

## Research Article

# Construction of Cold Chain Logistics Management System in Hotel and Catering Industry

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**Abstract:** Cold chain plays an important role in goods movement and meanwhile cold chain logistics is a key process in supply chain of hotel and catering industry. Focusing on functions of cold chain logistics and cold chain logistics system, this study analyzed the structure of cold chain logistics system of hotel and catering industry in aspects of time, temperature and storage stability and discussed over detailed requirements on cold chain logistics management system and the construction process. Moreover, suggestions for establishing and perfecting cold chain logistics system are proposed.

**Keywords:** Cold chain logistics, construction of management system, hotel and catering industry

## INTRODUCTION

As people's consumption awareness constantly strengthens, their requirement on foods has turned from meeting basic dietary requirement to nutrition. Demand on natural and fresh foods increases in a high speed, which brings huge challenge to cold chain logistics system of hotel and catering industry and food industry. Related statistics demonstrate that, demand of refrigerated foods in market from 2008 to 2012 has an increase rate of more than 22.3%. Cold chain logistics system in is an important component in logistics system of the whole hotel industry. It is of great significance to establish distinctive cold chain logistics management system and develop perfect industry logistics system.

## OVERVIEW OF COLD CHAIN LOGISTICS

**Concept of cold chain logistics:** Cold chain logistics, also called low temperature logistics, is a systematic engineering that ensures foods to be kept in low temperature environment by implementing temperature control in steps of food production, processing, storage, transportation and sales (Daochun, 2015). It is composed of steps of processing, packaging, loading and uploading, transportation, distribution and storage and related logistics information. Special equipments are required to monitor transportation time, processing and state in time in cold chain logistics. Cold chain logistics, a special logistics form causing high cost is characterized by high coordination, high technological content and high cost.

Aiming at ensure goods quality, cold chain logistics focusing on maintaining low temperature environment is required more strictly and complex than other normal temperature logistics system (Yuechao, 2006).

**Characteristics of cold chain logistics:** Compared to other types of logistics system, cold chain logistics system has more outstanding characteristics mainly reflecting on more strict construction and environment requirements. Generally, cold chain logistics system is characterized by three points. First is strict requirement of environment. Cold chain logistics is usually operated at relatively stable temperature. Temperature of cold chain logistics is hard to be controlled, as temperature of refrigerated logistics should be kept between 0 to 5°C and frozen logistics should be kept below -15°C. Meanwhile, temperature control is important in steps of storage, transportation and sales. The second feature is strict construction condition. Cold chain logistics system requires high on storage environment, basic infrastructure, delivery system, packaging system and sales exhibition system. For example, temperature for raw fish should be at -50°C and fresh fish and meat should be kept between -2 to 2°C. Besides this point, steps such as storage, transportation and loading should also be coordinated effectively. The third point is large investment. Compared to normal temperature logistics, cold chain logistics system needs more funds, usually 5~10 times of normal temperature system or even more. Moreover, cold chain logistics system usually has higher rate of return. Now normal temperature logistics industry competition is quite intensive, but with unobvious business features; on the contrary, cold chain logistics system with large investment and high technological requirements has been the key of the current logistics system competition.

**Development profile of cold chain logistics system:** Chinese cold chain started from meat product output in 1950s. In 1982, China released the Food Hygiene Law and since then Chinese food cold chain took shape. In the past 30 years, food cold chain in China developed

Table 1: Comparison of food cold chain in China and foreign countries

Item	In China	In foreign countries
Pre-cooling and storage rate	33%	82-100% in European and American countries
Loss rate in picking	25-33%	5%
Refrigeration capacity	7 million ton	8,000 in the whole world
Refrigerated transport capacity	6,792 refrigerated train, 40,000 cars	0.26 million refrigerated car, 60,000 insulated van in American
Refrigerated transport rate	Automobile transport 10-20%; railway 25%; water transport 1%	80-90% in European and American countries
Refrigerated transport management	Imperfect food cold chain system	European and American countries has established high-efficient refrigeration chain

