Edible oil traceability query system construction and application

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ABSTRACT

This article through the description cooking oil quality backward system setup procedure, proposed that in food tracing referral system's data acquisition and the polling message system establishment's essential factor, the implementation and the application, the system including the tracing database, the information acquisition, the network transmission and many kinds of inquiry terminals, introduced in detail the handset or the PDA WAP inquiry, the short note inquire and touch the terminal with to apply in cooking oil tracing referral system's realization.

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INTRODUCTION

The current food quality security incident sometimes occurs, the food security problem is day by day serious and is prominent. Especially occurred recently the tea oil "the benzene and pi" the event has caused widespread and the bad influence in the society, but because the tracing system is not perfect, the consumer is very difficult the real-time understanding question cooking oil the information, simultaneously the Production enterprise or the government Supervisory department recalls the question product rapidly difficultly in the first time, will lose falls lowly. For therefore the strict control cooking oil's quality, must to the cooking oil raw material planter, the production processing, the packing transportation and the wholesale retail sales link chain link carries on the entire journey effective supervision, a foundation measure is must establish a complete cooking oil tracing system, implementation cooking oil safe backward control system.

The Internet of things is an important part of information technology in the new generation, it can also be said that "the Internet of things is an internet which is connected with things". Through RFID technology, infrared sensors, GPS technology, intelligent perception, recognition technology and pervasive computing, combined with the application of ubiquitous fusion network, it can exchange information, the Internet of things is the expansion and the application of the Internet that is mainly about business and the application of innovation, which can realize the intelligent identification of goods, location, tracking, monitoring and management. Here the "things" should meet the following conditions that can be incorporated into the scope of the "Internet of things": 1. it should have a receiver that can receive the corresponding information; 2. it should have data transmission path; 3. it should have a storage function; 4. it should have CPU; 5. it should have the operating system; 6. it should have the specialized applications; 7. it should have data transmitter; 8. it should obey the communication protocol of the Internet of things; 9. it should have unique number that can be identified in the network.

The Key Technology of Traceability System
Traceability system at first originated in 1997 and set up at the European Union, at hat time, it was in order to cope with the epidemiology of BSE. Since the countries in European Union had suffered from many panics caused by the livestock and poultry products, thus, the confidence of people on our government with its food safety regulatory function is low, therefore, traceability system as an important means of managing food safety was born earlier in these countries, the international Codex Alimentarius Commission(CAC) and the International Organization for Standardization (ISO) defined "trace" as: it is the tracing ability through the identified code registration to trace the

history and use of the goods or behavior or location. Traceability is the ability that use the recorded marks to trace back the history of the product, the application, locations or the activities of the similar products.

Food traceability system mainly includes three aspects: the basic elements of individual products or batches of the product's identification, the time information of the moving or transforming, as well as the geographic information, information database and information transferring system, etc. The information technology has played an important role in the traceability system of food, the establishment traceability system must be based on information technology. Identifying information technology as an information carrier technology can record information, which is the key technology of food traceability system. At present, the main individual identification technology at home and abroad includes: common bar code, based on the method,the identification method based on proteins or lipids, infrared spectrometry, the global positioning system (GPS) and geographical information system (GIS) technology, deoxyribonucleic acid (DNA) fingerprint technology, radio frequency identification technology and iris recognition, etc. Among them, the bar code technology in food traceability system has been widely used.

The Overall Design of Food Safety Traceability System for Edible oils
The Principle of Designing Food Safety Traceability System for Edible oils
Based on the analysis of business processes of the system, combined with its own objectives and requirements, the establishment of food safety traceability system for edible oils should follow the following principles:

(1) the practical principle. The construction of food safety traceability system for edible oils should consider the different demands for the users, so as to meet the needs, which should be as the primary goal, avoiding blindly and fully construction.

(2) the scientific principle. Based on the practical principle, it should put the modern management methods, advanced information technology, the management theory of food safety, food safety traceability method and technology into constructing the system, which can make the food safety production and processing process controllable, so as to improve food quality and safety standard.

(3) the reliability principle. As the system is built, inevitably, the dependence degree between supply chain links on information transmission will become very high. Therefore, whether it is considered from the angle of system software, or from the hardware equipment and after-sales maintenance response ability and so on, it should ensure the reliability of long-term operation of the system.

(4) the principle of safety. As far as information system is concerned, security has an irreplaceable importance, which is even more important than the function of the system itself. So we should take various measures to ensure the security of the system, so as to ensures the safety of system data. For example, using firewall technology to avoid all sorts of hacker's attack, setting different levels of permissions for users to use.

(5) the principle of compatibility. Since information technology is updated and changed daily, thus, hardware, software and operation system also change based on the application of information technology. Therefore, food safety traceability system is so large, which should continue to optimize and upgrade, so as to improve the development and meet the requirements of the system in the future.

