Study on the Influence of Standardization on Quality Control Process of Cold Chain Express Services

Zong-zhen JIN, Li-li CAO, Yi ZENG and Fei HOU
China National Institution of Standard
*Corresponding author

Keywords: Standardization, Cold chain express, Service quality.

Abstract. In recent years, China’s cold chain express services have been developing rapidly. The management of cold chain operations has gained greater turbidity and the facilities adopted in cold chain services have also improved gradually. At the same time, however, the major problems such as low professional level, low-quality services and high complaint rate still exist. Based on the healthy development of cold chain express services, this article focuses on key links such as preparation, collection, sorting, transportation and delivery. It raises the standards for process quality control in aspects of temperature, equipment configuration, personnel management and exception handling. It analyzes key problems in cold chain express services and puts up with actionable and manageable standards.

Introduction

With the economic and social development of China and the continuous improvement of living standards of Chinese people, the demand for cold chain logistics is booming, the market size is expanding, and the cold chain logistic industry has secured a rapid growth. However, due to late start and weak foundation, there are still some problems in the cold chain logistics industry, such as imperfect standard system, backward infrastructure, low professional level, and insufficient supervision. In order to promote the healthy development of the cold chain logistic industry and ensure the safety of fresh agricultural products and food consumption, the Opinions of the General Office of the State Council on Accelerating the Development of Cold Chain Logistics and Ensuring Food Safety to Promote Consumption Upgrading has been released, which supports the involvement of China’s express industry in cold chain services and help to regulate the development of the industry.

Current Development of Cold Chain Express Market

Cold Chain Express Services are Developing Rapidly and Problems of Service Quality Become More and More Prominent

In recent years, the growing demand of Chinese people has led to the rapid growth of the cold chain market. According to statistics, the demand of China’s cold chain market reached 112 million tons in 2014 and will be nearly 200 million tons in 2017, with an average annual growth rate of 29.33%. As the cold chain market presents a good development momentum, the cold chain express also has evolved from scratch, with an increasing market share especially in the field of fresh agricultural products. It has basically realized the service “from farmland to tables”.

At present, express companies, such as Shun Feng, JD.COM and YAMATO, are involved in the cold chain industry. Shun Feng has launched cold chain express services in medicine, food and flowers since 2013. It provided such services in 59 cities and built 62 refrigerator warehouses. Its sales revenue reached 1.36 billion yuan in 2016, with an annual growth rate of 93%. The number of cold chain items delivered by YAMATO in 2015 accounted for 26.6% of its total delivery volume. The proportion climbed to 31.2% in 2016 and to 38% by now. The revenue from freighting cold chain items took up 51% of its total freight revenue. During its operation of the cherry project in 2017, EMS invested eight freighters to deal with cold chain delivery of cherries in Shandong,
Liaoning and Gansu. JD.COM has built more than 10 cold chain warehouses and more than 3,300
distribution sites across the country to support the delivery of fresh agricultural products.

In a broad sense, the cold chain express market has a bright prospect. Various express companies
became involved in it and invested a lot of capital to seize market opportunities. At the same time,
however, some problems in cold chain express, such as non-standard refrigerated vehicles, bacterial
reproduction in broken cold chains and uneven service quality, have resulted in higher complaint
rate and higher compensation rate than ordinary express services.

Cold Chain Express Services Have Special Requirements and the Services Come in
Diversified Modes

The items delivered via cold chain express are mainly fresh products. The business process of cold
chain express is different from that of other express services. In actual operation, express companies
gradually find out applicable service modes in order to ensure the quality of express items. These
service modes include three aspects, which should gain attention in the standard.

The first is that temperature control is required for cold chain express items. As cold chain
express items can only be stored in a short time and the temperature where these items are stored
needs to be strictly controlled, refrigeration and thermal insulation technologies are required for
cold chain express. Devices such as refrigerator trucks and thermal insulation containers should be
equipped. Temperature should be detected during the process to ensure that the express items are
kept in the required temperature range.

The second is that quality control in the whole process of cold chain express should be
strengthened. Issues of “broken cold chains” and “cold chains not cold” greatly hindered the
development of the cold chain express industry. The failure to establish enterprise quality control
system and the lack of regulations on the whole process management of cold chain express led to
unclear division of temperature zones, inadequate cold chain express devices and facilities, and
imperfect safety and health emergency management system. These problems directly resulted in
high complaint rate and compensation rate in cold chain express.

