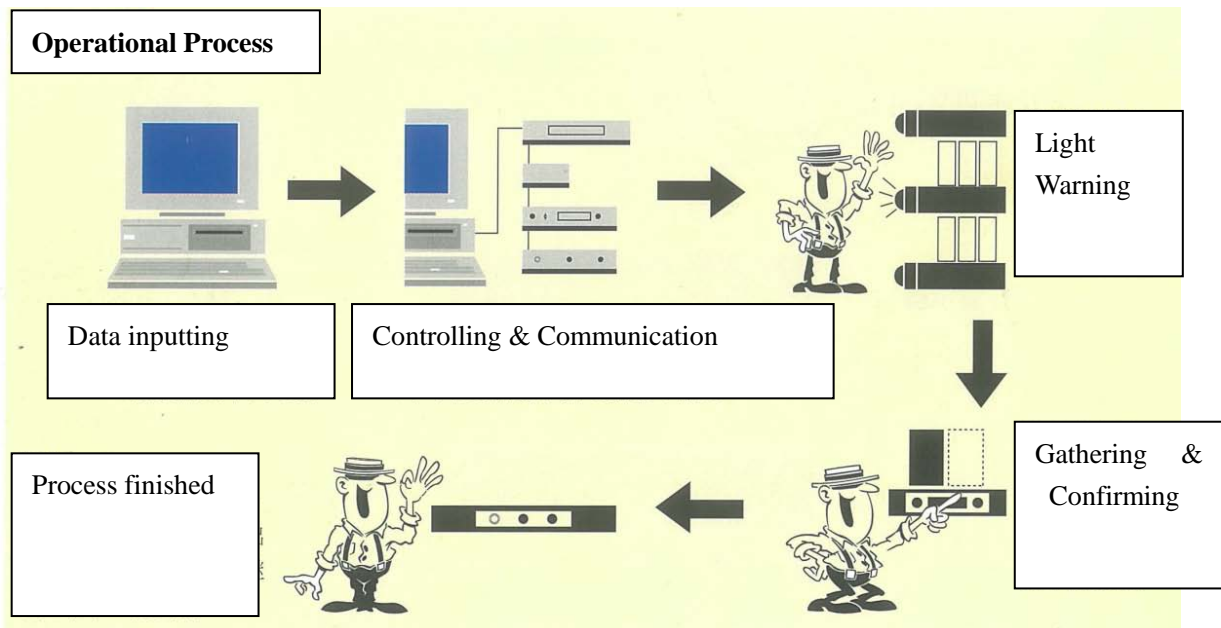


Figure 16- Operational Process of Electronic Labeling Interface

Source: *Shanghai Shangshang Auto technology Company Ltd.Co.* From world wide web: <http://WWW.ATOP.COM.CN>

3.6 Expected yield and Investment Budget

The expected yield with adopting the AblePick system in Bright Speed Fresh Logistics Company will increase 10 percent to 50 percent efficiency in the entire distribution system. According to present operating situation of logistics center, I can assume that the logistics center will be affected as the

following chart (Table 2) shows while we using the AblePick system in the company.

Annotation:

(1) This chart shows us under some certain condition of management while we using the electronic tagging system, the probable efficiency increase we could possibly receive. (2) ■ stands for score 5 (Excellent), O stands for score 3 (Medium), X stands for score 1 (Weak), reflect the present management condition. (3) Company can analyze the present situation they are in by operation modes which the chart lists.

