Research and Design of Anti-counterfeiting Traceability System for Aba Special Agricultural Products

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Abstract: Taking the current situation of Wenchuan sweet cherry sales as the background, the current situation and shortcomings of the current anti-counterfeiting traceability system are analyzed. Combining the current anti-counterfeiting traceability system with the actual situation of the agricultural special product market in Aba area whichrelies on the regional high-quality brands and registered trademarks, the two-in-one anti-counterfeiting traceability system design research was carried out. The system can identify the authenticity of agricultural special products, and can also understand the overall and individual production, storage, and sales data of such products, to facilitate government supervision and market decision-making guidance, while enabling consumers to understand consumption and protect regional quality brands.

1. Introduction

In recent years, with the improvement of people's quality of life, the quality, safety and anti-counterfeiting traceability of agricultural special products have received more and more attention and research. The No. 1 Central Document of 2019 states that “the implementation of agricultural product quality and safety assurance projects, the improvement of the supervision system, monitoring system, and traceability system”. The construction of anti-counterfeiting traceability system for agricultural special products has become the trend of agricultural development in the new era. The traceability system aims to establish a complete supply chain and sell high-quality products from rural farming to high-demand people. With the help of the Internet of Things technology, production information and environmental indicators are tracked and recorded during the process of product production, planting, breeding, storage and sales, and the server will present complete traceability information to consumers, realizing the "from source to dining table" of agricultural products. Traceability [1]. As an effective means to ensure the safety of agricultural products and food, the traceability system of agricultural special products has attracted wide attention from various countries. Especially in developed countries in Europe and the United States, a food safety traceability mechanism based on RFID technology has been widely established [2].

The anti-counterfeiting traceability of agricultural special products mainly includes two aspects, one is "anti-counterfeiting" and the other is "information traceability". "Anti-counterfeiting" refers to an initiative to prevent counterfeiting as a means of imitation, copying or falsifying and selling other people's products without the permission of the trademark owner. It is also a government or third-party agency monitoring and monitoring of agricultural special products Technical guarantee for the accuracy of data and information in planting, sales, and other aspects; "information traceability" refers to the traceability operation of a series of processes such as the cultivation and sale of agricultural special products through mobile Internet products when consumers purchase.

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2. Status and Problems

At present, many experts and scholars in China have carried out research and promotion of traceability systems. In 2013, Xing Bin et al. [3] proposed a traceability system application model combining C / S and B / S structures for fruit and vegetable agricultural products; in 2015, Zhang Youqiao et al. [4] proposed an NFC-based agricultural product traceability system. Focus on solving the inconvenience caused by the need to specify the reading device; in 2016, Huo Xiang et al. [5] proposed a seafood quality and safety traceability system based on RFID and mobile Internet technology, combined with and applying universal mobile Internet technology to ensure seafood Quality and safety.

By analyzing the actual status of agricultural special products in Aba Prefecture, the following problems currently exist: First, the impact of foreign products on local high-quality brands, which seriously affects the local brand image and the legitimate interests of farmers; second, it is difficult for the government to monitor the local farmers Relevant data such as planting, sales, and inventory of special products and making corresponding decisions dynamically; Third, consumers are attracted by the name, but it is difficult to buy high-quality Aba local agricultural products. Therefore, it is very important and necessary to build a set of agricultural special product anti-counterfeiting traceability system suitable for the actual situation in Aba area.

3. Demand Analysis

Taking Wenchuan sweet cherries as an example, firstly, a set of basic databases for tracing the source of sweet cherries from the original data collection of planting, to the growth process, flowering, fruiting, picking, inspection and other information records. On this basis, the relevant information is generated by the QR code generation software and the only fixed and valid authentication QR code is bound to the product on one block for sale, so that the government and consumers can monitor and accurately query the entire process, providing businesses and businesses with Consumers provide a secure and convenient source management platform. Growers and merchants can conduct product management and accurate inquiry through the platform, and can better handle product quality problems and reduce losses. Consumers scan products through WeChat or mobile phone APP to understand relevant information, realize online product authenticity, complaints and trace the source of products found to be problematic, track to the corresponding link and be handled by the government.

From the perspective of market supervision, the system must be able to accurately grasp the flow of growers and products. When there is a problem with the product, you can quickly control and take countermeasures.

In terms of the flow of goods, it can form a complete information record for planting, production, logistics, testing, and sales, and accurately grasp the flow of products at a glance. In terms of commodity management, the management department can implement a comprehensive, effective, and secure management and monitoring of the entire flow of goods through a system platform. And further get valuable "county, town, village, planter name, category, commodity quality, harvest date, harvest volume (kg), quality and safety testing information, management person in charge, manager phone, sales contact, Contact phone, detailed address, production file details ”and other data provide valuable statistical data for government management decisions.

