

Traceability Analysis and Management System Construction of "Yongbei" Golden Pear in Post Epidemic Era

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ABSTRACT

With the increase of urban residents' income, there is a higher demand for the quality and safety of fresh agricultural products such as fruits and vegetables. Therefore, as an effective means to improve product quality and safety, the traceability management system has gradually attracted the attention of people. At the beginning of 2020, the outbreak of COVID-19 has made the quality and safety of fresh fruits and vegetables a top priority. Yongbei Golden Pear is a brand fruit and vegetable agricultural product with good development prospect in Tianjin, and the guarantee of its quality and safety has become an urgent problem to be solved in the brand development. In this paper, SWOT analysis was used to analyze the strengths, weaknesses, opportunities and threats of establishing traceability management system for fruits and vegetables fresh agricultural products in China in the post-epidemic era, in order to provide scientific decision-making reference for the production of Golden Pear.

Keywords: *Fruits and vegetables, Fresh agricultural products, Traceability management, SWOT analysis.*

1. INTRODUCTION

Fresh agricultural products generally refer to fresh vegetables and fruits, which are closely related to people's lives, and they are also perishable. Therefore, there is a higher requirement for their circulation process and storage methods. However, the mode of production and management of fresh agricultural products in China is mostly decentralized production by farmers, and they are finally sold in the farmers' market through the wholesale markets in the production and marketing areas. The traditional mode of operation has some problems, such as small scale, complex trading links, backward means, high transportation and circulation costs, difficult to trace the source channels of agricultural products, and imperfect market storage and preservation facilities, which make the quality of agricultural products unable to be guaranteed [1]. Therefore, the traceability management system of fresh fruits and vegetables has gradually attracted the attention of people. In addition, the traceability management system provides an effective means to ensure the quality and safety of fresh fruits and vegetables during the emergence of COVID-19.

2. RESEARCH BACKGROUND AND METHODS

Supported by Municipal-level Assistance Funds and State-owned Assets Supervision and Administration Commission of Tianjin People's Government Assistance Funds, Tianjin Aodong Fruit and Vegetable Planting Specialized Cooperative was established in Aodong Village, Shigezhuang Town, Wuqing District. Through previous investigation and analysis, the Cooperative found that the Shangchanghe Golden Pear variety planted in Henan Province has a good development prospect [2]. In 2015, Tianjin Municipal Committee approved the economic development plan of One Village, One Policy in Aodong Village, and planted Shalite Golden Pear. After achieving good results, the Cooperative registered the trademark of Yongbei Golden Pear. In order to strengthen the brand building and further develop the Yongbei derivative products, the Cooperative makes greater efforts in research and development to use new technologies to create Yongbei Golden Pear series products. Among them, the construction of traceability management system of Yongbei Golden Pear has become an indispensable part of brand development. However, the outbreak of

COVID-19 in 2019 has brought great impact on the market of fruits and vegetables, which makes it more important and necessary to establish traceability management system of fruits and vegetables.

SWOT analysis is commonly used in competitive intelligence analysis. SWOT means strength, weakness, opportunity and threat. A series of conclusions or countermeasures can be drawn by listing the investigated factors in the form of matrix. The application of this method can effectively analyze the impact of traceability management system on fruit and vegetable agricultural products comprehensively, systematically and accurately, and help the Cooperative to formulate more detailed development strategies and plans for Yongbei Golden Pear, as well as corresponding development plans or countermeasures. Moreover, traceability management system is an effective way to ensure the quality and safety of fresh fruits and vegetables.

3. SWOT ANALYSIS ON THE CONSTRUCTION OF TRACEABILITY MANAGEMENT SYSTEM OF FRUITS AND VEGETABLES IN THE POST-EPIDEMIC ERA

Taking the production of Yongbei Golden Pear in Tianjin Aodong Fruit and Vegetable Planting Specialized Cooperative as an example, this paper analyzed the strengths, weaknesses, opportunities and threats of establishing traceability management system of Yongbei Golden Pear in the post-epidemic era by SWOT analysis, in order to put forward relevant countermeasures and suggestions for the agricultural production of the Cooperative. As shown in Table 1.