Table 2-Efficiency of distribution with different situations

Source: *Shanghai Shangshang Auto technology Company Ltd. Co.* From world wide web: <http://WWW.ATOP.COM.CN>

| The probable efficiency increasing after using Electronic Tagging System | Major Tasks of Logistics Center | | | | | | | | | | | | Score | |
|--|---------------------------------|---------------------|---------------------------|--------------------|-----------------|----------------------|--------------------|--------------------|-------------------|------------------------------|------------------------------|---------------------|-------|---------|
| | Delivery Apartment | Delivery Method | Delivery Staregy | | | Warehouse Management | | | | Delivery Information | | Delivery Equipments | | |
| | Clear the Delivery Apartment | Analyzing the Order | Divide The Warehouse Area | Separate the Order | Batch the Order | Number the storage | Manage the storage | ABC Classification | Kinetonema Design | Advanced Information Carrier | Information Management speed | Advanced Equipments | | |
| 10—20% | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | O | bove 50 |
| 20—30% | ■ | O | ■ | O | O | ■ | O | O | ■ | O | O | O | O | 40~50 |
| 30—40% | O | O | O | O | O | ■ | O | O | ■ | O | O | X | X | 30~40 |
| 40—50% | O | X | O | X | X | O | O | X | O | O | X | X | X | 20~30 |

This chart tells us very clearly that we can choose different modes to operate and manage the company leading to different direction. If Bright Speed Fresh Logistics Company is only striving to grab more profit and increase the output efficiency mostly, they could implement the last strategy (40 percent to 50 percent efficiency increase, the total score is 20 to 30) to develop their company, even though their management performance is little lower than the average, but their logistics

efficiency get a huge improvement. In my opinion, I think the middle point of the mode might benefit the company most. Like the second or third strategy (20 percent to 30 percent efficiency increase and total score is 40 to 50 or 30 percent to 40 percent efficiency increase and total score is 30 to 40), Bright Speed Fresh Logistics company could take advantage from both efficiency increasing and well-designed management process. And from developed countries' experience, we could (1) project this electronic tagging system individually then bring it into the whole distribution system and innovating other parts in distribution system, (2) or we can combine the electronic tagging system with information system, storage system, warehouse management system and delivery system, and innovate the entire integrated system at one time. But the second plan would need to make a large investment and potential risks would be higher relatively.

If we are planning to invest on this project, we need to set up a budget to make sure this project could be completed well. The following tables show us the exact budget we need to set up and how much we should invest in every detailed stage.

At present, Bright Speed Fresh Logistics Company needs to serve and handle at least 1,070 kinds of products in unpicking zone, and 450 kinds of products in full container zone, I make a probable assumption like the below table showing:

| Products Sorts | A(20%) | B(30%) | C(50%) | Total |
|------------------------------|--------|--------|--------|-------|
| Unpicking Products Zone | 214 | 321 | 535 | 1070 |
| Full Container Products Zone | 90 | 135 | 225 | 450 |

Table 3-Classification of products
 Source: The present Data of Bright Speed Fresh Logistics Company

Annotation:

(a) I suppose that Product A accounts for 20 percent of total, Product B accounts for 30 percent of total and Product C accounts for 50 percent of total.

(b) After we get the latest accurate data from the company, we will replace these hypothetical data.

The following part shows our initial estimation about the three stages investment. It could be thought as the reference to set up the accurate investing budget.

| | Number of the Electronic Tag | Amount of Investment (10 thousands RMB) | Specific Description | Objective |
|----------------|-------------------------------------|---|---|---|
| Stage 1 | 430 | 65 | 300 one-to-one Electronic Tags 130 one-to-six Electronic Tags | Satisfy 800 Convenience Stores' Delivery and Distribution need |
| Stage 2 | 640 | 80 | Add 640 Electronic Tags, Using one-to-one separation method to Product B and Product C | Become the first, biggest Delivery & Distribution Center serveing for Convenience Store and supermarket in Shanghai |
| Stage 3 | 450 | 67.5 | Using one-to-one separation method to all full container products part | Implement TPL ²⁰ , to create further more profits |

Table 4-Staged of investment budget

Source: The present Data of Bright Speed Fresh Logistics Company

By implementing the Electronic Tagging Plan, the entire Bright Speed Fresh Logistics Company's delivery & distribution system will be upgraded, the unnecessary workforce cost will be reduced down, the all efficiency will be improved, and could be useful to avoid making mistakes and incorrect

²⁰ TPL: Telecommunications Programming Language

manipulation.

