

## Storage Analysis and Improvement of Agricultural Products in Chongqing Food Market

Yifan Zhou

School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing 400065, China.

dlemorance@163.com

### Abstract

China, the widely acknowledged great agricultural country in the world, produces large quantities of agricultural products every year. Nevertheless, they have to face a challenge: how to reserve them. Storage is an important part of logistics, playing an indispensable role in keeping foods fresh. After fixing by government, the environment of food market which is on Forward Road of Jiulongpo District in Chongqing has been improved a lot. Besides, it sales more varies of agricultural products and increases the range of service. Consequently, it is representative to research the agricultural storage of other food market in Chongqing. After field trips, based on analyzing the storage mode and problems of food market, this essay gives some suggestions in five aspects: inventory optimize, storage risk control, order mode, talent cultivation and logistics policies. I hope that it is capable of promoting the development of the storage of agricultural products.

### Keywords

**Agricultural products, Reserve, Improvement, Food market.**

#### 1. Introduction

People can not live without agricultural products, and people's demand for it is always there. The government has always attached great importance to the development of China's agriculture, and successively issued relevant documents of agricultural products logistics, taking it as an important driver of economic development. However, the high production and sales of agricultural products at the same time has aroused wide concern about the loss and waste in the society. According to calculation, every year, more than 35 billion kilograms of grain is lost and wasted in the storage, transportation and processing by farmers nationwide <sup>[1]</sup>. They can be eaten by 200 million people for a whole year.

The storage of agricultural products is linked to the quality of agricultural products, and it is easy to produce waste caused by various reasons during storage. Food market is the place where consumers buy their produce every day, and it can be seen everywhere, without any advanced equipment. At the same time, it is also the place where producers, distributors and retailers store crops. This essay is based on this background, through the study of a representative food market located in Forward Road, Jiulongpo District of Chongqing, to discuss how to ensure the quality and reduce the cost of storing agricultural products.

#### 2. Related concepts of agricultural logistics

##### 2.1 Definition of agricultural products logistics

Agricultural products logistics refers to the activities that take agricultural products as the object, achieve the value preservation and increase of agricultural products through logistics links such as post-production processing, packaging, storage, transportation and distribution of agricultural products, and finally deliver them to consumers <sup>[2]</sup>.

##### 2.2 The characteristics of agricultural products logistics storage link

Different from ordinary goods, agricultural products are perishable, seasonal, and their loss is irreversible. Because of the unique nature of agricultural products, the storage of agricultural products

requires higher technical operation requirements and expertise, and has the following characteristics [3].

### **2.2.1 Special handling of specific goods**

Affected by region and seasonally, the variety of agricultural products is very rich. Different varieties have different requirements on temperature and humidity. If agricultural products with different properties are not stored separately in their suitable environment, bacteria will easily breed and result in spoilage of agricultural products.

### **2.2.2 The quality of agricultural products is the core**

The value of agricultural products is positively correlated with quality, and if the quality is lower, agricultural products will have less value. The low-quality products not only lose their original nutritional value and reduce their sales profits, but also tend to pass spoilage to other agricultural products when stored. To ensure the quality of agricultural products is to obtain more income, so the ultimate purpose of all activities in storage is to ensure the quality of agricultural products.

### **2.2.3 Need professional technology and equipment support**

Compared with ordinary logistics, cold chain logistics is not only more difficult, but more professional. In order to ensure the quality of agricultural products when stored, the warehouse will use professional technology and equipment to make the quality of the products reaches the standard, such as RFID, controlled atmosphere storage and radiation sterilization etc.

## **3. Forward Road food market overview**

### **3.1 The development of the food market**

Forward Road Food Market, located in the bustling area of Forward Branch Road, Jiulongpo District of Chongqing, near Yangjiaping Business circle. Since the government reorganized it in 2017, it has achieved "agricultural reform and upgrading", and the environment has been greatly improved. The food market covers a total area of 13,890 square meters and has four floors (1F, 2F, B1 and B2). There are over 800 stalls in the market, mainly dealing in foods, fruits, raw meat, eggs, aquatic products and a small amount of cooked food. Food markets have two roles: small stalls and medium-sized shops. The former way of purchase for a day, if the day's produce which is not sold out will be placed in the refrigerator the next day at a discount sales, while medium-sized stores have their own large cold storages, agricultural products are mainly sold to enterprises or schools in the form of wholesale.