3.1. Analysis on the Advantages of Constructing Traceability Management System of Fruits and Vegetables Agricultural Products

3.1.1. It can Ensure Food Safety and Make Consumers Assured

Since the outbreak of the COVID-19, the Chinese people have been making efforts to fight against the COVID-19 virus, effectively prevent and control the epidemic and achieve the final success [3]. Among many epidemic prevention measures, the guarantee of food safety is important, especially fresh fruits and vegetables, which account for a large proportion of people's daily diet. How to choose fresh and sanitary fruits and vegetables has become a "headache" for many consumers. At this time, the traceability management of fresh fruits and vegetables provides a solution for consumers.

Identification barcodes such as two-dimensional codes will be printed on the product packaging of fresh fruits and vegetables in the traceability management system of fruits and vegetables [4]. When consumers buy the agricultural product, they can obtain detailed information on varieties, tastes, picking time, planting sites, transportation modes, certification reports, and whole planting process of fresh fruits and vegetables, so that they can have an overall understanding of the food safety before purchase. In addition, they can compare the same kind of agricultural products produced in different producing places horizontally, and screen out the real high-quality and fresh agricultural products of fruits and vegetables.

At the same time, consumers can watch the monitoring video of the whole upstream process through the traceability platform, and even watch the environment where crops grow, the growth situation and the agricultural operations of workers online, so as to supervise the whole process of planting and production of agricultural products. When unreasonable and doubtful practices are identified, consumers can defend their rights through a complete traceability chain, report and complain to improper food operators, and help the majority of users reduce food safety risks.

Table 1. SWOT analysis of fruits and vegetables agricultural products Short cut keys for the template

Strength	Weakness
(1) Effectively ensure food safety and make consumers feel at ease and rest assured; (2) Help enterprises to operate and improve the government's ability to supervise the market; (3) Facilitate the production and management of agricultural products.	(1) There is no unified standard; (2) It is difficult to operate; (3) The popularization rate is low; (4) The supervision system is not sound; (5) The technology application is immature.
Opportunities	Threatens
(1) The government's support; (2) Economic recovery in post epidemic period; (3) Consumers attach great importance to the quality and safety of fruits and vegetables; (4) The rapid development of information technology.	(1) The traditional agricultural organization mode of intensive farming; (2) Farmers' traditional agricultural thought.

3.1.2. It can Help Enterprises to Operate and Improve the Government's Ability to Supervise the Market

On the one hand, the traceability management of fruit and vegetable agricultural products can reduce the unnecessary management costs of producers or brand enterprises of fruits and vegetables, and improve product competitiveness. For example, brand fresh agricultural products enterprises spend a lot of manpower and material resources every year on counterfeiting and cross-selling, and traceability management system can help enterprises reduce uncivilized business behaviours such as selling counterfeiting and shoddy goods, thus further reducing the cost of cracking down on fake products. Digital application of traceability system can collect complete information of products from production and processing to sellers [5]. Brand enterprises of fresh agricultural products such as fruits and vegetables can use the system to supervise the whole production process of agricultural products. In case of quality problems of agricultural products, they can trace to specific production lines, operators, and suppliers of raw materials. Then the problem products can be recalled to prevent from being spread in a large scale, which can greatly avoid bringing greater negative impact to enterprises. The application of traceability system for fresh fruits and vegetables products can also enhance the brand image and popularity of producers or brand enterprises of fruits and vegetables. The target consumers can find what they have purchased, thus increasing the protection of producers for the quality of agricultural products purchased by consumers. It not only ensures food safety, but also maintains the reputation of the products, which makes the fruits and vegetables agricultural products stand out among many similar products and gain more consumers' trust.