The third is that there are diversified modes of cold chain express services. At present, express
companies are engaged in cold chain express mainly in two service modes. One is packing
refrigerated and room-temperature express items in thermal insulation containers loaded with cold
media and sorting and delivering them in priority. The other is storing express items in refrigerator
warehouses when they are collected, transporting them with refrigerator trucks, and delivering them
with thermal insulation containers. These two modes of transportation coexist in cold chain express
services and are basically used by express companies.

The Standard Effectively Regulates Cold Chain Express Behaviors to Improve Customer
Satisfaction

The introduction of the industry standard of the Cold Chain Express Services has an important
purpose and a crucial significance in promoting the development of the industry.

First, optimize the operations of cold chain express to reduce risks. As cold chain express
requires temperature control, which is different from other ordinary express services, it is divided
into three temperature zones: frozen, refrigerated, and room-temperature zones. Besides, there are
requirements for temperature ranges in all service links. Through the establishment of the Cold
Chain Express Services, on the basis of the express service links, and in combination with the
special requirements of cold chain express, the quality of express items should be ensured in the
collection link. An agreement of cold chain express should be signed with the sender. In the delivery
link, the recipient will accept the quality of express items. The requirements for people who receive
express items on behalf of recipients should be made clear. In the compensation link, the obligations
of both parties should be clear. Express service organizations should be guided to provide optimized
operation regulations in a bid to enhance the service quality and reduce complaint rate and
compensate rate.

Second, regulate the configuration of cold chain devices to ensure the quality of express items. At
present, express service organizations have become involved in cold chain express but they have
not been equipped with sufficient refrigerator warehouses, refrigerator trucks, intelligent thermal insulation containers and information detection systems. These deficiencies led to failure to know whether express items have lost temperature and whether their quality has deteriorated. It is impossible to meet consumers’ needs by taking the completeness of packages as acceptance basis as this cannot guarantee the quality of the express items. The industry standard of the Cold Chain Express Services requires that express service organizations should equip necessary cold chain devices and information detection systems. It also raises up requirements for specific functions.

Third, facilitate the healthy development of the cold chain express industry and lead the development through monitoring. At present, there are a lot of national and industrial standards in China related to cold chain logistics. It is found that these national standards mainly include classification of cold chain logistics, tracing of food cold chain logistics, management of refrigerator warehouses, operations of cold chain transportation for fresh fruits and vegetables. However, there is not any standard related to cold chain express. The industry standard of the Cold Chain Express Services helps to guide express companies in participation in cold chain express services, to build the quality management system, to develop refrigeration and thermal insulation technologies in cold chain services, to improve cold chain devices, and to enhance the service quality of cold chain services. It also helps to form a good mechanism of “law execution, system building and standard implementation”, thus stimulating the quality supervision of the express industry.

**Principles and Basis for Formulating the Cold Chain Express Standard**

**Follow Existing Policies, Regulations and Standards**

The industry standard of the Cold Chain Express Services should be in coordination with existing principles, regulations and national standards. As a result, in the process of developing this standard, the drafting team followed the Measures for the Control of Express Market and referred to the regulations on cold chain transportation and devices from the Food Safety Law of the People’s Republic of China and the Opinions of the General Office of the State Council on Accelerating the Development of Cold Chain Logistics and Ensuring Food Safety to Promote Consumption Upgrading (document No. 29 [2017] issued by the General Office of the State Council).

Cold Chain express is one type of express services. It has high added value and grows fast. It has similarities with other express services but they also have distinct differences in service links and devices. Against this, on one hand, the drafting team also dedicatedly studied some national standards in the field of cold chain logistics.

**Highlight the Characteristics of Cold Chain Express**

The most outstanding characteristics of cold chain express are strict requirement for temperature control and multiple service links. In the process of formulating this standard, the drafting team considered the characteristics of cold chain express based on the service links. It also referred to the requirements for service links and management systems of cold chain logistics. It prioritized temperature control and device configuration in the links of collection, sorting, transportation and delivery, and proposed the requirements in order to achieve the goal that “cold chains never break and the whole process can be traced”. The team regulated all service links of cold chain express at the system level to ensure the quality of express items.

**Take the Development Status of Cold Chain Express into Consideration**

At present, as express companies just began to participate in cold chain express services, there are a lot of differences in service modes, business types and service quality. In the aspect of service mode, there are mainly two modes of cold chain express services. One is direct sale from farmland. In this mode, express service organizations collect agricultural products from farmland and deliver them to places across the country. EMS would collect agricultural products from farmland on a quarterly basis and deliver the by storing them in simple foam boxes loaded with cold media. The other is
integration of warehousing and delivery. In this mode, express service organizations collect cold chain express items from companies and deliver them through warehousing, sorting, distribution, packaging and delivery. JD.COM and Shun Feng built refrigerator warehouses by themselves and provided cold chain express services with professional cold chain devices. Thus when formulating the Cold Chain Express Services, the drafting team straightened up the differences and similarities of the two service modes in a systematic way and put up with articles that are actionable for express service organizations. The team also considered the prospects of the cold chain express industry and guide express service organizations in improvement of their cod chain devices and accomplishment of temperature control and information traceability in the whole process.

