Collection and Application of Intelligent Technical Information Data of Cold Chain Logistics of Aquatic Products

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Abstract. This paper firstly reviews and summarizes the relevant literature on data acquisition and application of cold chain logistics information. Then, the paper analyzes the importance of cold chain information, the current situation of its application in the cold chain industry, and puts forward the development idea of applying information acquisition to cold chain logistics. Finally, it puts forward the cloud service model of cold chain logistics, it also analyzes the factors affecting customer choice in one of the cloud service models according to the analytic hierarchy process.

Keywords: Aquatic Products, Cold Chain Logistics, Intelligent, Information Data Acquisition

1. Introduction

Aquatic products have the characteristics of high protein, low fat and good balance of nutrition, and become the main source of high-quality animal protein intake[1]. At present, the per capita share of aquatic products in China has risen to 36.4kg, twice the world average. Compared with other animal foods, aquatic products have high moisture content and rich nutrition, which is more suitable for the growth and reproduction of microorganisms. These microorganisms decompose proteins, amino acids, fats and other components in aquatic products, making aquatic products produce substances with odors and toxicity, and greatly reducing the utilization value and economic value of aquatic products. The perishability of aquatic products is a key factor threatening the aquatic products’ quality, and cold chain logistics is an important means to ensure the quality and safety in the transportation process. In 2010, the National Development and Reform Commission pointed out that accelerating the development of cold chain logistics of agricultural products is of great significance to promoting farmers' continuous income increase and ensuring consumption safety[2].

Cold chain logistics, as the main channel to transport meat, poultry, eggs, fruits, vegetables and other raw materials necessary for People's Daily life, has always been the focus of national attention. With the steady growth of China's economic strength, people's consumption level continues to improve, the consumption pattern is also changing, from the past only for food and clothing to more and more attention to the health of diet, from the past market, shop purchases to more and more online purchases. However, in the process of research, we found that there are still some problems to be...
solved in the development of China's cold chain logistics, mainly reflected in: China's cold chain logistics system is still not perfect. Cold chain infrastructure is relatively backward (mainly refers to the cold chain transport equipment and cold chain storage equipment)[3].

2. Research status of cold chain logistics intellectualization technology

2.1. Foreign research status

By analyzing the current situation of the application of GPS and RFID in agricultural products logistics in southeast Spain, Santa expounded the importance of collaborative information system construction in the land transportation process for perishable agricultural products. Kerrawang studied how RFID was applied to the monitoring of cold chain logistics environmental information, and realized the automatic monitoring of cold chain environmental information. In addition, in order to improve the accuracy and efficiency of monitoring, other scholars integrated RFID and WSN technologies to realize the monitoring of environmental information of cold chain logistics. Wang defined intelligent logistics and proposed the design and development of intelligent logistics system based on data mining and association rules technology.

![Figure 1. The proportion of various techniques used in multimedia dance teaching](image)

2.2. Domestic research status

Chen Jingyu studied the basic situation of cold chain logistics, the use of cold chain equipment and the coverage of cold chain of many e-commerce websites and agricultural products websites through practical investigation, and put forward Suggestions on improving policies, standards, technologies and equipment. Other scholars briefly described the role in the procurement, storage, transportation and sales, and put forward corresponding countermeasures and Suggestions. Liu Huannan summarized the characteristics of online aquatic products in the United States, studied the supervision and monitoring experience of cold chain logistics in depth, and finally put forward countermeasures and Suggestions to improve the quality and safety of online aquatic products sales in combination with the current situation of China. Zhang Xiaochuan believed that the cold chain monitoring technology of aquatic products has tended to be intelligent, and put forward corresponding development countermeasures and Suggestions[4]. Luo Heng designed an intelligent cold-chain tracking and monitoring system to monitor the temperature and humidity of the transported products in real time and remotely monitor the cold-chain products.

3. Cold-chain logistics information data acquisition model and platform construction

3.1. Key technical analysis

Cold-chain information acquisition and charge is implemented under the support of modern information technology, including information collection technology, sensing technology, testing technology and intelligent technology, location technology and emerging technologies, such as large data only to the comprehensive collection of information, to ensure that could not have sold the entire the careless mistake, once appear, they can always find out and deal with. In addition, an information data acquisition model is built on the basis of big data and the Internet of Things to analyze historical data and current data.
Table 1. The judgment indicators of analytical hierarchy process

| For c, The relative importance of $b_i$ over $b_j$ | $b_{ij}$ |
|---------------------------------------------|---------|
| Extremely Important                        | 9       |
| More important                             | 7       |
| Important                                   | 5       |
| A little important                          | 3       |
| Equally important                           | 1       |
| A secondary                                 | 1/3     |
| Secondary                                   | 1/5     |
| More than                                   | 1/7     |
| Extremely minor                             | 1/9     |

3.1.1. Information acquisition technology. Information acquisition is the basic guarantee to ensure the whole cold chain does not break. Now commonly used information technology including bar code technology, RFID and other technologies. Bar code technology is relatively simple to operate, flexible, convenient, high accuracy, so it is widely used. As a modern automatic identification technology, RFID, due to the characteristics of its working mode, has no special requirements on the application environment. The harsh environment is still sustainable, and it can carry more data and information, so it is increasingly accepted and applied by people\[5\].