Chapter 4 Vehicle problem modify

Bright Speed Fresh Logistics Company is aiming to serve nationwide food distribution center for a long time. In some hot and humid areas, some certain types of food, like refrigerated food must be stored in standard cold storage equipments to keep proper temperature in the process of production, storage, transportation and retail sale, which is being defined by us before as “cold chain”. Under this kind of situation, the vehicle-related problem appears apparently.

4.1 Definition and basic situation

The vehicle problems include three aspects:

- 1 When we don't need to consider about the time request, project and arrange the vehicle routing only by spatial location, we call it as VRP, which is short for Vehicle Routing Problem.
- 2 When we need to concern about the time restriction and request to arrange the vehicle routing, we call it as VSP, which is short for Vehicle Scheduling Problem.
- 3 When we need to think about the mixed situation which includes both routing and scheduling aspect at the same time, we always call this time-location-mixed problem as VRPTW, which is short for Vehicle Routing Problem with Time Windows.

The vehicle transporting problems and efficiency of refrigerated food distribution not only significantly affects the cost of the carriers but also the revenues of retailers. To enhance the level of service, carriers usually must satisfy time-window constraints of customers. For instances, many convenience stores contract with distributors for delivering refrigerated food in specific time-window. So, considering time-window constraint well in advance on planning shipping routes can lower the carrier's shipping cost and match customers' requests to raise level of service. Past literature about VRP focused on shipping normal products (e.g., Bodin et al., 1983; Solomon and Desrosiers, 1988;

Daganzo, 1987a; Daganzo, 1987b; Fisher and Jaikumar, 1981). Some studies investigated perishable products, but most of them dealt with perishable product inventory models and discussed the best EOQ²¹ (e.g., Covert and Philip, 1973; Philip, 1974; Charkrabarty et al., 1998; Giri and Chaudhuri, 1998; Hariga, 1996; Ghare and Schrader, 1963). Only few studies discussed the distribution of refrigerated food (e.g., Tarantilis and Kiranoudis, 2002).

Nevertheless, inventory cost due to the deterioration of refrigerated food and energy cost of equipments of cold storage in trucks, which are important characteristics of distributing refrigerated food, are seldom considered. This research extends VRPTW²² by considering randomness in refrigerated food distributing process and Bright Speed Fresh Logistics Company constructed a VRPTW model to solve the optimal shipping route. The objective function of the model aims at minimizing the sum of transportation cost, inventory cost, and energy cost. Among them, transportation cost depends on vehicle routing distance, while inventory cost accounts for the deterioration of fresh food due to the vehicle routing around many customer demand locations. Energy cost is due to extra energy consumption of freezing equipments on the vehicles. Then, the study formulates a time-dependent fresh food deteriorating function, and calculates the probability of deterioration occurrences and evaluates how much loss it causes. Bright Speed Fresh Logistics Company's trying to create the customer food demand, to prevent food delivery from route failure, defined as incapability for delivering the required amount of food at time-windows due to food perishing. This model can be used as a reference for distributors to make decisions, such as the required fleet, vehicles departure time, load, and distribution route.

Once we deal with these vehicle transporting problems well and increase the efficiency of food distribution, we can finally improve the entire logistics system efficiency and lessen the unnecessary cost in transportation stage.

²¹ EOQ: Economic order quantity

²² VRPTW: Vehicle Routing Problem with Time Windows

4.2 Feature and Problems

The vehicle routing problem mainly includes the next several aspects:

4.2.1 Products

Bright Speed Fresh Logistics Company should concern about the name and nature of the products, the package of the products, the weight and size of the products, the request delivery time of the products and whether the separated delivery is acceptable to this products. The nature of the products decides what kind of vehicle company could use. For instance, some certain type of products like fruit and seafood, which is supposed to be delivered to warehouse within the shortest time spending to keep them in fresh, and some products even tough are not the same sort of goods, but dues to their good outer package, they also could be delivered in a same vehicle. To the cold chain logistics, Bright Speed Fresh Logistics Company also needs to arrange the refrigerated food, fresh meat, seafood and some certain drugs to different cold chain transporting vehicle.