The service area of the food market includes 25 neighborhood committees and 9 residential areas, so the neighborhood is densely populated and there is a large daily flow of people [4]. Some people start selling at around 3am every day, and the flow of people in the food market peaks from 8am to 9am.

### **3.2 Storage methods of food markets**

Different from enterprises, the food market does not have advanced technology and equipment, and the storage mode adopted is more traditional and backward. The storage methods currently used in Forward Road food market include the following:

#### **3.2.1 Conventional storage**

Conventional storage is the most widely used storage method in food markets, that is, without special technical equipment and facilities, agricultural products are placed in stalls or dustproof bins in general warehouses. The agricultural products used in this way usually have less water content and do not require much temperature and humidity. Or the goods have a short turnaround time and can be sold off before they go bad.

#### **3.2.2 Sealed storage**

Sealed storage is when produce is wrapped in plastic (e.g. cling film) and covered with tarpaulin. This method has low cost and good storage effect. It can effectively isolate moisture and microorganisms in the air, weaken the physiological and chemical changes of substances in the air and agricultural products, so as to maintain good quality.

### 3.2.3 Refrigerator storage

Refrigerator storage is also one of the main storage methods used in the food market. A few large and medium-sized shops have their own cold storage. This storage method can effectively delay the activities of microorganisms, inhibit the activity of enzymes, weaken the physiological and chemical changes of agricultural products in storage, and maintain the due quality. However, the disadvantages of cold storage are also obvious. Not only is the purchase cost of cold storage high, but also the follow-up maintenance and use will consume a lot of funds. The cold storage used by the food market shops is basically not associated with modern information technology, but only a warehouse with refrigeration equipment. Moreover, the taste and nutrition of produce stored in the cold storage for a long time will be greatly reduced and will not be liked by consumers.

## 4. Problems with the storage of produce in food markets

### 4.1 Conventional storage is not standard

Conventional storage is not simply stacking produce. It actually has its own rules of operation. First of all, conventional storage should pay attention to the control of temperature and humidity in hot or humid environment. For example, foam board or PEF insulation should be used in summer, or part of the storage tank should be equipped with hygrometer to do moisture-proof work in humid weather. Secondly, the storage tank should be kept clean. When there is no agricultural products in storage, the surface should be cleaned with clean water and brush to prevent microbial reproduction affecting the quality of agricultural products. Finally, the produce in the box should be neatly stacked. Food farmers in the food market basically did not use the above assistance, and those serving foods in the clean and hygienic market did not meet the requirements. Many boxes still have a lot of dirt residue, which is easy to breed bacteria when the weather is hot and dry.

Besides, some retailers mix fresh and stale produce for convenience by not storing them separately. If stale produce rots when mixed, it is difficult for shopkeepers to pick it out in the first place, and spoiled produce will also accelerate the decay of other produce.

### 4.2 Warehouse control is not reasonable

Warehouse has long been an important factor in the successful operation of enterprises. In order to obtain more economic benefits, enterprises have to pay more attention to the storage link, including reducing inventory cost and improving storage efficiency through various methods. The same is true for traders in food markets. Even if their warehouses are far smaller and less equipped than those of enterprises, they ought to ensure the quality of their agricultural products and reduce the loss of their value through warehousing control. However, the traders in the food market usually do not have the awareness and knowledge of storage control. In addition, restricted by technical conditions, they fail to make the storage of agricultural products be best in terms of operation process and storage space allocation.

### 4.3 Facilities and equipment are relatively backward

Agricultural products are very perishable, so there are strict requirements for storage facilities. When storing agricultural products, the food market without information facilities and equipment can't carry out whole-process quality control and optimization treatment for agricultural products in the warehouse and can't deal with risks in a timely, effective and efficient manner, which indirectly limits the operation scale and income of food market vendors.

## 5. Countermeasures and suggestions for agricultural products storage optimization in food market

### 5.1 Optimize conventional storage

During conventional storage, ventilated plastic storage boxes or foam boxes should be used. And to avoid squeezing the goods, the height of the boxes should not be too high. Besides, vendors should be equipped with thermometers and hygrometers on the boxes to facilitate timely treatment according to the situation of the goods, which can reduce the frequency of unnecessary cooling and humidifying.

In terms of sanitation, the food market authorities can organize regular cleaning services. Stalls which closes in the afternoon will be cleaned by the market administrator at 12:00 every day, and the stalls which opens all day will be cleaned at 18:00 every day. At the time of storage, the goods are supported to be stored separately in two batches (fresh products and stale ones) and label them on the front of the box to distinguish them. This effort can effectively prevent the deterioration of defective products from affecting the quality of other agricultural products.