Table 2: Annual output of major foods in China

Year	Fruit (10,000 ton)	Vegetables (10,000 ton)	Meat (10,000 ton)	Eggs (10,000 ton)	Aquatic product (10,000 ton)
2008	19,220.19	59,240.35	7,278.74	2,702.20	4,895.60
2009	20,395.51	61,823.81	7,649.75	2,742.47	5,116.40
2010	21,401.45	65,099.41	7,925.83	2,762.74	5,373.00
2011	22,768.18	67,929.67	7,965.14	2,811.42	5,603.21
2012	24,056.84	70,200.00	8,387.24	2,861.17	5,907.68

constantly and some leading enterprises in food processing industry engaging in quick-frozen food, meat product, vegetable and fruit processing, ice cream, milk product, large-scale fast food chain and food export has established food cold chain system centering on their own products. But on the whole, China has not developed a complete food cold chain system, which can be seen from its comparison with developed countries (Table 1) (Guo, 2015; Dan, 2015) as well as imbalance between yearly output of perishable foods (State Statistics Bureau of the People's Republic of China, 2013) (Table 2) and refrigeration volume (Jing *et al.*, 2014).

According to the statistics (Yu, 2011; Xudong, 2015), annual output of various perishable foods in China is nearly 0.7 billion ton and annual consumption quantity of perishable foods is 0.24 billion ton. However, the current refrigeration capacity of China only accounts for 20~30% of foods demand. Moreover, insufficient hardware facilities cause huge waste of perishable foods. For instance, loss rate of fruits and vegetables in steps of picking, transport and storage can be as high as 25~30%, economic loss can be 75 billion Yuan and the wasted fruits and vegetables can meet nutritional demand of nearly 0.2 billion people. However, loss rate of fruits and vegetables in developed countries can be controlled to be less than 5%.

**Characteristics of cold chain logistics in hotel and catering industry and the existing problems:**

**Characteristics of cold chain logistics in hotel and catering industry:** Cold chain logistic system in hotel and catering industry has not been as large as those in sale terminal, but in the perspective of hardware, cold chain logistics in hotel and catering industry has its own outstanding features. First are stricter technological requirements as food cold chain logistics in sales terminal mostly face with individual consumers and cold chain logistics in hotel and catering industry is the extension of supply and production cold chain logistics and the foreground of sale cold chain logistics. Second

is outstanding sales individuation. Cold chain logistics system of hotel and catering industry usually emphasizes on individuation of chain operation, but such requirement often increases difficulties of cold chain logistics system. The third feature is mass circulation. Food circulation is usually in the form of mass. Most food circulating and processing spots overlap with sales places, for example, in chain restaurants. That requires cold chain logistics system to balance and coordinate sales individuation and mass circulation.

**Problems existing in cold chain logistics of hotel and catering industry:**

Cold chain logistics system has not been perfect. A complete cold chain logistics system includes raw material acquisition, refrigerated or frozen processing, refrigerated or frozen transport, refrigerated and frozen sales and consumption. Based on the current situation, cold chain logistics system of hotel and catering industry remains to be improved. Cold chain logistics system is required to operate efficiently using advanced automation technology, logistics technology and information technology. Referring to the development requirements of modern cold chain logistics system, cold chain logistics market in hotel and catering industry has still kept in development stage; one performance is the low operating efficiency of cold chain logistics system. Moreover, cold chain logistics has low standardization level. Professional cold chain logistics works must follow strict logistics standard. To be specific, delivered goods should be loaded and uploaded separately, different kinds of goods should be kept at different temperature and temperature should be controlled for the whole process in transport and delivery process. Compared to advanced cold chain logistics standard, cold chain logistics in hotel and catering industry needs further refined standardization. Additionally, cold chain logistics has low informatization level. On the one hand, basic information infrastructure level is low and

information technology is underdeveloped. On the other hand, construction and maintenance cost of cold chain logistics informatization is high and many hotels cannot afford it. On the whole, information construction should be strengthened in cold chain logistics system in hotel and catering industry.

