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Internet-based Farm Animal "Adoption" Management Model Research

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Abstract: With the advent of the new era of the Internet, it has become a trend to apply cloud computing and big data technologies to farming and livestock production. In order to solve the problem of marketing the excellent farming and livestock products in South China, and in response to the National 14th Five-Year Plan, technology is used to achieve real poverty alleviation in the sense of science and technology, and to develop a smart farming and livestock industry. Therefore, this project plans to design an Internet-based farm animal "adoption" system. Under this model, agricultural and livestock product producers sell their products on the internet and consumers can purchase the products directly and claim the products they have purchased through the internet. After claiming, consumers can use information means such as the traceability code or QR code provided by the producer to achieve traceability of information such as product quality, safety and production links. The system is developed using popular technologies such as the MINA framework, the front-end interface is designed using a combination of WXML + WXSS + JavaScript, and the system uses a B/S model with a Spring Boot back-end system for data exchange. At the same time, manufacturers can also use the recognition system to keep abreast of consumer feedback and opinions on their products, providing useful information for the management and improvement of the production process.

1. Introduction

With the advent of the new era of the Internet, it has become a trend to apply cloud computing and big data technologies to farming and livestock production. In order to solve the problem of marketing the outstanding farming and livestock products in South China, and in response to the National 14th Five-Year Plan, technology is used to achieve real poverty alleviation in the sense of science and technology, and to develop a smart farming and livestock industry. Therefore, this project plans to design an internet-based farming and livestock "adoption" system, where users can adopt a field, a fruit tree, a chicken, a cow, etc. from the system by paying a certain amount of money, and through the high-definition cameras installed in each project area of the farm, they can monitor the goods they have adopted 24 hours a day and check the growth of their The farmers, in turn, must strictly follow the guidelines of both parties. The farmers, in turn, must strictly follow the farming standards signed by both parties in the contract and deliver green, pollution-free and even organic products to

customers' homes after harvesting through logistics [1].

With consumers' increasing demands for food safety, quality and health, the traceability and tracing of agricultural and livestock products has also become a topic of social concern. The traditional sales model for agricultural and livestock products is characterised by asymmetric information and poor information flow, which can easily lead to unreliable product quality and a lack of consumer trust in the products[2]. Therefore, in order to ensure the quality, safety and reliability of agricultural and livestock products, an internet-based "adoption" management model for agricultural and livestock products has emerged [3].

The internet-based farm animal "adoption" management model effectively solves the problems of opaque information and poor circulation in the traditional sales model, ensuring the quality and safety of farm animal products. Under this model, consumers can purchase agricultural and livestock products directly through the Internet and adoption the products they have purchased. Information means such as traceability codes and QR codes provided by the producers allow for traceability enquiries on information such as product quality, safety and production links. At the same time, producers can also use the adoption system to get timely feedback and opinions from consumers on their products, providing useful information for the management and improvement of the production process[4].

With the continuous development and application of Internet technology, the Internet-based farm animal "adoption" management model will play a more important and extensive role in the agricultural industry chain. This model can improve the quality and reliability of agricultural and livestock products, promote the transformation and upgrading of production and marketing, drive the development of the entire agricultural and livestock products market, and accelerate the process of agricultural modernisation.

2. The Current State of Development of the Internet-based Farm Animal "adoption" Management Model

The Internet-based management model of "adoption" of agricultural and livestock products has been widely used and promoted at home and abroad. Some large domestic e-commerce platforms, such as Tmall and Jingdong, have already started to promote the "adoption" management model for agricultural and livestock products and have established a comprehensive traceability system and trading platform. At the same time, some internet platforms that focus on agricultural and livestock products trading and information enquiry, such as Food Security and Agricultural Products, have also built corresponding "adoption" management systems[5].

There are also a number of overseas attempts to adopt the "adoption" management model for agricultural and livestock products. For example, in Australia, some agricultural enterprises have started to use blockchain technology to establish an "adoption" and traceability system for their products, enhancing consumers' trust in the quality and safety of agricultural and livestock products. In Europe and the US, many agribusinesses and technology companies are also developing and applying "adoption" management systems for agricultural and livestock products, and are gradually achieving certain results[6].

