Keywords: Dairy Industry, Cold Chain Logistics, Physical Distribution Management

Abstract. In recent years, with the rapid development of domestic logistics industry, people's demand for dairy products has increased rapidly. However, the overall level of development of cold chain logistics in China is not high, and the market development model is not yet mature and perfect. Enterprises encounter many problems and difficulties in the process of developing cold chain goods. The paper mainly focuses on the problems of cold chain logistics in Bright Dairy Industry and how to optimize and solve them, including cold chain logistics information management, personnel management, cold chain logistics center planning and design, cold chain distribution and distribution center planning and layout. Through a large number of data and research and analysis, the Bright Dairy cold chain logistics problems have been summed up and optimization programs are discussed.

Introduction

Since 1990, China's dairy market has witnessed a blowout period, showing a trend of rapid development [1]. The 10-year average growth rate from 1990 to 2000 was 12.1%, ranking first in the world. 2000-2016 also showed a rapid growth trend, but the growth rate slowed down slightly. Dairy production reached 29.932 million tons in 2016, a cumulative growth rate of 7.7%. Dairy production reached 30.590 million tons in 2017, with an annual compound growth rate of 5.65% in the next five years. According to the information consulted, China wastes about 12 million tons of fruits and 130 million tons of vegetables every year due to the problems of cold chain logistics, the total value is about $10 billion [2]. As one of the leaders of China's dairy industry, Bright (or, Guangming, as it is called) Dairy also has some problems to be improved in the cold chain logistics of dairy products. Therefore, we choose Bright Dairy as our research object, study and analyze the problems of Bright Dairy Cold Chain Logistics, and put forward reasonable solutions.

Summary of Cold Chain Logistics of Dairy Products

The Concept of Dairy Cold Chain Logistics

Cold chain logistics of dairy products refers to the logistics of milk of origin in the whole process of storage, transportation, distribution and retail, relying on refrigeration technology, using advanced refrigeration technology means, always maintaining the low temperature conditions required by dairy products. Dairy products can be divided into liquid milk, milk powder, ice cream, butter and cheese [3]. Different products have different requirements for cold chain logistics, according to the temperature control conditions of dairy products, the cold chain logistics of dairy products can be divided into three categories: the normal temperature logistics of milk powder and liquid milk, the fresh-keeping cold chain logistics of yogurt and pasteurized milk, and the cold chain logistics of ice cream and cheese.

Characteristics of Cold Chain Logistics of Dairy Products

Three characteristics of dairy cold chain logistics are: Dairy products are liable to corruption and...
deterioration, so the construction cost of cold chain logistics of dairy products is higher than that of normal temperature logistics; Dairy products have a very high demand for logistics timeliness, and all links of the cold chain should have efficient organization and coordination. The operation of dairy cold chain is always related to the cost of energy consumption; therefore, very effective cost control is very important.

**Development Status of Cold Chain Logistics of Dairy Products**

China's dairy industry started late and started at a low level, but it developed very rapidly. China's dairy consumption is gradually expanding, but the current large-scale consumer market is far from being formed. Cold chain logistics is an extremely complex and systematic project. With the support of national policy and the promotion of market demand, cold chain facilities such as refrigerators and refrigerated trucks have grown rapidly in China. Although the domestic dairy industry has a bright future, the development of cold chain logistics in China is still in the initial stage, and the development speed is very slow and uneven. More than 50% of the corrosive food consumed by Chinese consumers every year is transported by cold chain, but the pass rate of cold chain is only 19%. This figure is about 95% in developed countries, which shows that the domestic dairy industry still has great challenges and opportunities [4].

**Current Situation of Company Development**

**Brief Introduction of Enterprises**

Bright Dairy Co., Ltd., established in 1996, is mainly engaged in the development, production and marketing of dairy products, feeding, breeding and distribution of dairy products. In the domestic large-scale dairy production and marketing enterprises, Bright Dairy has become one of the industry leaders through continuous development.