### 5.2 Implement the HACCP system to prevent and control risks

HACCP system is a preventive food safety control system adopted to evaluate the hazards that may occur in food production, processing and marketing<sup>[5][6]</sup>. It includes hazard analysis (HA) and critical control point (CCP)<sup>[6][7]</sup>.

Agricultural products are vulnerable during storage, which will affect the quality of agricultural products and reduce the sales volume. Therefore, it is necessary to analyze the potential factors leading to the occurrence of hazards in the storage process and determine the critical control points. Critical control points are set according to actual conditions, such as storage temperature, humidity, or impurity contamination. However, if too many critical control points are identified, quality control will be more complicated. And if too few critical control points are identified, the quality of agricultural products may not meet standards.

After the critical control point is determined, the critical limit for specific activities should be set. For example, the critical limit for temperature control should be 0-4°C to inhibit microbial activities. The critical limit for different agricultural products may vary. For dairy products, set a maximum temperature of 6 degrees Celsius and a minimum temperature of 2 degrees Celsius. If there is any indication that the temperature limit is about to be exceeded, immediate action should be taken to prevent harm. Strong regulatory measures such as the HACCP system can prevent the occurrence of various hazards in the storage process without affecting the quality of agricultural products.

### 5.3 Promote EOQ model

EOQ model is now concerned by most enterprises and helps entrepreneurs to reap good economic benefits. In this way, the quantity of orders is fixed, and it is very suitable for the food market traders and shopkeepers to order. This method is based on the following assumptions: the demand rate is known and uniform, inventory utilization is high, with unlimited replenishment capacity. Through the formula calculation, the ordering and storage costs of fresh agricultural products can be balanced by EOQ model, which effectively reduces the inventory waste caused by the failure of agricultural products to achieve the expected effect in sales. After skillful operation of ordinary EOQ model, more factors such as quantity discount or deterioration rate can be taken into account to better optimize the inventory.

### 5.4 Training of professional talents

Traders in food market shops lack the concept of cold chain logistics system, not only do not have the corresponding norms and standards in operation, but also do not have the relevant knowledge of inventory decision-making. The government can cultivate theoretical talents who are familiar with the logistics theory and good at applying the theory into practice, and technical talents who master the theoretical knowledge and operational skills related to modern logistics activities<sup>[7]</sup>, and introduce them to the food market for management. Besides, the training of logistics knowledge and skills of professional personnel to vendors can be incorporated into poverty alleviation projects and activities to help the people, so as to enhance their theoretical literacy in the aspects of agricultural products preservation, application and maintenance of logistics equipment, and use of electronic information technology. Meanwhile, their practical operation ability can be improved through on-site demonstration.

### 5.5 Improve relevant laws and regulations

The development of cold chain logistics is relatively backward in China. Therefore, in the future policy making, the government should actively guide the development of cold chain logistics and

improve the development vitality of the industry by introducing policies that enable enterprises to participate in and operate<sup>[8]</sup>.

In terms of food hygiene, quality and safety, the state should improve the Law on *Quality and Safety of Agricultural Products*, *Regulations on Wholesale Market Administration of Agricultural Products* and other regulations, and strictly control the technical standards, environmental standards and quality standards for the processing of agricultural products. After the laws and regulations are improved, the best regulatory effect must be achieved through the coordination of departments, the law enforcement means should be optimized and the law enforcement efforts should be strengthened, so as to finally promote the sound and healthy development of agricultural products logistics industry<sup>[9]</sup>.

## 6. Conclusion

This essay introduces the definition of agricultural products logistics and analyzes the characteristics of agricultural products storage. After field investigation, it was found that the traditional agricultural products storage methods used in the food market are usually conventional storage, sealed storage and cold storage. Besides, the storage of agricultural products is not standard, inefficient and the infrastructure is not complete. All these factors restrict the development of the food market. Therefore, this essay uses the HACCP quality monitoring system and EOQ model adopted in the study of agricultural products logistics in enterprises for reference to optimize the storage of agricultural products in the food market, solve the problems of low storage efficiency and high storage cost in the food market, and improve the storage quality of agricultural products to a certain extent. Based on the research conclusion of this essay, there are still some contents to be improved, such as logistics informatization of food market, demand forecast of agricultural products, etc. I hope this article can use the example of Qianjin Road food market in Jiulongpo District of Chongqing to arouse more thinking and promote the development of agricultural products storage in Chongqing food market.

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