

Analysis and Research on Operation Process and Process Layout of Air Cold Chain Logistics Center

Hou Xuhui

Xianyang Vocational Technical College, Xianyang, Shaanxi, China

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Abstract: in Recent Years, with the Rapid Development of China's Logistics Market, the Expansion Speed of Cold Chain Logistics Market is Accelerating. At Present, Aviation Cold Chain Logistics Has Become the Preferred Mode of Logistics Transportation in Cold Chain Market with the Characteristics of Rapidity and Safety. However, Due to the Rapid Development of China's Aviation Logistics, the Construction of Logistics Center is Not Perfect, Which Gradually Shows Many Disadvantages in the Operation Process and Process Layout. It Has a Negative Impact on the Development of the Whole Aviation Cold Chain Logistics. Based on This, Based on the Current Situation of the Development of Air Cold Chain Logistics Center, This Paper Analyzes the Functional Division, Operation Process and Process Layout of the Center, in Order to Enrich Relevant Research Theories and Promote the Development Process of Air Cold Chain Logistics.

1. Introduction

1.1 Literature Review

Nowadays, aviation logistics has become the main part of modern logistics industry because of its high timeliness. The convenience provides a good development foundation for cold chain logistics, which makes the cold chain logistics market have a broad development prospect. On this basis, establishing a perfect air logistics center is the main task at this stage (Li, 2017).Zhu Yuxue pointed out that the overall layout of air freight station is a very important part of the air logistics chain, which is affected by many factors and is a quite complex transit system (Zhu, 2015).Based on the function of air freight center, Xiao Yuanhua and Shi Qingmu put forward the operation engineering of rapid circulation, including roadside operation, rapid entry and exit of bulk cargo, integration of container assembly, direct exit of container, etc. (Xiao and Shi, 2014).According to the functional layout of fresh food logistics center, Cai Jianming and Xiao Shibin divide the aviation cold chain logistics center into 10 functional areas, improve the SLP method, and minimize the investment cost (CAI and Xiao, 2019).Scholars Luo run and Yin Chunjian applied ISM model to analyze the influencing factors on the development of aviation cold chain logistics center, which can be divided into three levels: deep level, middle level and direct impact, providing theoretical development suggestions for air land intermodal transport (Luo and Yin, 2016).Chen Bingcheng, a scholar, proposed to build an information-based aviation cold chain logistics center by building an aviation cold chain logistics information platform and other technologies to achieve efficient operation of aviation cold chain (Chen, 2017).

1.2 Purpose of Research

At present, in order to meet the increasing demand of cold chain logistics transportation, China has built an aviation cold chain logistics center. At present, the existing cold chain center facilities of air logistics in China are backward, which can not meet the requirements of cold chain logistics transportation. As a cargo transfer center, air cold chain logistics center plays an extremely important role in the whole freight process. Its internal process operation and process layout have a great influence on the timeliness of transportation and cargo quality. However, when the author combs and summarizes the air cold chain logistics center, it is found that most scholars are one-sided in this research, unable to improve the operation process and process layout. Based on

this, this paper makes an in-depth analysis, hoping to provide relevant reference for the construction of air logistics center.

2. Overview of the Development Status of Aviation Cold Chain Logistics Center

In recent years, with the rapid development of China's logistics industry, the cold chain logistics market is also expanding. As biomedicine and fresh frozen food have rigid requirements on transportation speed, aviation cold chain logistics is more and more popular in the cold chain logistics market. Aviation cold chain logistics is mutually beneficial to the whole cold chain logistics market in China. In 2018, the total demand of aviation cold chain logistics reached 180 million tons, and the amount involved reached 30 billion yuan according to the statistics of relevant organizations. At present, the aviation cold chain logistics market is designed to fresh cut flowers, fruits and vegetables, medicine, fresh e-commerce and other industries. Among them, the pharmaceutical industry brings great demand for aviation cold chain logistics. Cold chain logistics requires high temperature and time, and there are many processes of land and sea transportation, which leads to indirect increase of cost output due to cargo loss. Moreover, the value of goods transported by cold chain logistics is higher, and air transportation is more suitable for cold chain logistics than land transportation and sea transportation. Cold chain logistics is a kind of operation form composed of multi-point combination. Any problem in any link will affect the quality of goods. Therefore, as a key link of goods, the operation process and process layout of air cold chain logistics center is very important. At present, China Aviation cold chain logistics center is mainly divided into three parts: freezer, refrigerator and fresh-keeping warehouse (sun and Chen, 2015). Starting from entering the center, the process is divided into unloading, security inspection, operation, storage and other steps. In addition, in order to promote the development of cold chain logistics, the state vigorously supports the construction of air cold chain logistics center. For example, the cold chain logistics center of Guilin east railway station and Xixian airport logistics center are all built with the support of the state. And there are still a large number of large-scale aviation cold chain logistics center under construction, to promote the development of domestic aviation cold chain logistics industry.

3. Operation Process and Process Layout of Aviation Cold Chain Logistics Center

3.1 Functional Area

Table 1 Temperature Requirements Of Cold Chain Logistics Goods

	Super cold chain products(-50℃)	Freezing temperature(-18℃ ±3℃)	Ice temperature and temperature(-2℃~2℃)	Reefer-Temperature required (0℃~7℃)
Fruits			Strawberry	Most fruits such as grapes and cherries
Vegetables			Spinach, pumpkin and other vegetables	Pepper, cucumber, potato and other vegetables
Milk and dairy products		Ice cream, ice cream and other dairy products		Pasteurized milk, yoghurt
Frozen Foods		Most frozen food		
aquatic product	Sashimi	Most aquatic products		
meat		Cattle, sheep, rabbits, chickens and other common birds		
Eggs		Ice egg		Fresh eggs
medical products		Vaccines, injections, biologics		

The most important thing of the air cold chain logistics center is its functional division. When designing the center, we should fully consider to meet the requirements of various temperature cargo characteristics and air transportation ground operation. As the most important node in the cold chain, the temperature characteristics need to be fully guaranteed. It is necessary to provide the operating environment with different temperatures that are small and most suitable for the goods. See Table 1 for the temperature requirements of all kinds of cold chain goods.