However, in practice, there are still some problems and challenges in the Internet-based farm animal "adoption" management model, including information security and privacy protection. How to ensure the security of the adoption system and avoid data leakage and malicious use of information is an urgent issue to be resolved. Standardisation of information collection and disclosure. How to standardise the collection and disclosure of product traceability information and avoid incomplete, inaccurate or false information, and the need to establish perfect standards and mechanisms. Public participation and trust building. How to enhance the public's trust in the adoption system and stimulate

public participation and recognition is the key to the ultimate success of farm animal "adoption" management.

Overall, the internet-based farm animal 'adoption' management model has been gradually recognised and accepted. In the future, this model will be further popularised and promoted as an effective means of improving the quality of agricultural and livestock products, meeting consumer demand and promoting the modernisation and transformation of agriculture.

3. Project Programme

3.1. Project Content

The farm animal "adoption" system uses WeChat Internet as its platform. The front-end interface is designed through a combination of WXML + WXSS + JavaScript. The system uses a B/S model, a MySQL open source database and a Spring Boot back-end system for data exchange[7].

The system is divided into two modes: one is for users to adoption the goods themselves and then send them to the users through logistics after they have matured; the other is that when the user has successfully adoption the goods, the system calculates that the user will be able to enjoy the goods the next day, i.e. eat them while farming. The goods consumed by the user are not adoption by the user, but by others on the farm, and high-definition cameras are installed on the farm to set up a live broadcast of the farm, so that the user can keep an eye on the growth of the adoption goods via the Internet. In order to guarantee income, the system can purchase exclusive insurance for large animals such as cattle and sheep according to the farmer's wishes, and in the event of losses caused by unforeseen circumstances, the user's rights and interests will be effectively guaranteed by means of specific insurance.

Farmers can upload three types of goods for users to adoption. One is land divided into several units for the user to adoption (the land is owned by the farmer) and the user can choose the crops to be planted according to the local climate; another is crops such as trees that have already grown; and finally, animals such as chicks, cows and sheep.

Users can choose from three types of produce uploaded by the farmer, and users can grow and manage crops according to their own preferred pleasure, or let the farmer manage them for them. Large animals like cows and sheep can be adopted by multiple people in a single order. Before the order is placed the system will divide them into different parts for users to adopt depending on the price.

3.2. Project Objectives

(1) Farmers can log in to the system to publish their products, edit their adoption agreements, review their orders and publish them.

(2) Users can log in to the system and farm their adopted products online, and watch their adopted products grow in real time.

(3) Administrators can manage farmer and user information, process orders and maintain the system through the system.

3.3. Design route

The Internet-based farm animal "adoption" system mainly includes six main parts: front-end UI, display layer, business layer, data layer, database and operating environment.

(1) Front-end UI adopts the combination of WXML+WXSS+JavaScript to improve the development efficiency and maintenance efficiency of the system.

(2) Display layer: system interface design, through the B/S mode information interaction to make the Internet interface information updated in a timely manner, and through the template engine rendering to make the interface beautiful and simple.

(3) Business layer: the design of the functions that can be achieved on the Internet and the items managed by the administrator.

(4) Data layer: each commodity to be adopted when uploaded to the Internet, the Internet automatically designed for its traceability code, the user to adoption and each time the breeding process and logistics process, user evaluation will be through the traceability code feedback to the data layer.

(5) The database uses a MySQL open source database, and the processed data from the data layer is stored in the database through Spring Boot background operations[8].

(6) The operating environment is the brain of the Internet, with Ali cloud hosting and a separate server to maintain the operation of the Internet.

4. System Design

4.1. Functional Design

The system's WeChat applet development uses the MINA framework and the front-end interface design is realised through a combination of WXML + WXSS + Java Script. The applet framework page file consists of j s page logic, wxml page structure, wxss page style sheet and json page configuration together. Based on the results of the requirements analysis, different functional modules were designed for the backend of the system. The SSH framework is used for the backend, which effectively improves the reusability of the system, and the coupling between different layers is small and cohesive, which greatly improves the development efficiency and maintenance efficiency of the system [9].

The system design includes user management, product information and release and online, product classification, order management, online payment and logistics management. Specific interfaces include farmer authentication, simple registration, online adoption, live farming, farming interface and my goods.