The Overall Structure of Traceability System of Edible oils
Identifying the aspects of the origin of the information, determining the origin of the information of each food safety supply chain for vegetables and fruits must follow the following principles:
(1) determining the enterprise information involved in food safety throughout the supply chain of edible oils.
(2) determining the information that has impact on the safety of edible oils.
(3) the determined information should be reliable and easy to collect.
(4) the determined information should meet the requirements of national laws and regulations.

The traceability system of edible oils supply chain can be divided into internal traceability system and full traceability system according to the different scope. Internal traceability system of edible oils supply chain refers to the function happened in the enterprise, which is only traceability for the production process of a single enterprise within the supply chains, moreover, each link of the product is a tracing point.
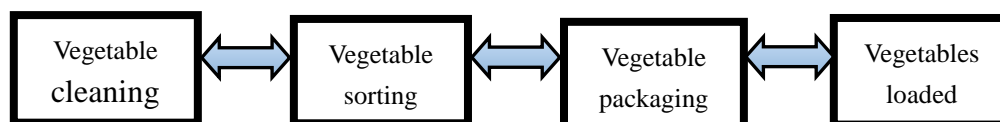
| Vegetable cleaning | ⟷ | Vegetable sorting | ⟷ | Vegetable packaging | ⟷ | Vegetables loaded |

Fig.1　Vegetable Supplying Process

From the analysis of the supplying chain of edible oils, the traceability system of edible oils is based on the information flow of the supplying chain, using the Internet of things technology to identify, record, store and analyze the circulation information of edible oils, so as to ensure the quality and safety of the products and reduce the risk. Especially when the products have safety problems, it can use the inquiry function of traceability system, combined with the relevant laws and regulations, clear the division of responsibilities, so as to implement the targeted products' recall or punish the relevant enterprises, making the corresponding adjustment.
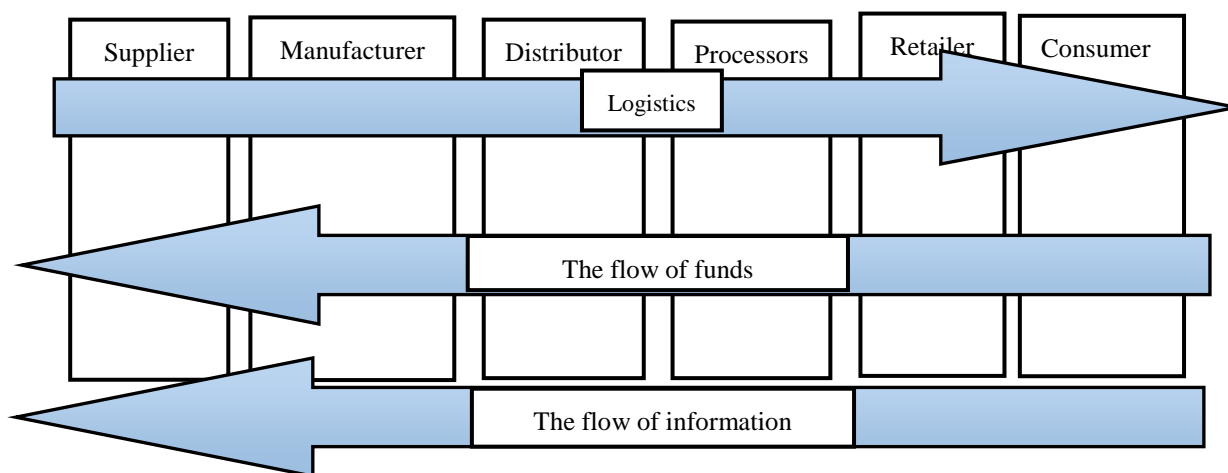
| Supplier | Manufacturer | Distributor | Processors | Retailer | Consumer |