From the consumer's perspective, the product uses two sets of two-dimensional codes, namely product traceability and product anti-counterfeiting. The product traceability QR code can be scanned multiple times. After scanning, it can be connected to the WEB platform to return food traceability information; the content can include basic information such as product name, origin, picking date, management person in charge, production grower, product picture, etc., and it can also include the production process Records, agricultural product quality and safety testing information and other process information provide consumers with product quality and safety information assurance and provide regulatory authorities with information basis for safety supervision and law enforcement. The product anti-counterfeit two-dimensional code is used after the product is

purchased, and it is connected to the WEB platform to return the authenticity of the food. After scanning once, it is invalid, and a second scan will prompt "This product has been scanned and certified N times, pay attention to counterfeiting". Consumers can verify online complaints if the quality of their products does not match the quality claimed. The system traces the commodity to the specific production grower and the person in charge of management, and punishes accordingly.

4. Design Goals

The system needs to record the agricultural special products from the grower's production process, including fruit tree planting, flowering, growth, results, and consumer use, to a traceability platform database, and finally print the QR code label and bundle it with the product. The previous block was sold to realize the whole monitoring and precise inquiry of planting, which is convenient for consumers to understand the product information.

The system should provide a safe and convenient product traceability management platform for growers, merchants and consumers. Growers can better product management and precise inquiry through the system, and can deal with product problems when they occur, reducing losses. Consumers can learn about the product through WeChat or install a mobile phone reading device, or visit the company's website for more detailed queries. Intermediate sellers can understand the origin and reliability of the product through the traceable QR code. The government understands market sales and inventory in real time, and at the same time, it protects regional brands and helps farmers to increase their income.

5. Design Principles

Practical principles: The system needs to adopt mature and reliable technology and equipment to achieve practical, economical and effective purposes.

Openness principle: First of all, it is beneficial to the expansion of future network systems, and secondly, it is beneficial to interworking with external networks when needed.

High availability / reliability principle: To ensure a high MTBF and minimize the MTBF as much as possible.

Security Principles: To ensure the safe operation of network systems and data.

Principle of Advancedness: Adopt advanced and mature technology, more advanced technology and equipment, in line with the trend of future network development.

Ease of use principle: The entire system must be easy to manage, install, and use, and the network system must have good manageability, and lay the foundation for future application upgrades while meeting existing network applications. The network system should also have high resource utilization.

Scalability principle, has good scalability in terms of both scale and performance.

6. Design Ideas

6.1 Production Supervision System

Complete government departmental filing, establish production archives, sales information。The main purpose is to establish a basic data source and provide a basis for government decision-making. Provides the search function of subject information according to administrative divisions and subject names. The search results are displayed in the form of a list. The data column contains the county, town, village, planter name, category, commodity quality, harvest date, harvest volume (kg), quality and safety information, management person in charge, telephone number of the person in charge, Sales contact, contact phone, detailed address, production file details, etc. Provides statistical functions for uploading data according to administrative divisions and operating hours. The statistical results are presented in the form of a list. The data column contains the production and operation subject, the industry, the region, and the data upload (article). The system provides the function of exporting statistical results to Excel. The statistical data source comes from

the production record information in each production traceability system. Provides statistical functions for product certification information according to administrative divisions and planting types.

6.2 Anti-counterfeiting Traceability System

take one box and one code (fixed outer packaging, unified trademark), scan the two-dimensional code on the mobile phone side, verify and track the authenticity of anti-counterfeiting, and trace back the whole chain of consumer feedback and counterfeiting;

6.2.1 Commodity Anti-Counterfeiting System (Two-Dimensional Code Generation and Printing)

The main function is to obtain traceable source / anti-counterfeit code images for printing. It can automatically calculate and generate a specified number of anti-counterfeiting code sequences and QR code images containing traceability information display addresses based on user registration information in the production supervision system, and can be exported and printed in batches. The relationship between the security code sequence and the traceable two-dimensional code is one-to-one correspondence.

6.2.2 Commodity Traceability System

The consumer scans the product QR code, and the system displays the product related information in the form of a traceability chain. The display content includes basic information such as product name, origin, picking date, person in charge of management, production grower, product picture, etc. It can also include process information such as production process records, agricultural product quality and safety testing information, and provide consumers with product quality and safety information. Ensure that the regulatory authorities provide information basis for security supervision and law enforcement. Automatically calculate and automatically generate a corresponding number of unique two-dimensional codes according to the "production supervision" information for use by farmers when selling. This QR code can only be scanned and authenticated once, and a second scan will prompt “This product has been scanned and authenticated N times, pay attention to counterfeiting”.

