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Design and Implementation of the WeChat Applet for the "Local Flavor" Agricultural E-commerce System

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Abstract: *This paper proposes the design and implementation of a "local flavor" agricultural e-commerce system based on WeChat applet, which provides users with a popular science program for agricultural e-commerce exchange through WeChat applet. It mainly uses WeChat Mini Programs to interact with users and provide services. On the backend, it uses Vue to build an administrator to manage product user information, and adopts the Springboot SpringMVC framework to write backend programs and provide corresponding interfaces (APIs). The front-end uses a WeChat applet for display, and uses the wx.request plugin to send an HTTP request to the back-end to obtain data in the real time for rendering. This paper introduces the design, implementation and optimization process of the system in detail, and verifies the effectiveness of the system.*

Keywords: *WeChat Mini Program; Helping farmers; Agricultural products; Springboot; Vue*

1. Introduction

Since entering the era of "Internet plus", rural e-commerce has gradually become an important force to promote the development of rural industries and economic growth. It can not only broaden the channels for the sales of agricultural and sideline products, but also bring regional agricultural products into the public view through digital information technology (such as live broadcast), promote the brand construction of agricultural products, and help farmers increase their income and become rich. [1]

The purpose of this paper is to design and implement a set of "local flavor" agricultural e-commerce system based on WeChat mini programs. MySQL is used for data storage, Vue administrator is used to manage WeChat Mini Programs, and WeChat Mini Programs are used for visual display on the front end. Through this system, it can help the development of the rural economy, and promote the rural characteristic products to a broader market by building an e-commerce platform, which not only drives the growth of the rural economy, but also provides consumers with more high-quality product choices.

2. Project research background

2.1. Background of the project

The Party Central Committee believes that it is necessary to unremittingly solve the "three rural" problems as the top priority of the whole party's work, and use the strength of the whole party and the whole society to comprehensively promote rural revitalization and accelerate the modernization of agriculture and rural areas.In February 2023, the Central Committee of the Communist Party of China and the State Council issued the "Overall Layout Plan for the Construction of Digital China" to provide policy guidance for the development of e-commerce of agricultural products in China. E-commerce is an effective way to promote the convergence of agricultural product production and marketing, promote agricultural transformation and upgrading, help farmers get rid of poverty and increase income, and finally realize agricultural and rural modernization and rural revitalization. [2]

The traditional e-commerce system generally has technical requirements for merchants, the system functions are cumbersome, and the standard operation of rural merchants using the system for commodity management is more troublesome. Traditional e-commerce systems cannot only sell agricultural products

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or one category, and individual categories such as agricultural products can only be sold in the same way as ordinary categories of products. Traditional platforms only focus on closed-loop transactions, lacking popular science guidance for rural merchants and farmers.In 2017, with the birth of WeChat Mini Program, a new model of "Mini Program + Mall" began to appear in the field of agricultural product sales, compared with traditional e-commerce platforms with higher thresholds, WeChat Mini Programs with lower development costs, more integrated functions and easier operation are more advantageous for farmers, and new formats of rural e-commerce of small programs are gradually emerging. [1]

2.2. Current status of domestic research

Industrial revitalization is the top priority of rural revitalization. In recent years, regions and departments across China have leveraged local agricultural and rural characteristic resources to transform rural resource advantages, ecological advantages, and cultural advantages into product and industrial advantages, laying a solid foundation for comprehensively advancing rural revitalization.

2.3. Development prospects

According to the "2024-2029 China WeChat Mini Program E-commerce Market In-depth Analysis and Development Trend Research and Forecast Report" written by the China Research Institute of Puhua Research Institute, by the end of 2023, the number of WeChat users has exceeded 1.26 billion, of which the number of monthly active users of WeChat Mini Program has exceeded 8.5100 million, and the number of daily active users also exceeds 200 million. These data show the high user penetration rate and usage stickiness of WeChat Mini Programs. In the e-commerce mini program, its usage rate continues to rise, occupying a large market share. According to statistics, the transaction volume of WeChat Mini Program e-commerce will reach hundreds of billions of yuan in 2023, a year-on-year increase of more than 50%, reflecting the rapid growth of its market size.