On the other hand, the traceability system of fruits and vegetables is helpful for the government to carry out relevant work and formulate relevant policies. At the beginning of 2020, the outbreak of COVID-19 seriously affected people's normal work and life, and the price and supply of agricultural products were also affected to some extent. As an important material for residents, the quality and safety of fresh agricultural products have been greatly affected and faced with quality risks because of its short shelf life and perishable characteristics. The characteristics of fresh agricultural products make it vulnerable to adverse effects in planting, harvesting, processing, transportation, storage and sales, such as illegal use of pesticides, hormones, pesticides and other product technologies during planting; In the actual acquisition process, the goods were not bought in accordance with the standards; Poor maintenance of refrigeration equipment and temperature control equipment during transportation will cause the

quality of agricultural products to be polluted to varying degrees [6]. However, the impact of epidemic on transportation and circulation makes the transportation quality of fruits and vegetables worse. In order to increase the shelf life or ensure the appearance of fresh fruits and vegetables, some unscrupulous merchants are more likely to abuse additives and preservatives driven by interests. In addition, during the epidemic prevention and control period, consumers will worry about whether the purchased fresh fruits and vegetables will carry viruses and threaten their own health, which makes it particularly important to ensure the quality and safety of fresh fruits and vegetables. By establishing a sound safety traceability system for fresh agricultural products, the government can know the relevant situation of agricultural products which have registered in the market in time, greatly reducing the workload of daily inspection and supervision of the market. In addition, it can deal with sudden agricultural product safety incidents in time, improve the monitoring ability of agricultural products market, and put an end to the circulation and consumption of problem foods. Agricultural products with problems in market source or production quality can be found in time, and measures such as recalling the same batch or cutting off production can be taken to control the market, so as to protect consumers' rights and interests, and ensure the quality and safety of agricultural products. In addition, by using the traceability system, the government can curb the inflow of fake and shoddy food into the market and ensure that the food that consumers come into contact with is traceable.

3.1.3. It is Convenient to Strengthen the Management of Agricultural Production and Operation

The traceability management system can be adjusted according to the needs of growers. The links needed for traceability and the detailed information of each link can be defined according to different crop types and the actual needs of local traceability. For example, it can only trace the planting while the storage and sales are not required, or the types of planting links without the information of fertilization and diseases and insect pests. The flexible application of the traceability management system for fresh fruits and vegetables can help growers to plant crops more scientifically and accurately, reduce the error rate and greatly improve the yield of crops.

3.2. Analysis on the Disadvantages of Traceability Management System of Fruits and Vegetables Agricultural Products

The construction of safety traceability system for fruits and vegetables should be managed in a unified and standardized way. However, due to the fact that

most of the fruit and vegetable agricultural products industry in China is small-scale operation, the relevant departments have issued different regulations and guidelines, and the local governments have formulated corresponding standards according to their own actual situation when they launch the pilot traceability system of fruit and vegetable agricultural products at first. As a result, the traceability standards are different, the contents are overlapping, and the description is not unified, which leads to the difficult progress of traceability work, the poor circulation in the supply chain, and finally the interruption of traceability information. In addition, as the domestic standards are not in line with international standards, the export of agricultural products has also been affected to some extent.

3.2.1. Difficult to Operate the Traceability System of Fruits and Vegetables

Traceability system is a new technology emerging in recent years. Therefore, there is a higher technical requirement for operators, and the cost of equipment and individual identification required by the system is high, which restricts the implementation of traceability of agricultural products.

3.2.2. The Penetration of Traceability Management System for Fruits and Vegetables is Low

Due to the influence of China's long-term economic system and production mode, most production and sales enterprises of fresh agricultural products are small enterprises or informal family workshops, and the main body of production is farmers. However, these small-scale production enterprises are generally low in information level, production technology, operator quality and safety awareness, which makes them unable to support the operation of traceability management system with high technical requirements for equipment. Although the promotion of traceability work has been gradually improved, it is mostly forced by government legislation. The construction of traceability system will increase the cost of enterprises, and it will be difficult to achieve results in the short term. As a result, large and medium-sized enterprises do to actively participate in, or some enterprises implement traceability management system only for export and supply sales of large supermarkets. The difficulty in popularizing the traceability management system of fruits and vegetables agricultural products has made it difficult to implement in China.