**Path of Formulating the Cold Chain Express Standard**

For regulating the behaviors and quality of cold chain express services, temperature control is an important factor to guarantee the quality of cold chain express items. And information traceability is the key to realizing temperature detection and quality process control in cold chain express services. It is also an efficient way to promote healthy and orderly development of cold chain express. In the process of formulating the standard for cold chain express services, the drafting team made a survey on the situations of cold chain services in different regions, provinces and companies in China by means of both field research and expert forums. It made a systematic analysis of the characteristics, features and business conditions of cold chain express companies and cold chain logistics companies. It came up with the actual developments (B2C and C2C) that are suitable for express companies to participate in cold chain services. It pointed out that the B2B mode suitable for cold chain logistics companies cannot be directly adopted by express companies. It raised up requirements of quality control for express companies in the general service links. In the preparation link, the requirements for temperature control, sites, contract content and signing are proposed. In the collection link, temperature control requirements are proposed for frozen,
refrigerated and other temperature-controlled cold chain express services. It is required to check the quality and quantity of items and thermal insulation packages. In the sorting link, requirements of sorting time, sorting temperature, and sorting sites are proposed for three different types of cold chain express services. In the transportation link, requirements of transporting express items by different sorts, organization management, temperature control and time limit are proposed for three types of cold chain express services in the two transportation ways of refrigerator trucks and room-temperature trucks. In the delivery link which is “the last one kilometer” of the whole process, plans are made for delivery ways, time, acceptance, acceptance on behalf of recipients, and exception handling. This article focuses on the key contents of cold chain express service standards based on the thinking in the above illustration.

Discussion on Key Problems of the Cold Chain Express Service Standard

Preparation

**Conditions of Collection.** Identification of express items before collection is a necessary step for express service organizations and is also an effective measure to avoid collection failure. Based on this, the standard specified that express service organizations should notify the senders of the conditions for accepting express items.

<table>
<thead>
<tr>
<th>Category</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of express items</td>
<td>Lists of acceptable and unacceptable express items</td>
</tr>
<tr>
<td>Temperature for express items</td>
<td>Temperature zones for express items, precooling, etc.</td>
</tr>
<tr>
<td>Express area</td>
<td>Collection and delivery areas</td>
</tr>
<tr>
<td>Express time</td>
<td>Collection and delivery time</td>
</tr>
<tr>
<td>Packaging conditions</td>
<td>Packaging methods, materials and the amount of cold media to be used</td>
</tr>
</tbody>
</table>

**Contract Signing.** Based on the major problems in the current cold chain express services, the drafting team, through survey, proposed that, apart from the content required by the Express Service Part 2: Organization Requirement (GB/T 27917.2), the terms and conditions of a contract agreed by a cold chain express organization and a sender should also at least include the following content:

<table>
<thead>
<tr>
<th>Category</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Express items</td>
<td>Types, specifications and temperature zones of express items,</td>
</tr>
<tr>
<td>Packaging</td>
<td>Packaging specification and check</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Responsibility division and exemption</td>
</tr>
<tr>
<td>Compensation</td>
<td>Reasonable damage rate, compensation responsibility identification, and compensation proofs</td>
</tr>
<tr>
<td>Other terms and conditions</td>
<td>Requirements for rejecting express items, delay of express item delivery, and returning of express items</td>
</tr>
</tbody>
</table>

**Collection**

To ensure that express items do not suffer from temperature loss and broken cold chain express, this part specifies two aspects of requirements for express service organizations in the process of collecting the items. One is that express service organizations should collect express items in the specified temperature. There are specifications about the temperature ranges for collecting frozen, refrigerated and room-temperature express items with an aim to avoid the temperature of express
items being affected by the temperature of the environment. Another is that express service organizations are required to check the quality and temperature of express items and describe the situations where they will reject to collect express items.

Packaging

Packaging is an important part of cold chain express services and is the key to the quality of and the temperature control for express items. Through survey, the drafting team found that in the mode of sale from places of production, express items are delivered by being packed with cold media. Thus, express service organizations are required that the packaging materials and the amount of cold media they use should satisfy the temperature requirement. They should ensure that the express items are always in the temperature range of the temperature zone. At the same time, in order to avoid the cases of express items being contaminated by non-standard packages, the standard requires that the packaging should be clean and seamless.