4.2.2 Vehicle

Bright Speed Fresh Logistics Company should concern about what the type of the vehicle, what the loading capacity of the vehicle, how long this vehicle could delivery in one time and where to park the vehicle before or after the delivery activity.

Bright Speed Fresh Logistics Company always divided the vehicle into two sorts: general vehicle and special vehicle. According to the different delivery requirements and different nature of the products to choose which kind of vehicle is more proper. The cold chain transporting vehicle is the major working facility in cold chain logistics, the allocation and dispatch of cold chain vehicle will impact the efficiency of cold chain logistics a lot, and plays an allimportant role on keeping the products (perishable food) fresh, reducing the fuel cost and total transportation cost.

4.2.3 Distribution Center

In a distribution system, company could establish just one distribution center or several distribution centers, it refers to the problem of distribution network (Figure 17). If there are too many spots need

to be distributed in a certain area which is big scale, most companies prefer to use multilevel distribution center to distribute. A well-designed optimal multilevel distribution center could help Bright Speed Fresh Logistics Company a lot to make more profits and reduce the cost.

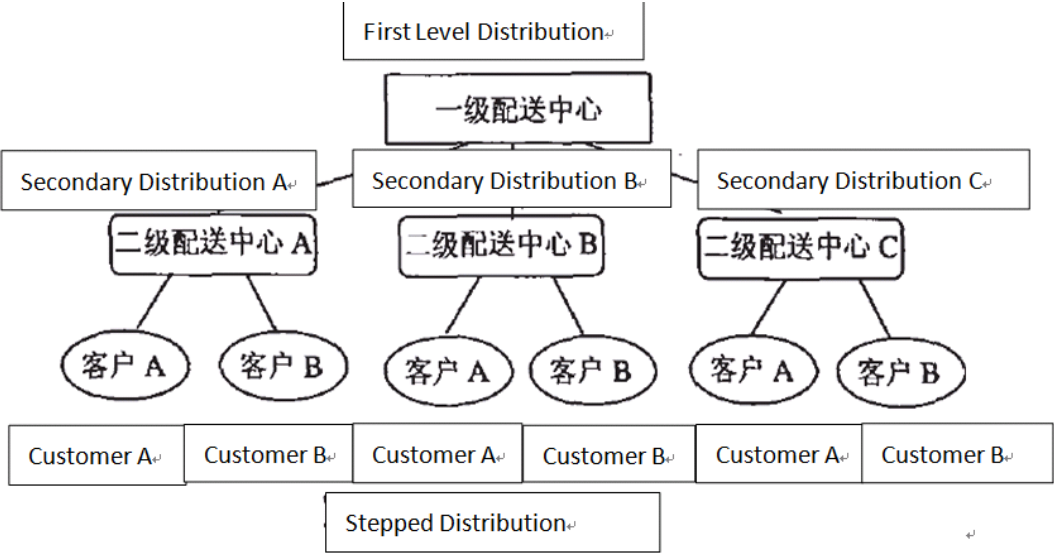


Figure 17-Stepped Distribution
 Source: Li Hong, (2006). *The research of distribution in city cold chain logistics*, Unpublished master's thesis, Changsha University of Science and Technology, Hu Nan, China

4.2.4 Clients

The majority of clients for cold chain logistics company are storage centers and retailers. Aiming at different clients, company should use different strategies to meet their distribution requirements. Distribute in a flexible way, provide the time-unrestrictive strategy or Tim-window strategy, try to establish a positive relationship with clients for long term, that will be helpful to the Bright Speed Fresh Logistics Company.