**Analysis of the Current Situation of Enterprise Cold Chain Logistics**

Bright Dairy has a large-scale pasture, cut off the source of bulk milk, began to pay attention to the quality of dairy products at the source, and strive to ensure the high quality of dairy products in all links. For the transportation of dairy products, it is different from some dairy enterprises that outsource the distribution to other logistics companies. Bright Dairy has its own logistics department, which uses cold chain logistics technology in transportation, processing, warehousing, distribution and other aspects, and carries out strict management of each logistics link. At the same time, Bright Dairy has a "production and marketing integration" cold chain logistics model, through cold chain technology, pasture, refrigerated warehouse, distribution center and sales convenience stores are connected.

**Problems in the Company**

**Information Management**

**The Social Base is Relatively Weak.** The advanced development of cold chain logistics needs a set of high professional standards, and can be standardized in the whole industry of cold chain, in order to better develop cold chain logistics information technology. Although Guangming Dairy Industry is constantly improving and strengthening its own logistics, it is still in a relatively scarce stage in the use of information standards in the cold chain logistics industry, and has not yet developed its own set of mature industry standards suitable for China's national conditions. Therefore, the application of logistics information technology industry guidance is inadequate. Bright Dairy industry is only relying on their own constantly groping for new directions.

**Imperfect Logistics Information System.** The logistics information system was developed before Bright Dairy, but only in Shanghai. However, with the improvement of people's living standards, orders in Bright Dairy Area are also increasing. The absolute operating time and volume of operations for the Logistics Department are increasing sharply. However, Bright has only
established logistics information system in Shanghai, so it is difficult to master the total inventory distributed in various regions [5]. It can't be uploaded and delivered quickly. Part of the work still depends on the original manual work. The resulting business processes are not smooth, operational errors are unavoidable, and cost increases lead to the loss of some profits.

**Personnel management**

**Shortage of Senior Management Personnel.** Traditional logistics practitioners have been unable to meet the demand, Bright Dairy employment requirements are also changing - "compound, technology application-oriented talents" demand is more and more widespread. So the traditional practitioners who only know the general knowledge of logistics industry can no longer meet the needs of Bright Dairy industry, but also know the relevant knowledge of computer technology, network technology, and other fields. However, the state attaches great importance to logistics education and starts relatively late. Logistics education cannot keep up with the pace of development of the times. So logistics talents are scarce in China, and demand is far greater than supply. Logistics talents have become one of the scarcest professional talents. It is known that there are less than 100 professional managers in China who hold logistics professional management qualification certificates issued by international authoritative certification bodies. At present, only 572 undergraduate colleges and universities in China have established logistics specialty. There are about 200,000 graduates of Logistics Specialty in China every year, but there are more than 1.3 million new logistics posts in China every year. Therefore, Bright Dairy Industry and even the whole logistics industry are very short of talents, especially senior logistics talents. Bright Dairy Technology is a highly paid recruitment, and it is rare for a professional senior logistics personnel.

**Unbalanced Professional Ability of Grass-roots Personnel.** Bright Dairy has many highly educated logistics technicians, but the demand is far more than the supply. Throughout the logistics industry in China, only 5.62% of the core practitioners are undergraduates, and only 0.47% are postgraduates or above. Only 4.38% of logistics practitioners hold intermediate technical titles. Then, there are fewer logistics talents in Wuhan Guangming Dairy Industry, even some grass-roots personnel or distribution personnel do not understand the concept of logistics, only understand logistics as transportation. Wuhan Bright Dairy Industry has to go through many procedures from production to customers. Dairy products, unlike other products, are also related to the cold chain. Some practitioners do not have a good understanding of the whole process of low temperature. Although dairy products are transported by refrigerated trucks, improper operation, poor temperature control, or lack of professionalism in the cold chain, incorrect cost savings in logistics, did not make dairy products in the right temperature state, as long as a staff member improper operation will lead to deterioration of dairy products [6].

**Planning and Design of Cold Chain Logistics Center**

**The Planning of Cold Chain Logistics Center does not Match the Market Demand.** Guangming has relatively few cold-chain logistics centers in China, and the planning of regional cold-chain logistics centers is quite unbalanced, mainly concentrated in East China. The distribution pressure of regional cold-chain logistics centers is high, and the existing cold-chain logistics centers cannot meet the growing market demand.