The standard to measure the quality of the judgment matrix is that there is satisfactory consistency in all the judgments in the matrix. If,

$$b_{ij} = \frac{b_{ik}}{b_{jk}} \quad b=1,2,\ldots,n$$

Then the judgment matrix is said to have complete consistency.

3.1.2. Sensor network and detection technology. In the Internet of Things, sensors are usually arranged and installed manually, which is a huge and tedious project. Sensor network nodes can form a wireless network through self-organization, and perceive, collect and process the perceived information in real time within the network coverage. All network nodes cooperate with each other and upload the perceived information to the management center. Remote management centers can control and manage all network nodes in real time, which is how the Internet of Things is perceived.

3.1.3. Intelligent technology. Intelligent technology includes a variety of technologies and means, mainly through the collection of data and information processing to achieve the purpose of intelligent management. Nowadays, intelligent technology is more and more applied to the collection of logistics information. By attaching information receiving and receiving devices to goods, goods will be able to carry out simple information processing and interactive communication, so as to realize the information exchange with users.

3.2. Demand for data and information in each link of cold chain logistics

In the origin of raw products, such as fresh agricultural products just picked, aquatic products just caught on shore, and meat and poultry just slaughtered, it is necessary to conduct pre-cooling treatment immediately. Compared with the raw products without pre-cooling treatment, the loss rate of the raw products after pre-cooling will be greatly reduced in the whole cold chain process. Precooling greatly reduces the loss of suppliers and ensures the freshness of raw products purchased by consumers. After precooling to bear some samples for simple processing and packaging, the RFID electronic tag for packaged products, born to collect some samples taken from origin to XiaoDe temperature humidity in the process of the change of all kinds of information. This is to start from the first step in the whole cold chain activities. It is having some samples of information collection, born sold information source to ensure traceability.
In the whole process of transportation, it is also necessary to monitor the temperature and humidity of fresh products at any time. Once changes occur that exceed the limit of suitable storage of fresh products, it is necessary to immediately check whether there is any problem with the equipment and take immediate measures to ensure the normal circulation of fresh products, reduce losses and ensure the diet safety of consumers. When having some samples from the origin to the sale of warehousing center, which requires storage center in cold storage with sufficient RFID equipment, cold storage controller, temperature sensor and informatization management system is the necessary equipment, to have some samples of the label to read, and have some samples of each of the cold storage information real-time monitoring and tracking[6].

3.3. Information data acquisition model based on Big data and Internet of Things

Information data acquisition technology has been widely used in logistics industry, through the historical data of cold-chain information source. Automatic processing of logistics information by using modern intelligent processing technologies such as data mining is the key to improve the level of intelligent processing of logistics information. It is unrealistic for a single cold-chain enterprise to establish a cold-chain information and data acquisition system within the enterprise, which requires a large amount of investment and professional technical personnel.

![Figure 2. Cold chain logistics data acquisition model](image)

Therefore, this is not a project that can be completed independently by a single enterprise. At present, a large number of logistics enterprises have built information service platforms based on cloud computing, and transferred the logistics information analysis work to the "cloud" of the Internet to distribute and timely process and analyze large-scale logistics data and information. We can collect and utilize the data produced by cold chain logistics through various modern technical methods and means.

4. Research on intelligent cold chain logistics information collection and cloud service mode

4.1. Application of data collection in intelligent cold chain

The goods transported by cold chain logistics also cannot escape the logistics process, which goes through processing, packaging and transportation from the origin place to the sales place, and then through warehousing and sales. For this, it is necessary to complete the collection of information existing in the whole process, so as to ensure the integrity of the data. Therefore, we should monitor and collect data in each link of the cold chain. Cold chain after data collection, will feedback to the monitoring center, and now the cold chain logistics is more and more common, causing huge amount of data, previous technical level is not enough to quickly deal with these data and information, but
now the maturity and popularity of cloud computing and big data technology for the processing of a large amount of data has brought great convenience. It is very difficult to process a large amount of data, which can only be processed by the data generation, acquisition, storage and analysis functions of big data, and can be processed quickly, efficiently and accurately by relying on the processing environment of cloud computing.

4.2. Construction of cloud service mode
Cold-chain logistics services in the cloud is based on network technology and logistics services in the cloud platform, integration of customer resources and cold chain resources, the main body of the whole supply chain can be according to their own needs to realize the intelligent management of cold chain resources and dynamically allocate, complete cold-chain capacity and cold chain of service virtualization of resources, is a kind of intelligent, efficient, safe, unified process of information sharing and collaborative logistics mode. This service mode integrates cloud computing, big data and Internet of Things technologies to ensure the flow and sharing of cold chain information among all links of the whole cold chain. The system consists of a center and four system functions. One center is the big data processing and dispatching center, and the four core systems are product management system, transportation management system, warehouse management system and market supply and demand system.

5. Conclusion
Chinese People's Daily life is inseparable from fresh food, and cold chain logistics as an important guarantee of freshness and safety of fresh products, how to collect information of fresh products and ensure the quality are related to the quality of life and life safety of the people, is an important subject that needs urgent research at present. This paper first introduces the modern scientific and technological means used to collect fresh product information in the process of collecting cold chain, and constructs a cold-chain information data acquisition model integrating big data and Internet of Things, and builds a cold-chain information platform for information sharing. Then a new cold chain logistics service model is proposed, which is called cold chain logistics cloud service model. Finally, the article discusses and analyzes the logistics personalized service based on different customer needs.

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