4.2.5 Transportation Network

There are some possibilities could happen in Bright Speed Fresh Logistics Company's transportation network. Because the transportation network is constructed by a lot of routing and time points, thus the transportation network could be (1) fixed and won't be changed with the time points and vehicles changing (2) will be changed only with the time points changing (3) will be changed only with vehicles changing (4) will be changed with either time points or vehicles changing. In a complete

transportation network, the flow rate of transportation is changing in different time points, and there are lots of restrictions on designing Bright Speed Fresh Logistics Company's routing and arranging your vehicles, so we can conclude that, build up an excellent transportation network is pretty tough but if Bright Speed Fresh Logistics Company completes that successfully, that will bring company a lot.

4.2.6 Restriction

There are five key restrictions within Bright Speed Fresh Logistics Company's distribution process:

- 1 Satisfy all clients' request about products' sort, specification, quantity.
- 2 Satisfy all clients' requirement about the delivery time range
- 3 Distribute the products in the permissive period
- 4 The loading capacity of vehicle could not over the maximal loading capacity
- 5 All distribution activities in distribution center should be under the entire distribution capacity

4.2.7 Objective Function

From previous successful case, the most used objective functions to Bright Speed Fresh Logistics Company could possibly are:

- 1 The least distribution mileage. The distribution mileage has a direct connection with fuel cost of vehicle, depreciation of vehicle and tiredness of driver. It impacts the transportation cost mostly, and influence economic returns greatly.
- 2 The least tonnage/mileage of distribution vehicle. Consider about the distribution mileage and loading capacity of vehicle conjointly, seek to find a least product which is timed by maximal tonnage of vehicle and total distribution mileage.
- 3 The least overall cost. It is the basic request for the economic distribution business. Overall cost always can be reduced by decline the vehicle maintenance cost, vehicles management cost, products loading and unloading cost, employees' salary etc.
- 4 The highest time reliability. To some certain sorts of products, clients have a very strict timing requirement, to meet clients' need and improve the quality of service, sometimes we

will set the top time reliability as company's distribution guideline.

- 5 The most reasonable distribution. Try to achieve using less vehicles finishing the distribution job, keeping the full-load ratio at the top level, exploiting the maximal capacity of vehicles fully.
- 6 The lowest workforce cost. In this objective function, the ultimate target is employing as less drivers as they can which also could guarantee their routine distribution work, and set the shortest working time which could get the payment.

All of these seven aspects are typical features and most usual problems in vehicle routing problem in Bright Speed Fresh Logistics Company, observe them from different angles and deal them with different methods will bring totally different results.

4.3 Specific implementing method

From my personal viewpoint, I think there are two possible operating stages to modify Bright Speed Fresh Logistics Company's vehicle routing problem. From the internal to the external environment, Bright Speed Fresh Logistics Company needs to promote a brand new management system to upgrade its whole delivery system and releasing its potential capacity.

First stage, enhancing the order management. Divide the B-to-B²³ type order and B-to-C²⁴ type order to two different individual department, allocate different types of vehicle to meet the delivery service. To B-to-B type order, I suggest to use the vehicle with high loading capacity, set up the special time arrangement to avoid delivering at the peak period, and increase the monitoring strength during the delivery process. Build up a developed database to store all orders records, to offer the useful experience for further development. To B-to-C type order, I think developing an order information shared network, to share the order information with retailers at any time, and both sides company could track the order from this online system. This implementation will make the delivery process being more transparent, and the delivery process will be controlled in detail by both sides.

²³ B to B: Business to Business

²⁴ B to C: Business to Customer

The total delivery quality might be increased a lot, and will be helpful to create a more positive trusting relationship between the Bright Speed Fresh Logistics Company and retailers. In the other side, a scientific order classification & operation system can help the management of company making the right decision to set up the transporting routing. For instance, according to the past information from the order information database, we will figure down how many vehicles should be arranged in some routings in peak period, and is helpful to make out the vehicles transferring policy, to ease some hectic spots' delivery pressure, and also increase the operating factor for the idle vehicles.