Guangming has five cold-chain logistics centers in China, which are planned to serve East, North, South, Central and Southwest China respectively. There are 21 regional logistics distribution centers, mainly concentrated in East and Central China. Although the cold chain logistics center in East China has a mature cold chain system, the operation cost of the cold chain logistics center increases gradually due to the rapid increase of new network points and new routes. At the same time, the network layout between secondary cities and towns is relatively scattered, and the regional logistics center cannot meet the requirements of sales. With the vigorous development of Bright in the western market, the cold chain logistics center in the central and western regions takes Xi’an as one of the primary layout. But at present, the products in the central and western regions are allocated by Wuhan logistics center, so the layout is extremely unfavorable to the development of the market. The dairy market in the southwestern region has great potential, but the cold chain
logistics infrastructure construction in the region is still quite backward, which leads to the imperfection of the cold chain logistics network in the region. At present, Bright has only planned a cold chain logistics center in Chengdu. At present, the re-integration and planning of cold chain logistics center has become a bright and urgent problem to be solved.

**Unreasonable Design of Cold Chain Logistics Center.** The bright cold-chain logistics centers are mostly comprehensive cold-chain logistics centers and U-type cold-chain logistics centers, which greatly reduces the operation efficiency of logistics centers and seriously wastes resources. At the same time, because of the large investment and high risk in the construction of cold chain logistics center for dairy products, Guangming pays more attention to sales and neglects the construction of cold-chain logistics centers, which leads to the low degree of specialization of logistics center, which leads to the increase of construction cost and facilities and equipment management cost, large quality loss and low timeliness. At the same time, there are some problems in the location of cold chain logistics centers. Some of the cold chain logistics centers in the planning layout are not compatible with the distribution of milk source base and consumption market. Therefore, how to establish an efficient and low-cost cold chain logistics center is also an urgent issue [6].

**Cold Chain Distribution**

**Increased Demand for Distribution and Inadequate Equipment for Distribution Facilities.** With the increasing demand for dairy products in the domestic market, dairy producers have higher and more requirements and challenges. Guangming, like other dairy enterprises, mainly invests its energy in production. In order to develop new varieties and new products to meet market demand, it neglects the distribution process of dairy products, which leads to the shortage of cold chain logistics facilities and equipment, and directly reduces the quality and efficiency of product distribution.

**Low Investment in Technology Development and Low Degree of Informatization.** Due to the large investment and high cost of scientific and technological development of cold chain logistics, Guangming has less investment in technology, which makes it difficult for Bright to keep up with the development trend of information technology of cold chain logistics, and makes Guangming inefficient in product distribution.

**Lack of Standard Quality Control, High Product Damage Rate.** Due to the neglect of Bright in the cold chain distribution, strict standards and accurate and standardized operation procedures have not been established at the same time. Because of the low level of staff specialization, the cold chain distribution of products has been seriously damaged, resulting in huge losses for the company.

**Solutions**

**Information Management**

**Use Advanced Logistics Information System.** The logistics system is divided into three parts, namely WMS (Warehouse Management System), TMS (Transportation Management System) and PMS (Planning Management System), which are implemented in phases according to financial resources and time. In the first stage, WMS system is taken as the core part. In the process of system implementation, we usually take room temperature products as the main object of implementation, and then transform the warehouse and cold storage. In the warehouse management system stage, the three modules to be completed include WMS operation system, information summary analysis system and information self-service query system specially established for customers. The six parts of pre-implementation are basic information, purchase and delivery management, inventory management, allocation management and logistics processing [7]. After the completion of these six parts, it can basically achieve the effect of managing physical operations through system software.