3.2.3. The Supervision System of the Traceability Management System for Fruits and Vegetables Needs to Be Improved.

The production, processing, circulation and sales of agricultural products are supervised by the Ministry of Agriculture, the Ministry of Quality Inspection, the Ministry of Industry and Commerce and the Ministry of Health respectively, and the investigation and handling of major accidents is mainly managed by the Food and Drug Supervision and Administration Department [7]. In order to fully guarantee the quality and safety of fruit and vegetable agricultural products, it is necessary to strictly monitor and manage the traceability management system, which requires close cooperation between various departments and connection of management methods and technical standards. However, these high requirements for various departments also increase the difficulty of traceability work to a certain extent, which makes it necessary for the government to formulate a complete supervision system for traceability, so as to ensure the quality and safety of fresh fruits and vegetables.

3.2.4. The Technical Application of Traceability Management System for Fruits and Vegetables is Immature

Currently, there are many research and technology development (RTD) programs and projects related to traceability of (food) products [8]. EAN coding system, RFID technology, Internet of Things and other technologies developed abroad have been used as the main technical means in the construction of traceability system. With the development of science and technology, the application of blockchain technology and 5G technology in traceability system is also in the initial stage. However, the research and development cost of these technical means is high, and it is generally difficult to popularize them, which affects the construction and popularization of traceability system in China to a certain extent.

3.3. Analysis on the Opportunity of Constructing Traceability Management System of Fruits and Vegetables Agricultural Products

2020 is the closing year of building a well-off society in an all-round way, winning the tough fight against poverty and the Thirteenth Five-Year Plan, and it is also the year to achieve the first centennial goal of China to build a moderately prosperous society in all respects [9]. In such a crucial year, the outbreak of COVID-19 epidemic has brought great impact on China's agricultural and rural economy.

2020 is a year to help farmers to alleviate poverty. The sales of agricultural products are supported by the government, and the planting and stocking of various agricultural products have increased compared with previous years. However, the outbreak of the COVID-19 at the beginning of the year has caused a large

backlog of agricultural products to be sold. As fruits and vegetables are easy to be perishable and difficult to be preserved, it is difficult to ensure the quality of these products during the process of delivering. At the same time, consumers are unable to determine whether the fruits and vegetables they purchased are fresh during delivery and transportation. As a result, many consumers who purchase fruits and vegetables through e-commerce during the epidemic period find that the quality of these products cannot meet their expectations. In order to solve the current outstanding problems, the government has implemented various policies in the long run, which makes the establishment of traceability management system for fruits and vegetables agricultural products become the general trend.

In 2004, China's Ministry of Agriculture began to implement the Pilot Work of Urban Agricultural Products Quality and Safety Supervision System, and accelerated the pilot construction of agricultural products quality and safety traceability system. In recent years, China has taken food safety as the top priority of people's livelihood and has gradually introduced a series of policies, laws and regulations related to the traceability system [10]. Relevant departments have actively engaged in the traceability work in professional fields such as planting, farming animals and aquatic products. The implementation of these series of policies has laid a solid foundation for the construction and research of traceability management system for fruit and vegetable agricultural products.

In recent years, science and technology has developed rapidly, and the mobile Internet technology has taken the lead in the world. The 5G era has arrived, and the 5G technology is now integrated with the Internet of Things [11]. The core of the technology that the agricultural product traceability system relies on is the cloud data. As a technology for traceability management of fresh agricultural products that is not fully developed in China, it has a very promising development prospect.