3. Functional analysis of the "local flavor" agricultural e-commerce system based on WeChat applet

It makes it more convenient for users to place orders using the Mini Program on their mobile devices and directly use WeChat Pay to complete transactions. The "Rural Flavor Helping Farmers" WeChat Mini Program has very rich functions to complete the purpose of combining agricultural and e-commerce exchanges. [3]

3.1. Demand Analysis

The "Rural Flavor" agricultural e-commerce system is built based on WeChat applets, focusing on the two-way needs of farmers to increase income and upgrade consumption: through the establishment of a direct connection channel between farmers and the platform, direct sales of agricultural products can be realized (source of demand: eliminate intermediate links to improve farmers' profit margins), and simultaneously meet the core demands of consumers for cost-effective, fresh and high-quality agricultural products; Despite this, in rural areas, especially in developing countries, there are still many challenges such as the relatively lagging level of informatization and the unsalable agricultural products, which seriously restrict the growth of farmers' income and the development of the rural economy. At the same time, the homepage announcement accurately reaches the policy documents, popular science videos empower production management, and user forums to build a two-way feedback link to achieve a win-win situation at both ends of supply and demand. It can benefit users and allow them to eat and use cheaper, fresher and better quality agricultural products. [4]

3.2. Farming/communication function

The platform pays attention to the changes in the domestic three rural policies, market demand, user needs, and farmers' needs, and timely informs the information related to the interests of farmers and users such as various policy documents, changes in the agricultural product market, agricultural knowledge popularization, and platform management regulations, and timely informs them through announcements, video playbacks, and user exchange forums. This method can effectively improve the production management level of farmers, and at the same time effectively help farmers to reduce the impact of market "lag" and "blindness" to a limited extent. It can also receive feedback from users in a timely

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manner through forums to protect the consumer rights and interests of users, and at the same time remind farmers of the problems existing in their own agricultural products to achieve a win-win situation.

4. Design and analysis of "local flavor" agricultural e-commerce system based on WeChat applet

4.1. System design framework ideas

With the in-depth implementation of rural revitalization and digital village strategies, the digital transformation of rural industries has become an important part of rural construction. In the context of the continuous deepening of digital rural construction and the "Internet + Agriculture" strategy, rural e-commerce platforms have ushered in unprecedented development opportunities. In order to implement the rural revitalization strategy and improve the sales efficiency of agricultural products, this project has developed a WeChat mini-program platform of "Rural Flavor Helping Farmers", aiming to build an efficient agricultural service platform integrating agricultural product display, user ordering, order management and data analysis. [5]

Relying on the lightweight application of WeChat Mini Program, the platform makes full use of its "ready-to-go", convenient communication and huge user base, so as to lower the threshold for users and improve the efficiency of information access. The front-end uses WXML, WXSS, JavaScript and other technologies to achieve page structure and visual effect design; The back-end uses the database to achieve efficient integration of data management, business logic processing, and interface calls.

The overall architecture is divided into four levels:

User interaction layer: a simple and intuitive interface is designed to support functions such as browsing, collecting, placing orders and paying for agricultural products;

Business logic layer: efficient processing of user operations, covering core services such as user registration, order management, shopping cart maintenance, and address information management;

Data processing layer: use the database and back-end services to work together to realize user behavior data collection, sales data statistics and visual display;

System support layer: Integrate multiple interfaces such as WeChat payment, agricultural information and logistics services to ensure the stable operation of the platform.

At the same time, the platform will also connect with local farmers and merchants to realize the functions of commodity information shelving and background management, further simplify the operation process of farmers, and improve the overall operational efficiency of the platform.

The technical roadmap for WeChat Mini Programs is illustrated in Figure 1.

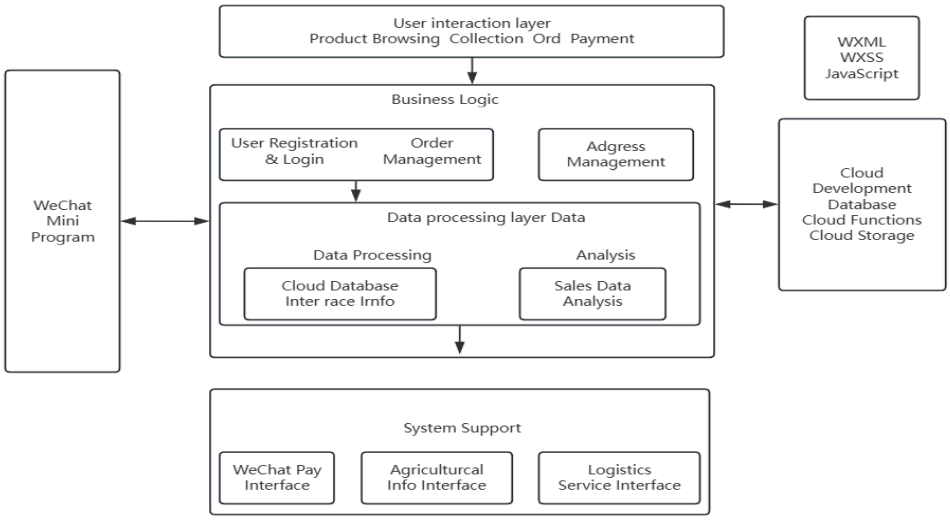

Figure 1: WeChat Mini Program Technology Roadmap.