Second stage, building more secondary distribution centers and cooperative with local auto-maintenance companies. Both of them can benefit company's long term developing strategy, and reduce their basic operation cost.

As I know the depreciation of vehicle is the major expenses in delivery stage. If we can significantly reduce the maintenance cost of the vehicles by make cooperation with local auto-maintenance companies, that could save a lot of money for vehicles' maintenance and bring more cash flow into company's business. More cash flow in a company will be extremely good for Bright Speed Fresh Logistics Company's long term development and business expanding.

And from the previous experience, secondary distribution center always play a supportive role in the whole distribution process. They could offer the necessary supply chain service, inventory management and convenience to expand the business scale and occupy the more market share. To the logistics company, the reputation and market share are critical to your further developing. Once you form a systemic network to operate your business, the scale merit will be reflected within your regular business operation, more secondary distribution centers' advantage is going to emerge.

All in all, in order to make the vehicle stage works better, we could modify and adjust this link with designing and developing a more advanced order operation system, and set up the positive cooperative relationship with local enterprises to reduce the operation cost, and continue to expand

the enterprise's scale and market share in certain areas, establish Bright Speed Fresh Logistics Company to be integrated and dynamic to suit the modern economy trend.

Chapter 5 Conclusion

After several years of development, the Bright Speed Fresh Logistics Company (belonged to Bright Dairy Company) has developed step by step to be the top pioneer in China, especially in cold chain logistics area. Even though Bright Speed Fresh Logistics Company is relatively influential nationwide, but compare with competitors from developed countries who has successfully extended their business to international markets, Bright Speed Fresh Logistics Company has a long way to go. Whatever in cold chain technology, cold chain transportation & distribution process designing or cold chain managing aspects, there is a still an obvious gap between us and developed countries, and these lags directly causes the cold chain logistics industry experienced a slow development in China.

The core part of cold chain logistics is temperature controlling technology and combinational use adding on transportation. Bright Speed Fresh Logistics has introduced into some advanced temperature controlling technical system, but the whole company's development was on a starting stage, the concrete application was still on a trial stage, and the operational standard has not been established yet, then Bright Speed Fresh Logistics Company is still supposed to be developed a lot to avoid waste and increase efficiency. This trend of cold chain logistics is unstoppable in the coming times, but at present, the cold chain food can not able to make a full guarantee yet.

According to the study about how Bright Speed Fresh Logistics Company works, by analyzing what parts of their operational mode need to be adjusted and developed, I figured out several doable methods to deal with the existing problem in this company right now, and aiming to prevent other further problems happening in the future. The first feasible approach is introducing the new

Electronic Tagging Technology. This tool will be helpful on order receiving, classification, recording, analyzing, authorization and archiving aspects. It will shorten the operating time greatly and reduce the chance to let the mistakes happening. Thus, we can say this Electronic Tagging System is pretty great for Bright Speed Fresh Logistics Company's whole order processing system.

To the other side, I think the Vehicle Related Problems should draw our serious attention. Because the unchangeable nature of the company is "transporting via temperature controlling VEHICLES". Vehicles really play an important role on this cold chain logistics mode. In this paper, I suggest we should enlarge the loading capacity per one vehicle to increase the transporting efficiency, optimize the vehicle routing designing to avoid source being idle and wasted, and cooperate with local auto-maintenance company to reduce the vehicles maintenance cost. From those three aspects to modify the entire vehicle transporting system, that will benefit Bright Speed Fresh Logistics Company from bringing a more integrated delivery chain.

By comparing the lags between us and developed countries, learning something from their success or failure experience, is absolute an easy-path for us developing. We just need to upgrade our present service in domestic, grab the opportunity to develop the abroad markets, be nice to suggestions, be professional to customers, be tough to competitors, be curious to new technologies, be attentive to challenges. I do believe cold chain logistics could develop well in China, and there are always lots of invisible potential chances waiting for our exploring in the future.

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