4.2. System Interface Design

Considering that some of the users of the system are farmers, the system interface should be simple and easy to operate. The main page of the system is divided into farmer interface and user interface, and set up farmer authentication, customer operation, commodity classification, farm live, shopping cart, order information, etc.

The farmer interface is divided into three sub-interfaces for livestock products, fields, fruit trees and other existing resources. Under each sub-interface there are product information and insurance sub-interfaces.

The user interface has three sub-interfaces for adopting livestock products, fields, fruit trees, etc. Under large livestock products like cattle and sheep, there are sub-interfaces for sole adoption and single adoption.

Farmer certification: Farmers upload basic information about their farms, and after successful certification, a farmer page is automatically generated to facilitate farmers to carry out relevant operations, modify personal information and upload products. Personal information includes the farmer's name, farm address, farm introduction, product introduction, etc., and each upload and modification needs to be reviewed by the administrator.

Customer operations: Convenient for customers to perform personal information operations.

Modify personal information, including ID, mobile phone number, delivery address, etc.

Product classification: For adoption to search and find adoption products. With functions such as searching, sorting and viewing product details.

Live farming: 24-hour live streaming of subdivided blocks of items with HD cameras.

Shopping cart: View and check out pre-adopted items. Has the function to select, delete and settle the products in the shopping cart.

Order information: displays information about the series of orders. With the function of displaying information on the growth of adoption goods, breeding details, pending delivery, pending payment, pending sign-off and evaluation.

4.3. Information Transfer Structure

The system is based on the B/S model, which is short for Browser/Server. As the B/S model has very low client requirements and requires little maintenance and upgrades, it makes the applet portable, functional, scenario-based, easy to maintain and low cost. As long as there is a network, any mobile phone can be connected to the applet, which is connected to WeChat and is easy for farmers to use [10].

4.4. System Operating Structure

The system runs on a structure where the backend of the WeChat applet cannot directly send requests to operate the database, so the requests are interacted with the Spring Boot backend on the cloud server, which operates the database, and then the mobile phone displays the data in the database on the interface. The user operates through the pages of the system, initiating relevant requests to be transmitted to the server and the database to complete a series of operations.

4.5. Traceability Code Design

Traceability codes should comply with national industry standards, and uniform specifications should exist for the length of codes and coding methods. The duplication of codes should be minimized to ensure the uniqueness of the codes. At the same time, the length of the information in the code should not be too long for the convenience of consumers. The product information contained in the traceability code is large and must be displayed within a defined range. Therefore, an information transmission rule needs to be designed to ensure the integrity and correctness of the information. For example, certain rules can be adopted to limit the presentation of product production information, quality and safety information, etc. in the traceability code. Traceability codes should be easy to circulate and use, and need to be designed to support traditional channels and emerging online channels, such as computers, mobile and other forms of internet information transmission. The design of the platform should take into account consumers' habits of use and the way of application, so that the query and presentation of the code is more convenient.

Traceability codes can be displayed in the form of 2D codes and barcodes, and 2D codes are a common form of presentation in order to better serve consumers. In the design of the code, uniform colours, fonts, graphics and other design methods can be used to provide consumers with clear, concise and intuitive information identification and provide enquiry services. QR code technology has become a popular trend nowadays as they offer advantages such as convenience and speed. The information related to the agricultural products uploaded by the farmer is generated into a QR code, which is used as a traceability code for the goods, one thing, one code, which serves as the identity of the agricultural products and this traceability code is equivalent to a link to connect the parts. When the user places an order the associated QR code is automatically produced and the code is linked to

the production information database of the agricultural product, ensuring that each link is accurately fed back to the server system data repository. Due to the convenience and practicality of the QR code, it allows users, managers, farmers and physical staff to quickly check information on the adoption goods after scanning.

4.6. Database Design

The database of the applet uses a MySQL open source database, which abstracts the reality of the objects and transforms them into data storage according to the actual situation of the system. "The information collected includes information on the origin, operator information, basic information on the produce, growth process, expiry date, storage temperature and logistics and transportation process.

Information on agricultural products includes the QR code, transaction information, user information, operator information and growth process information.

Animal information includes animal medical reports, feeding, slaughter and the whole process of trading.