Sorting

In the sorting link, division of sorting sites into different temperature zones and time of operation are the important factors to ensure the quality of express items. Through survey, the drafting team finds that there are strict requirements of temperature control for the sorting sites for frozen and refrigerated express items. Based on the current temperature of sorting sites for cold chain express, the standard specified that the temperature of the sorting sites for frozen and refrigerated items should not exceed 10°C and that the temperature of the sorting sites for room-temperature items should not exceed 25°C. The sorting should be accomplished as soon as possible so that the quality of the express items will not be affected.

Transportation

At present, express service organizations are engaged in cold chain express services mainly in two modes. One is transporting express items with refrigerator (thermal insulation) trucks in different temperature zones. The other is transporting express items with room-temperature trucks loaded with refrigerators or thermal insulation containers. The drafting team analyzed the above two modes. It proposed requirements for the first mode. Express items with mixture risks should be precooled and separated from each other. The truck doors should be opened less frequently and for shorter time. The temperature should be detected and uploaded. The team also proposed requirements for the second mode over the time of thermal insulation of truck-carried refrigerators, transportation routes, temperature detection and uploading.

Delivery

Based on the Express Services Part 3: Service Links, this part gives specifications on the delivery link from perspectives of basic requirements, delivery preparation, and signing for acceptance.

Basic Requirements. To ensure the quality of express items, express service organizations should accomplish the delivery within the specified time and temperature based on the agreement with senders. The drafting team believes that express service organizations should deliver cold chain express items in priority. They are encouraged to use truck-carried refrigerators, small refrigerator (thermal insulation) trucks or thermal insulation containers to deliver frozen and refrigerated express items.

Delivery Preparation and Signing for Receiving. There are three situations when express service organizations deal with signing for receiving. The first is that the items are received by recipients in person. In this situation, express service organizations deliver the items to recipients and check the quality and quantity of the items in the presence of the recipients. There are also refrigerators at autonomous pickup outlets and containers with the function of thermal insulation in the community where recipients can pick up their items. The second is that the items are received on behalf of recipients. If recipients entrust other people to receive the items, express service organizations should check the quality and quantity in the presence of these people. The third is
exception handling. When recipients find that the items are in broken packages, delivered beyond the agreed time, or in poor quality and insufficient quantity, they can reject the items. The standard specifies the requirements of handling the above-mentioned three situations. If recipients receive items, it is required that both parties should check the items in the presence of each other and that the recipients should pick up their items within the agreed time. If items are received on behalf of recipients, express service organizations are required to notify the recipients of the risks and the people who receive the items on behalf of the recipients of the temperature where the items should be stored. If recipients reject items, express service organizations can describe the exceptional situations where recipients can reject items.

Suggestions for Improving the Quality of Cold Chain Express Services

Standardization is an important technical support and tool for improving the quality of cold chain express services. In order to actually improve the quality of cold chain express services and optimize the standard system of the cold chain express industry, the relevant suggestions for the formulation and promotion of the standard are as follows:

1. Specify the access threshold of cold chain express based on the actual development of the industry. As various levels of device configuration, personnel management, and corporate operation management systems exist in the cold chain express service, the standard needs to contain some restrictive requirements. It should specify that express companies which want to participate in cold chain express should be equipped with business capabilities and devices of cold chain services. Express companies should be controlled not flooding into the cold chain express market, as this may cause disorders and hinder the development the entire cold chain express industry.

2. Summarize experience of industry development and cultivate the cold chain express market. Currently JD.COM and Shun Feng are among the major participators in the cold chain express market. As cold chain express just came into being for a short time and the market is still in the preliminary stage without much experience, it is urgently necessary to summarize the excellent practices of typical companies. Such experience can help other express companies enter the market quickly and get accustomed to the development demand. In this way, the cold chain express services can be cultivated into a better level.

3. Strengthen the promotion and implementation of the standard to enhance the services of the industry. Cold chain express, as an emerging business type in the express industry, is quite different from traditional express services in aspects of organization management, personnel management and device configuration. Besides, cold chain express is also different from cold chain logistics. Against all these differences, the cold chain express services should be strengthened at the national level. The cold chain express service standard should be implemented to satisfy the basic needs of cold chain express customers as well as the customized demands of them, which will then stimulate the service quality of the cold chain express industry.

Acknowledgement

Supported by Dean found of China National Institute of Standard: Study on evaluation technology and tools of express logistics safety and personnel.

Reference