According to the ground operation, the whole logistics center is divided into six areas: cargo receiving area, cargo clearance security inspection area, cargo weight calculation area, cargo sorting area, cargo storage area, cargo clearance area. In addition, in the construction and design of cold chain logistics center, the international cargo transportation should be fully considered, and the inspection of customs security and quarantine departments should be fully responded to.

3.2 Operation Process

The operation process is a very important link in the air cold chain logistics center, which requires the center to connect the apron and the land, and the cargo needs to pass efficiently when entering and leaving the port. Starting from the arrival of the goods at the center, the arrival process is in turn unloading at the apron area, x-machine detecting dangerous goods, customs checking contraband, weighing the goods, and transporting them to the storage area for storage according to the temperature requirements. The outbound process is that the goods are transported from the storage area to the cargo station, and then to the cargo sorting area for classification and decomposition. When sorting the goods, the palletizing operation is carried out according to the cargo temperature requirements, waiting for the customer to pick up the goods or carry out logistics delivery. See Figure 2 for the specific process.

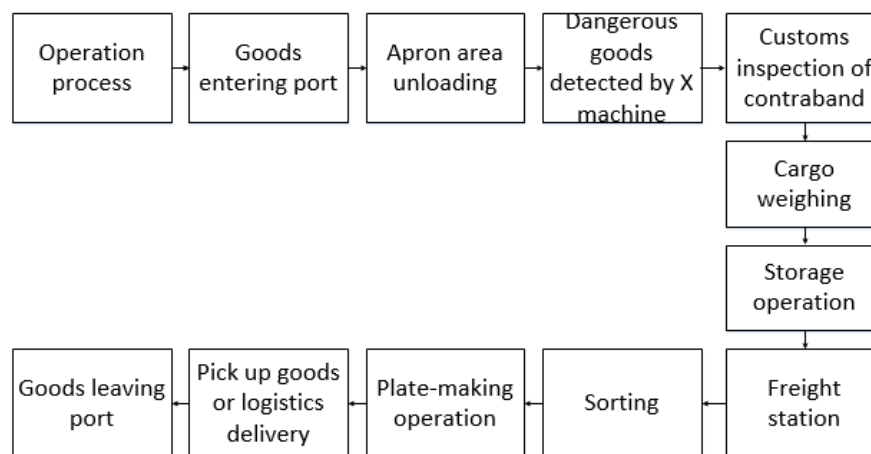


Fig.1 Flow Chart of Air Cold Chain Logistics

The whole operation of logistics and transportation of goods should be completed in the cold storage environment. The whole process of temperature control should be ensured from the beginning of cargo unloading at the port. In addition, the operation time of the goods in the cold storage should be saved as much as possible. For the goods with special needs such as drugs and vaccines, priority should be given to transportation. The arrival time of normal goods is arranged in sequence, and the time occupied by the goods in the functional area is reduced to the shortest, so the operation process needs to be centralized, so as to save the time and energy consumption in the area.

3.3 Process Layout

As air transportation is adopted in the air cold chain logistics center, additional operation time will be generated when docking with the ground, so the process layout of the center is particularly important. At present, the domestic air logistics center is designed according to the location and size of the apron, and its route is designed in three forms of U-shaped, L-shaped and linear. Generally,

the left side of the cold chain logistics center is the land transport channel, the right side is the air transport channel, and generally the rectangular reservoir area. The goods in cold chain logistics center have certain operation requirements for temperature, so the design of the stay area is mostly the stay area in the cold storage, and the number of departure platform and entry platform parking spaces is designed according to the target transport capacity of the goods. The departure platform corresponds to the outbound inspection area, and the inbound platform corresponds to the inbound receiving area. The outbound inspection area and inbound receiving area shall be separated by a block. Security inspection area and full weight weighing area shall be set in the inbound receiving area in turn, net weight weighing area shall be set in the outbound inspection area, and X-ray machine shall be set for inspection according to the inspection procedures of the Customs Department. In the middle of the passageway, there are operation areas in the middle of the passageway, such as the operation area of outbound striking, the operation area of inbound sorting and tally, etc. The inspection area between the two areas is the inspection area of the quarantine department to inspect the timeliness of goods entering and leaving the port. If the goods do not need to be stored immediately after leaving the port, according to the different degree of temperature control, they shall be stored in three warehouses: fresh storage, cold storage and freezing storage. The three warehouses can be divided into upper and lower storage units, the upper part temporarily stores cold chain logistics containers, and the lower part stores bulk goods. Storage mode can be divided into container shelf storage, ground storage, bulk storage, etc. The container can be transported to the warehouse for storage by loading Trailer. The centralized construction of three warehouses is to flexibly adjust the storage mode according to the change of goods demand.

4. Conclusion

The operation process and process layout of air cold chain logistics center is an important research direction in the logistics industry. The center provides many conveniences for cargo transfer and improves the timeliness of land and sea transportation. However, due to the rapid development of air logistics, the construction level of national air logistics center is still relatively low, and there are many areas to be improved. With the increasing importance of air cold chain logistics, the construction of air cold chain logistics center also needs to be improved. In the logistics industry, the market prospect is broad, and the aviation cold chain logistics faces the increasing logistics demand. Based on the current construction points, the continuous improvement of the central function is of great practical significance for promoting the development of aviation cold chain logistics.

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