4.7. System Testing

The system testing of the Internet-based farm animal "adoption" management model requires testing of the various functional modules of the system, including the testing of the adoption function, the testing of the traceability function, the testing of the feedback function, data security and privacy protection. According to the system function setting, the system part realizes information entry, information simulation processing and information output on the mobile phone. Simulate the process of simulating the entry, adoption and cultivation of agricultural products and livestock by farmers and users. Test the information interaction function of the system.

4.7.1. Testing of the Recognition Function

As one of the key features of the Internet-based farm animal 'adoption' management model, the adoption system needs to be tested for usability on different operating systems and browsers, and for the ability to properly track, manage and maintain consumer adoption data. In addition, the scalability and reliability of the adoption function needs to be tested.

4.7.2. Testing of the Traceability Function

The traceability function is one of the core functions of the internet-based farm animal 'adoption' management model. The usability, accuracy and reliability of the traceability system needs to be tested in different scenarios, including the source and authenticity of traceability data, data update and query speed. It is also necessary to test the way in which the traceability function is queried, how it is presented and the user experience.

4.7.3. Testing of the Feedback Function

The feedback function helps manufacturers to understand consumer feedback and opinions on their products, which in turn provides useful information for the management and improvement of the production process. Therefore, the usability and accuracy of the feedback system needs to be tested, including whether feedback information is delivered in a timely and effective manner, and whether feedback management can support multiple methods such as SMS, email and telephone.

4.7.4. Testing of Data Security and Privacy Protection

Data security and privacy protection is one of the most important issues that must be considered in an internet-based farm animal "adoption" management model. Testing data security requires testing from the perspectives of data storage, data transmission and data backup to ensure safe and reliable data. Privacy protection needs to be tested from the perspective of user authentication, privacy protection measures, authority management and other aspects to ensure the privacy of users.

To sum up, the system testing of the Internet-based farm animal "adoption" management model needs to consider all factors and carry out system testing through targeted testing methods and means, so as to improve the stability and reliability of the adoption system and ensure that the system can better provide quality and safe services for consumers and producers.

4.8. Improvement Options

Improving product quality and safety: Consumers can find out information about the production process, production steps and inspection procedures after purchasing a product through adoption and traceability enquiries, improving the reliability and transparency of product quality and safety.

Optimise product sales model: Through the seamless connection between producers and consumers, the information flow challenges of traditional sales channels are opened up, improving product sales efficiency and market competitiveness.

Increased consumer involvement: Consumers can be directly involved in the process of adoption and tracing the management of the product during the purchase process, increasing their involvement and sense of ownership of the product.

Improved management capabilities of manufacturers: manufacturers can use the adoption system to understand consumer feedback and opinions, keep abreast of product quality and sales, and provide useful information for management and improvement of production processes.

It is worth noting that there are still some difficulties and problems with the Internet-based "adoption" management model for farm animals, such as how to ensure the security of the adoption system, how to standardise the collection and disclosure of product traceability information, and how to strengthen the building of trust between producers and consumers. Therefore, in practice, these issues need to be thoroughly considered and explored in order to truly promote the application of the Internet-based farm animal "adoption" management model.

5. Summary

The Internet-based "adoption" management model for agricultural and livestock products refers to consumers purchasing products directly from agricultural and livestock product manufacturers through the Internet, and adopting and tracing the management of the purchased products. This model has been widely used and promoted at home and abroad, and can effectively improve the quality, safety and transparency of agricultural and livestock products.

Under this model, consumers can purchase agricultural and livestock products directly through the internet and adoption the products they have purchased. Information means such as traceability codes and QR codes provided by producers can enable traceability enquiries on information such as product quality, safety and production links. At the same time, producers can also use the adoption system to get timely feedback and opinions from consumers on their products, providing useful information for management and improvement of the production chain.

The advantages of this model include improving product quality and safety, optimising product distribution patterns, increasing consumer engagement and improving the management capabilities of producers. However, the model still has issues and challenges such as information security and

privacy protection, standardisation of information collection and disclosure, public participation and trust building, which require further research and exploration.

Overall, the Internet-based "adoption" management model for farm animals has become an effective means of improving the quality of agricultural products and promoting the modernisation and transformation of agriculture, and will continue to play an important role in the future, contributing to the protection of consumer health and promoting sustainable development.

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