## METHODOLOGY

### Construction of cold chain logistics system in hotel and catering industry:

**An internal and external combined structure:** Cold chain logistics can be divided into internal cold chain logistics and external cold chain logistics based on characteristics of modern circulation industry and inherent rules of logistics system in hotels (Yuling *et al.*, 2012). In the view of internal and external coordination, internal and external structure of cold chain logistics in hotel and catering industry are of equal importance. Internal cold chain is the extension of external cold chain logistics and also the most important part that plays the function of cold chain logistics. Closest to customers, quality and service level of internal cold chain logistics determines the whole cold chain logistics system. In addition, external cold chain is the premise and security of internal cold chain. Closely connected to external environment, external cold chain is also a key part playing the performance of the whole cold chain logistics system (Fig. 1).

It can be seen from Fig. 1 that, it is difficult for external cold chain logistics as it faces complex external environment. External cold chain logistics system should have the following characteristics.

**Integrated purchasing:** Integrated purchasing pattern is an innovation of traditional purchasing mode. Aiming at reducing cost, integrated purchasing focuses on integrating supply chain amount and improving purchasing process, in order to offer systematized and scale purchasing service.

**Integrated transportation and distribution:** Integrated transportation and distribution refers to transportation and distribution integrating manpower, material resources, financial resources, information and management, aiming at low cost and high efficiency and focusing on temperature. Integrated transportation

and distribution is the leading step in cold chain logistics system, especially in hotel and catering industry. In hotel and catering industry, most products or objects needs to be transported and distributed by cold chain logistics system, thus integrated transportation and distribution is one of the main business in cold chain logistics system.

**Combined storage:** Storage in cold chain logistics system is greatly distinguished from ordinary logistics system. Storage of cold chain logistics system is required to keep objects in original condition for a long term under low temperature. Objects should be stored based on different kinds and regions. Combined storage refers to scientifically store objects based on object properties and different temperature requirement. Though low temperature environment in cold chain logistics system requires security from technology and finance, combined storage can effectively lower cost of cold chain logistics system.

**Construction of internal cold chain logistics system:** For internal cold chain logistics system, reasonable operation steps inside is the key points. The following are points that should be emphasized.

The first point is reasonable operation steps. Operation steps are considered as the key point of refined management for cold chain logistics in catering industry. Compared to other logistics system, operation steps in cold chain logistics system is special. First, temperature is the premise of cold chain logistics system and cold chain logistics system without taking temperature as standard is of no significance. Unreasonable operation steps determine whether cold chain logistics can success. Generally speaking, operation steps of cold chain logistics system especially in hotel and catering industry include primitive production and processing, preset temperature, transportation, distribution and storage under balanced temperature, terminal marketing and individual storage. Changes of temperature can be divided into four stages (Fig. 2).

Thus the key point of rationalization is keeping temperature which can ensure high efficient operation of the whole chain.

Next is operation process refinement. Among catering cold chain logistics, catering enterprise is the