3.4. Analysis on Threat of Traceability Management System Construction of Fruits and Vegetables Agricultural Products

At present, the threat for traceability management of fruits and vegetables fresh agricultural products mainly comes from the traditional intensive farming organization mode in China. Although with the progress of science and technology, the traditional intensive farming mode has also changed. For example, the production tools have changed from iron plow and cattle farming to diesel cultivator; Farming techniques have also been improved according to cultivated crops and environment; Water conservancy facilities have been gradually improved, so that the harvest of agricultural products no longer depends entirely on the weather.

However, with the emancipation of the mind, the popularization of education and the yearning for urban life, the number of young people who choose to study and work in cities far away from the countryside is increasing year by year, and more and more people have never been exposed to farming and are unwilling to choose the occupation of farming as their economic source. Most of the farmers are middle-aged and old people who have been engaged in farming. It is often difficult for them to accept new ideas, and master new technology including the traceability management system, which hinders the popularization of traceability management of fruits and vegetables. However, for some large and medium-sized agricultural enterprises engaged in contracted and concentrated planting of fruits and vegetables, the construction of traceability management system of agricultural products will increase the cost compared with continuing to use the traditional intensive cultivation mode. In addition, it cannot achieve results in a short time, so that enterprises need to bear certain risks, such as the reduction of profits. Therefore, most enterprises will still choose the traditional intensive cultivation mode for planting most fruits and vegetables while adopting traceability system for a few fruits and vegetables agricultural products in high demand markets, and making up for the loss of profits by raising the selling price of agricultural products. There is no doubt that the number of consumer groups of these increased selling price agricultural products will be less than those of original selling price agricultural products, which also hinders the promotion of the traceability management system of fruits and vegetables agricultural products.

4. COUNTERMEASURES FOR THE CONSTRUCTION OF TRACEABILITY MANAGEMENT SYSTEM OF GOLDEN PEAR IN THE POST-EPIDEMIC ERA BASED ON SWOT ANALYSIS

Based on the above analysis, it can be seen that Aodong Village in Wuqing District is the main producing area of Golden Pear in Tianjin. The Cooperatives can use modern agricultural science and technology such as QR code and sensor to establish a quality and safety traceability system, so as to realize the tracking of the whole supply chain, reduce the dependence of Yongbei Golden Pear production on natural conditions, and improve the market competitiveness of the characteristic agricultural products of the Cooperative and the overall added value of agriculture.

Based on the psychology that consumers attach great importance to the quality and safety of fresh agricultural products such as fruits and vegetables in the post-epidemic period, the Cooperatives should seize the opportunity provided by the state for economic

recovery, poverty alleviation and building a moderately prosperous society in an all-round way in 2020, to promote its unique production management mode of traceability system, enhance the sales and brand image of the Cooperative agricultural products, and build its characteristic brand agricultural products.

While building the traceability management system of Yongbei Golden Pear, the Cooperative should establish a long-lasting cooperation relationship with scientific research institutions, using the project achievements and funds of research institutions to serve the Cooperative, so as to ensure advanced and effective technology and reduce corresponding scientific research costs.

5. CONCLUSION

2020 is a difficult year for the market of fruits and vegetables agricultural products, and at the same time, it is also a year full of opportunities. The following conclusions can be drawn from the above analysis.

(1) Constructing and promoting the traceability management system of fruits and vegetables can make the information of safe and high-quality agricultural products, which are pollution-free, green, organic, transparent and open to consumers in city, which is an effective way for cities to feed back the countryside, alleviating poverty, increasing farmers' income and building a well-off society in an all-round way.

(2) The arrival of COVID-19 has drawn attention from all sides to the origin and route of agricultural products. A complete traceability management system can facilitate the operation and management of enterprises and enable the government to supervise the market at any time and make timely adjustments.

(3) The traditional pattern of intensive cultivation is not suitable for the market with the rapid increase of consumer demand. At present, the government's strong support, the urgent need for economic recovery, and the advanced technology all provide a good development atmosphere and opportunity for the application of traceability management system in the production of fresh fruits and vegetables, and also provide a direction for the further development of Yongbei Golden Pear.

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