The selection of suppliers will be the starting point of the first link, and the logistics centers in Shanghai and other fast-growing areas will be the main implementation objects. In terms of
hardware facilities, we use the high-speed backbone network established between the information processing center of Guangming Enterprise Headquarters and those cities that need to be traded, covering the trading points of logistics business department, and then establish the local area network by ourselves. We build the system in the backbone network points far from the logistics operation area. As for the increasing number of local area networks and PC maintenance, we outsource it to the third-party cold-chain logistics enterprises [8]. At this stage, we should expand the scope of application of the logistics system in the whole country, use C/S structure, set the local area network in each logistics warehouse, and then collect the data from different places into the general database through the replication function of the database. According to certain formats, the system solves the transaction information from different places, so as to explain the overall operation status of the logistics department. In the form of Internet, some operation information is provided to customers, thus establishing a self-service information inquiry system especially for providing services to customers, so that customers can timely understand the basic information such as orders and goods inventory and transportation status. Logistics system and ERP are mainly composed of basic information, purchase, delivery and warehouse management, as well as daily settlement module. They have the interface of delivery order and basic information. The main features of the new logistics system include real-time, sharing, accuracy, integration, security, openness and expansibility. It has the functions of searching inventory status by network and printing out delivery orders directly.

Improving Warehouse and Warehousing Information Management System. Construction of fully automatic three-dimensional warehouse is important. In order to achieve real-time data synchronization update, it is necessary to connect bright ERP with WMS cable in real time. In order to achieve paperless operation, wireless handheld terminal technology is used; in-service commodity management is implemented to ensure accurate and effective order issuance; in order to achieve customer satisfaction, order return management system and customer classification management system are established; in order to timely understand order information, barcode technology can be used on orders. Using computer and communication technology, different owners' warehouses and other hardware facilities are connected through the network to establish "virtual warehouse" and "virtual distribution center". Realize the virtual warehouse management mode in East China, and carry out unified management and supporting use. Improve service quality, reduce inventory, commodity turnover days, commodity depletion and so on.

Personnel Management

The key to solve the personnel management problem of Bright Company should be to improve the development system of logistics education, formulate post standards that meet the actual and development requirements, and rationally locate the implementation content of enterprise personnel training.

Strengthen School-Enterprise Cooperation and Train Logistics Technicians. On the one hand, Bright Enterprise should actively organize internal staff to participate in the education and training activities of cooperative schools. It should conduct theoretical training for employees according to the needs of enterprises, so that internal staff can grasp the theoretical knowledge of modern logistics and truly understand logistics. On the other hand, colleges and universities can also use the training base and equipment of Bright Company to provide practical places for interns, realize the combination of theory and practice, and then import professional logistics technicians for Bright Company [9].

Strengthen Continuing Education of on-the-Job Staff and Implement Elimination Mechanism. Employees of enterprises are encouraged to participate in logistics professional education based on their own shortcomings, such as attending on-the-job personnel seminars to improve their professional quality. In addition, when Bright company recruits logistics talents, it should formulate corresponding recruitment standards, recruit a group of senior logistics talents who know management, management and good decision-making, and then eliminate a group of low-quality employees from the existing staff to inject fresh blood into the enterprise.
Improving Staff's Awareness of Supply Chain. Storage, transportation, sales and processing, as well as the whole process of low temperature preservation are the supply chain links of dairy products [10,11]. At the same time, these five links can be realized, which will also become the advantages of Bright Dairy Industry in the operation process. Therefore, the staff should standardize their own operation, understand the suitable temperature of various dairy products to ensure the quality of dairy products.

Planning and Design of Cold Chain Logistics Center

Optimizing the Strategic Layout. In the cities where the production bases are located, cold chain logistics centers should be established to produce and sell products locally. Fresh-keeping production bases close to consumer markets should be established to ensure adequate supply in large markets, and new cold chain logistics distribution centers should be built to integrate and optimize the layout of new routes and networks. Xi'an is added as the cold chain logistics center in the Northwest region, and the western logistics network with Xi'an as the core is established. At the same time, we will accelerate the construction of cold chain logistics centers in Chongqing, Yunnan, Guizhou and Guangxi, and cooperate with Chengdu cold chain logistics center to build a relatively sound cold chain logistics network in the southwest. Increase cooperation with specialized cold chain logistics enterprises, and with Mengniu, Yili and other enterprises to build cold chain infrastructure, to achieve cooperation in competition.

Site Selection for Scientific Planning. In the planning of cold chain logistics center, an important step is the location of cold chain logistics center. The location of cold chain logistics center affects the speed of transportation and the arrival of goods, and then affects the profits of enterprises. The location process of cold chain logistics center should be adapted to the relevant factors such as national policy, distribution network of logistics resources, adhere to the principle of cost saving, and coordinate with the national logistics network. When Bright Enterprise conducts scientific location selection of cold chain logistics center, it can consider the method of factor proportion method [12]. Factor proportion method refers to a variety of factors that need to be considered in the process of site selection.