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4.2. System module design and interface design

4.2.1. System module design

In order to realize the core functions of the "Rural Flavor Helping Farmers" WeChat Mini Program platform, the overall design of the system can be roughly divided into four main modules: user management module, commodity display module, order management module, and background management module. Close cooperation between each module is achieved through data interaction and interface call to ensure the efficient and stable operation of the system. The system module design and interface design are shown in Figure 2.

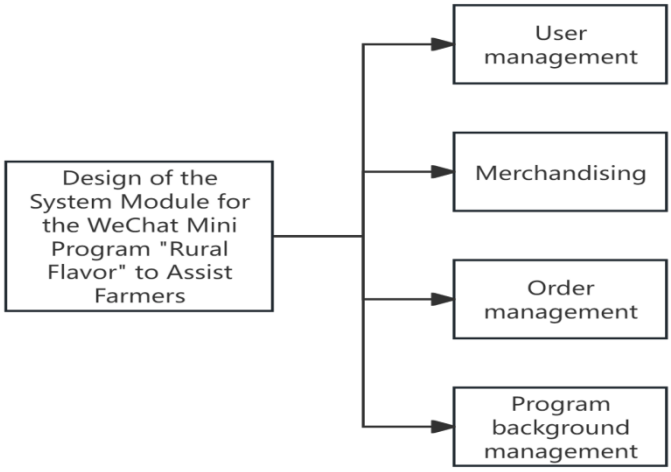

Figure 2: System module design and interface design.

4.2.2. User management module

This module provides basic information management services for platform users, and its main functions include user registration and login, personal information maintenance, delivery address management, password modification, account security settings, etc. The design of the user management module is shown in Figure 3.

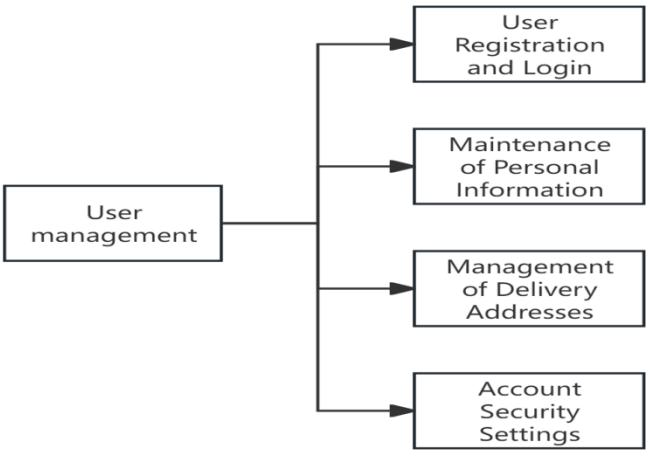

Figure 3: User Management Module.

4.2.3. Product display module

This module provides users with a clear and convenient browsing experience for agricultural products, and supports functions such as category viewing, popular recommendation, product detail display and product search. Product information is uploaded and managed by the merchant or farmer's background, and users can view detailed content such as pictures, prices, introductions, inventory, etc., and support

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the shopping cart function to facilitate users to manage products. The design of the product display module is illustrated in Figure 4.

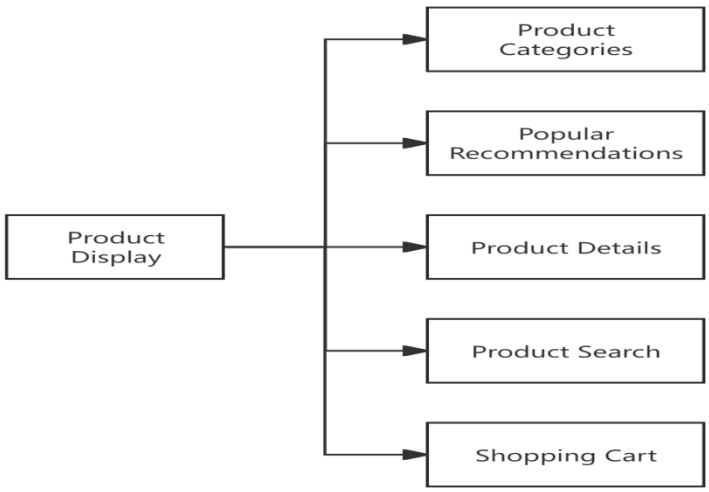

Figure 4: Product display module.

4.2.4. Order management module

This module is responsible for the management of the entire transaction process after the user places an order, including order creation, order status update, user order cancellation and order history query. Users can view and manage their order records in their personal account, and merchants can view new orders in real time and process shipments. The design of the order management module is shown in Figure 5.