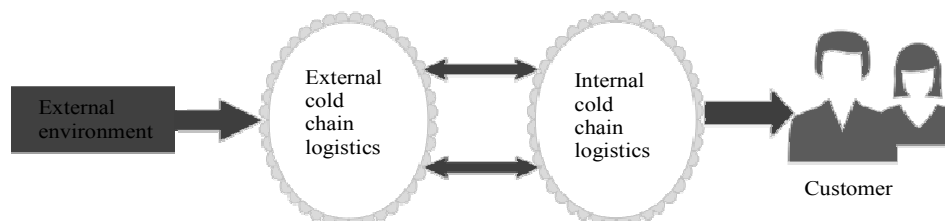


Fig. 1: Internal and external cold chain logistics

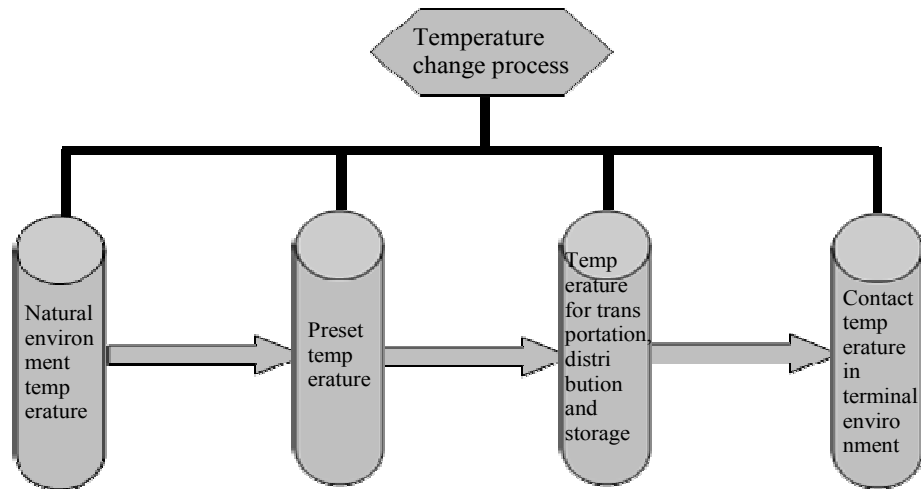


Fig. 2: Changes of temperature of cold chain

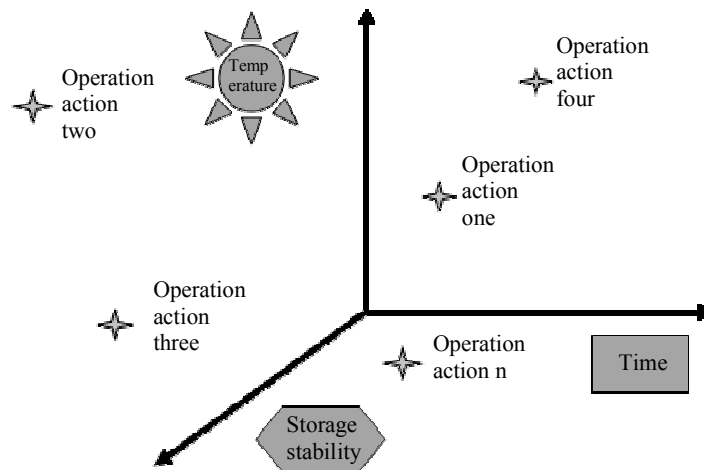


Fig. 3: Distribution of operation action points in 3T coordinate system

core and raw material supply enterprises is ahead of it and customers is next to it. Thus operation process of catering enterprises becomes a connecting link between the preceding and the following and its refinement level determines quality of following steps. Operation process of cold chain logistics system is considered integrating various steps produced under the motivation of final product and it also includes process tracing from the final product to the source. Such backward deduction can help to refine process and meanwhile it links the operation process of the whole cold chain logistics system as a line.

The third point is operation action standardization. One work is composed of many single actions. To standardize these single actions, staffs are required to form standard action at the beginning. Taking sticking gummed paper as an example, actions such as using which tools, how to take gummed paper and how to use scissors should be standardized. Standardizing actions can improve efficiency and promote mutual studying. As to cold chain operation in catering enterprises,

operation action standardization is executed taking temperature, time and storage stability as coordinates (Fig. 3). Actions of every cold chain operation should be analyzed in 3T coordinate system, thus to confirm action standard.

**Construction based on supply and demand chain:**

The construction is mainly a process of value increment. Every node on supply chain is formed based on supply and demand relation and the whole cold chain system is constructed based on supply and demand relations (Wenming and Xiaoliang, 2011). When we explore value increment process of cold chain in the perspective of supply and demand chain, 3D increase mode (dot, line and plane) is relatively outstanding. Dot refers to value increment point based on supply and demand relations, line refers to value increment process based on supply and demand relations and plane refers to value increment system based on supply chain relations. In cold chain, dot can also be regarded as operation action, line as operation

process and plane as cold chain system. With such refined analysis, we can easy to find out value increment.

### **CONCLUSION**

Cold chain logistics system is a lifeline of the whole logistics system in hotel and catering industry, demand of cold chain logistics in hotel and catering industry now has still remained at the initial stage, i.e., simple outsourcing and hotel and catering industry requires to establish a distinctive cold chain logistics system to support and promote the establishment of the whole large logistics system. Thus it is beneficial to develop perfect cold chain logistics systems for hotel catering and construct a distinctive logistics system for hotel and catering industry. We found in the present study that, scientific management method and performance analysis system has not been used in constructing cold chain logistics system and moreover we has just made a simple introduction for Hazard Analysis and Critical Control Point (HACCP) and means of 3T. But this study is expected to be concerned and effectively used by developers engaging in constructing cold chain logistics system.

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