Logistics

The flow of funds

The flow of information

Fig.2　The Supplying Chains of Edible oils

Therefore, the main food safety traceability information of the supplying chains of edible oils is involved in four links, namely, vegetable planting, picking, logistics and distribution; at the same time, the basic information of the enterprise in each process also belongs to the category of traceability information. Based on the analysis of HACCP production process of edible oils, it can determine the key links and information framework of the tracing origin , according to the designing points and the designing principle of the system, combined with the production and processing processes of edible oils, as well as the users of the whole supplying chain, so as to design the framework and the structure of the traceability system. Based on the platform of the Internet of things and the structure of the traceability system of edible oils, shown in Fig.3, it can be divided into three layers: the client layer, business layer and data layer. The client layer provides mobile phone client browser and custom software with multiple querying methods. Producers, consumers and other regulators, users of the system can use the combination of querying modes to query information, grasp the quality and safety of information in each link. The main function of the business layer provided for the system is mainly consisted of seven subsystems, namely, the planting subsystem, picking subsystem, packaging subsystem, storage and transportation system, the sale subsystem, RFID subsystem and vegetable traceability label subsystem. The data layer is divided into two parts, namely, the platform database and professional database, the platform database provides basic data for the operation of the platform, while business database provides business data.
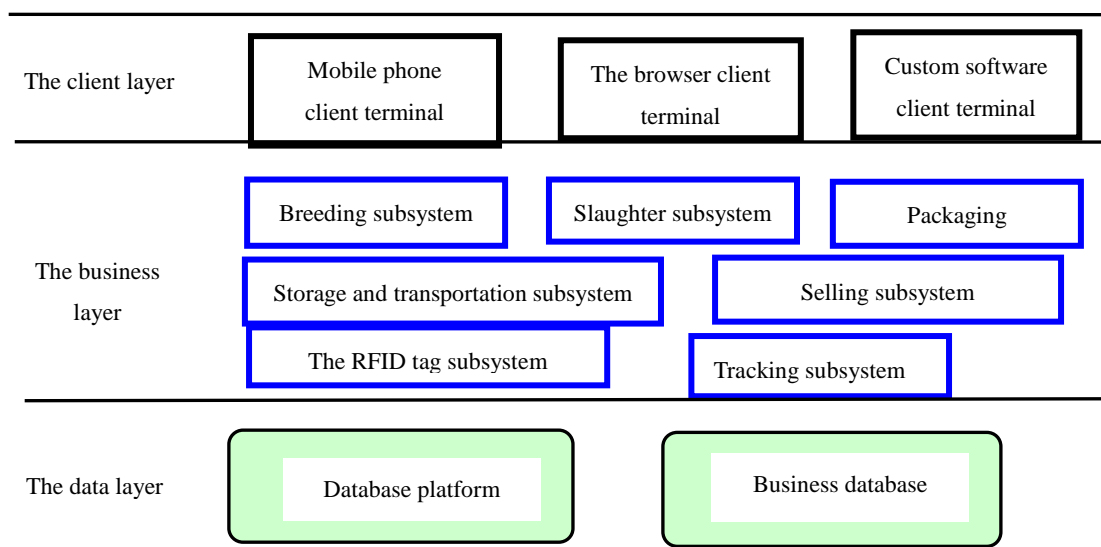
| The client layer | Mobile phone client terminal | The browser client terminal | Custom software client terminal |

The business layer	Breeding subsystem	Slaughter subsystem	Packaging
Storage and transportation subsystem	Selling subsystem
The RFID tag subsystem	Tracking subsystem

| The data layer | Database platform | Business database |

Fig.3   The Construction of Platform of Edible oils Traceability System Based on the Information of the Internet of Things

In the traceability system of foods and vegetables, the system adopts many forms of combination structure (Fig. 4), so as to meet the different needs of users. Because the region of the cultivation base is rather strong, the communication of Internet is not convenient, thus it is more suitable for C/S structure. But for the picking link of edible oils as well as the processing and transporting links, the circulation of information is fast with high real-time demand, which is more suitable for B/S structure. So the effective integration of B/S and C/S model, adopting the mixed model with the model of client / server mode (C/S) and the mode of browser / server (B/S), making full use of the advantages of these two kinds of modes, after completing picking or sales, uploading the centralized information to the web server, for those areas that the network connection is not convenient can maximize the efficiency of the system function. Using RFID handhold reader to record information, then transmit the information to the database. In this way, it can connect the dispersed information together, realize the record and management of data, so as to ensure the continuity of the information transmission.

The Function Design of Fruits and Vegetable Logistics Management System
Logistics enterprises is mainly to help the circulation of edible oils, mainly record the moving track of the products, which can help people recall the products that have problems immediately. The function of the logistic delivering management system includes: information input, information inquiry and the management of the system.
(1) information input: input basic information of transportation vehicles and the transportation information of logistics.
(2) information inquiry: query the basic information of the transporting vehicles; query the transportation information of logistics.
(3) the management of the system: managing the basic customer information of the logistics enterprise, the user's information of the system as well as the right of permission, at the same time, making maintenance for the basic information of transporting vehicles.

CONCLUSION

The consumer when purchases the cooking oil may inquire some bottle of oil raw material, the production, the packing, the circulation, the examination through the backward code and so on various aspects detailed information, realizes "feels relieved the purchase"; When the cooking oil gives rise to the problem, may inquire each link, some through the backward code raid of as well as a some bottle of oil, once finds the problem, can carry on the effective control according to the tracing referral system and recall, safeguards consumer's legitimate rights and interests fast from the source, will lose and the injury falls the bottom, has provided the effective monitoring measure and the technical application for the food safety control, the maximization guarantees the people's life and the property security.

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