6.2.3 Complaint System

Consumers can verify complaints online if they verify that the quality of the product does not match the quality claimed. The system traces the commodity to the specific production grower and the person in charge of management, and punishes accordingly.

6.3 Platform Management System: Mainly Completes Basic Information Management, Production Information Management, User Management, Workbench Management and Other Functions

6.3.1 Basic Information Management

Including product management. Contains the maintenance functions of planter main information, area information, plot information, variety information, and personnel information. Various information about sweet cherries in Wenchuan County can be imported through EXCEL as a whole.

6.3.2 Workbench

Provide data entry function for growers and administrators. Administrators can establish production batch information based on area-parcels, that is, start the planting process based on the parcels. At the same time, through data operations, convenient agricultural operation information can be recorded. The information push function can push relevant announcement information to the administrators and growers in real time, which is convenient to carry out related work in time.

6.3.3 Production Information Management

Mainly includes planting distribution, planting management, data statistics, product sales and

inventory management, and product certification

6.3.4 User Management

Add, delete, modify and manage the platform administrator account, administrative management account, and grower account.

6.4 Overall Logical Architecture Design

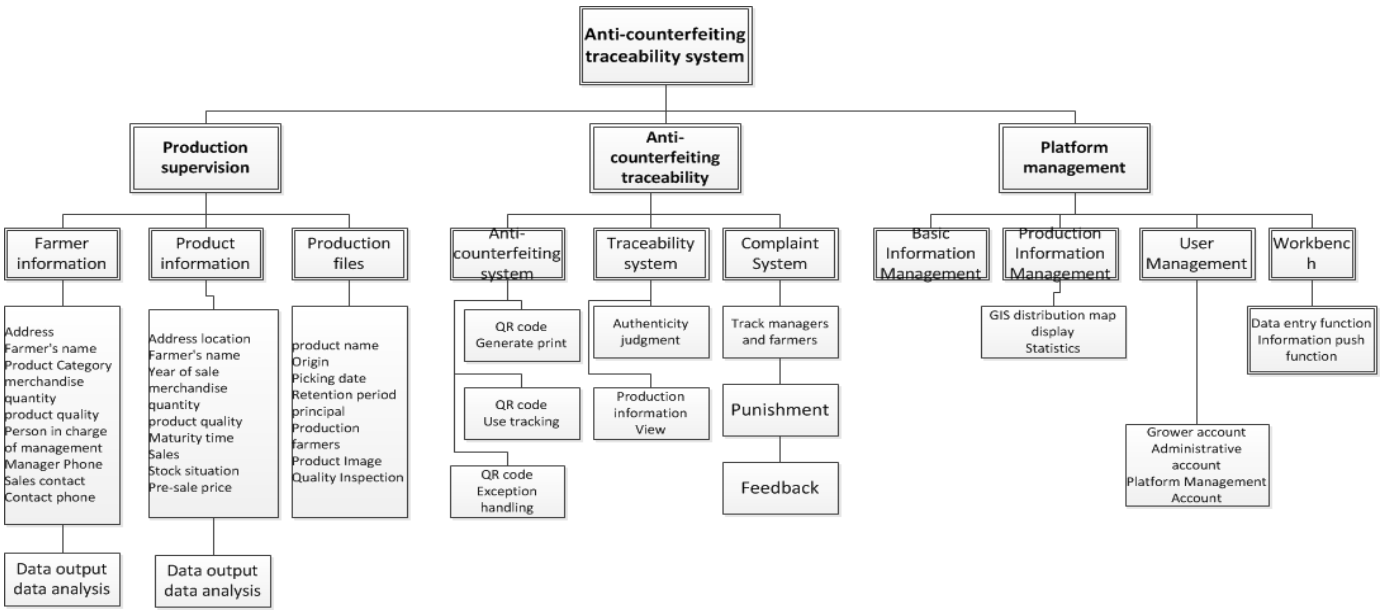

Figure 1 Management system architecture diagram

7. Conclusion

Taking sweet cherries in Wenchuan County, Aba County as an example, a series of information from the collection of the farmers' basic data to the planting production process, picking, inspection and testing were established to the database of the traceability platform, and then the information passed the anti-counterfeiting and traceability double QR code inspection. The authentication method realizes the anti-counterfeiting and traceability functions of agricultural special products, thereby realizing the entire process of agricultural special products monitoring, real-time understanding of sales and inventory status, accurate query of product information, brand and authenticity guarantee and other functions. It has a strong promotion effect on protecting local high-quality brands from interference from foreign products and promoting farmers' poverty alleviation and income increase in Aba minority areas.

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