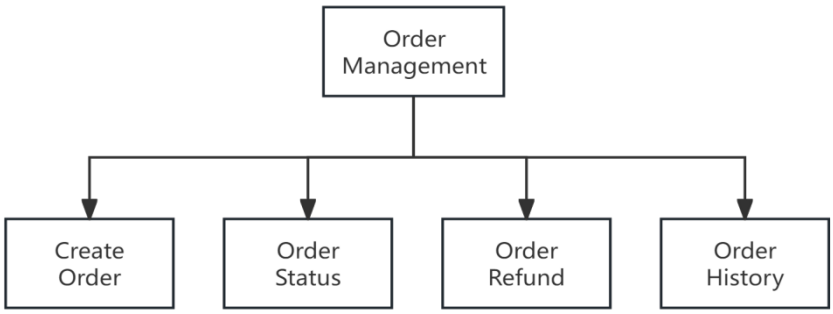

Figure 5: Order Management Module.

4.2.5. Background management module

Provide farmers and administrators with background management functions such as product listing, inventory management, order processing, and feedback viewing in user forums. The management interface is concise and clear, and supports permission hierarchy to ensure that the operation scope of different roles is reasonable and safe. The module also includes auxiliary processing functions such as notification push and system announcement. The design of the Background management module is shown in Figure 6.

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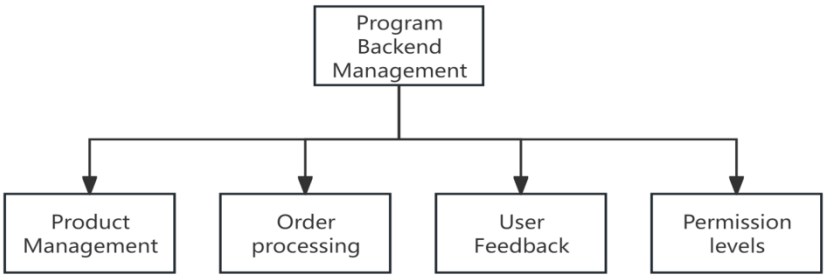

Figure 6: Background management module.

4.3. System interface design

The interface design of the "Rural Flavor Helping Farmers" WeChat Mini Program platform adheres to the principle of "concise and intuitive, clear functions, and user-friendly", and combines the interactive specifications of the WeChat Mini Program and the usage habits of the agricultural product e-commerce platform to build a complete interface system. The interface is mainly divided into the home page, product detail page, shopping cart page, order page, personal center page and background management page.

4.3.1. Home page

Feature layouts include a top carousel, navigation categories, and a search box. The design features a modular card-type layout, which is convenient for information browsing; The recommended content is dynamically updated based on user browsing history and hot sales rankings. In terms of user interaction, users can click on the product card to jump to the product detail page, and the search box supports quick keyword search.

4.3.2. Background management interface

It is intended for administrators and merchants, and its main functions include product management, order management, data statistics and information notification. Product management features include publishing, editing, and removing agricultural products from shelves. The order management feature supports order receiving, shipment processing, and refund review. Statistics include things like sales, visits, and inventory data. The Information Notification module is used to publish system announcements and view user feedback. The interface is adapted to mobile terminal operation, supports multi-role permission control, and has a clear layout and clear functions.

5. System function test

This paper proposes a "local flavor" agricultural e-commerce system based on WeChat applet, which uses WeChat applet, Vue, Springboot, and SpringMVC frameworksTomcat Embedded Server, MyBatis, HikariCP Data Source Connection Pool, MySQLand other technologies to complete the construction of the entire system. The system function test is shown in table 1:

Table 1: System function test.

Test content	Test function	Test results
User login and registration	It can log in after entering your account password	The test was successful
Modification of personal information, shipping address, account number, etc., using personal information as an example	It can modify the mobile phone number, user name, etc	The test was successful
Product Categories, Popular Categories, Product SearchTake product categories, for example	The different kinds of goods can be classified and displayed	The test was successful
Shopping cart	The items can be added to the	The test was successful

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	shopping cart and can be added, deleted and modified	
Product details	The detail page of the product is shown, and all products have their own unique product detail page	The test was successful
Order status, order inquiryTake, for example, the order status	The order can be displayed as paid or unpaid	The test was successful
Backend pages	It can modify the carousel map, announcement, and basic data on the backend administrator page	The above backend pages can be displayed on the frontend

6. Conclusions and prospects

6.1. Conclusion

By optimizing the user experience and strengthening the social communication function, the WeChat Mini Program has effectively improved the efficiency of agricultural product sales and the agricultural knowledge reserve of farmers. This model not only reduces the transaction cost of agricultural products, but also helps farmers accurately grasp the market demand through policy announcements and mutual aid forums, and reduces the impact of market "lag" and "blindness" to a limited extent.

6.2. Future research directions and prospects

It can optimize and expand in the following aspects: (1) further combine big data and blockchain technology to strengthen the traceability of agricultural products; (2) Improve the credit evaluation system and promote the evolution of agricultural assistance services in the direction of intelligence and ecology.

Acknowledgment

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