<table>
<thead>
<tr>
<th>Factor (full score 100)</th>
<th>proportion</th>
<th>Location 1</th>
<th>Location 2</th>
<th>Location 1</th>
<th>Location 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural environment</td>
<td>0.29</td>
<td>70</td>
<td>60</td>
<td>0.29*70=20.3</td>
<td>0.29*60=17.4</td>
</tr>
<tr>
<td>Business environment factors</td>
<td>0.37</td>
<td>85</td>
<td>80</td>
<td>0.37*85=31.45</td>
<td>0.37*80=29.6</td>
</tr>
<tr>
<td>Infrastructure status</td>
<td>0.22</td>
<td>60</td>
<td>70</td>
<td>0.22*60=13.2</td>
<td>0.22*70=15.4</td>
</tr>
<tr>
<td>Other factors</td>
<td>0.12</td>
<td>50</td>
<td>60</td>
<td>0.12*50=6</td>
<td>0.12*60=7.2</td>
</tr>
<tr>
<td>Total</td>
<td>1.00</td>
<td>70.95</td>
<td>69.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

However, due to the different importance of the factors considered, the decision makers should judge which factors are more important in this process, so as to make the evaluation more realistic. The steps of this method include the following six aspects. All the considerations presented above; Important scale reflecting each factor considered by weight; Scoring for each factor considered, ranging from (1-10 or 1-100); Score all alternative addresses for each factor according to the value range of step 3; Calculate the score of each alternative address. The formula is total score = score of each factor*weight; Choose the site with the highest score.
Cold Chain Distribution

Streamlining Process and Using Multi-Temperature Layer Technology. On the one hand, in the transportation process, we should simplify the corresponding operation process, reduce the number of loading and unloading, save time, improve the operation efficiency and transportation speed. On the other hand, multi-temperature technology means can be used to carry out multi-variety distribution. According to the transportation temperature requirements of different kinds of dairy products, heat insulation layer is set between refrigeration and freezing to provide the best transportation environment for Bright Dairy products, so as to achieve quality and nutrition. Compared with traditional logistics transportation, multi-temperature technology can increase the utilization rate of transport containers and control transport costs. Moreover, multi-thermostat technology has high stability and high efficiency, which meets the multiple needs of consumers for environmental protection and health.

Reasonable Increase of Distribution Network and Rational Design of Network Layout. In the aspect of distribution network optimization, Bright Enterprise can refer to the previous order data and adopt effective forecasting methods to reasonably increase the number of distribution networks in the target area, provide high-quality services for consumers, speed up transportation, improve inventory efficiency and reduce transportation costs.

Re-planning Routes by Means of Combined Transportation. Bright Dairy, as a well-known brand, has a wide range of products including yogurt, cheese and other varieties. In order to expand the market scope, we should combine various modes of transport, plan reasonable routes, realize multi-batch and multi-batch transport mode, and realize the rationalization of transport [13].

Joint Distribution. As one of the industry leaders, Bright Dairy Industry should encourage enterprises in the industry to cooperate with each other, make use of third-party cold chain logistics companies for unified distribution and centralized allocation. Outsourcing distribution links to specialized logistics enterprises and providing services by third-party cold chain logistics enterprises can not only save costs, but also reduce the pressure of regional cold chain logistics center and improve efficiency.

Conclusion

As one of the pioneers in China's dairy industry, the enterprise logistics in Guangming Dairy Group has completed the transformation to logistics enterprise, and its logistics company is becoming a third-party logistics enterprise. The management of transportation, processing, storage and distribution of milk source and dairy products through low temperature refrigeration can better guarantee the quality of dairy products. But in the investigation, we also found the shortcomings of Bright Dairy in cold chain logistics, the imperfect logistics information system and distribution system, etc. In view of the existing problems, Bright Dairy needs to plan the cold chain logistics center more reasonably, improve its logistics information system, enhance the competitiveness of enterprises in the industry.

References


