

Development and Implementation of a Community Convenience Service Platform Based on WeChat Mini Programs

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Abstract: With the advancement of digital community construction, residents' demand for convenient and diversified community services is growing day by day. WeChat Mini Programs have become a suitable carrier for building community convenience service platforms due to their advantages, such as no need for download and installation, a large user base, and low development costs. Currently, community services face problems such as scattered resources, delayed responses, and non-standardized service processes, making it difficult to meet residents' demands for efficient access to services. This paper combines the actual needs of community residents with the technical characteristics of WeChat Mini Programs, and explains the development process of the community convenience service platform from four aspects: demand analysis, system design, development implementation, and testing improvement. It clarifies the core functions and technical framework of the platform, providing practical references for improving the efficiency of community services and enhancing residents' quality of life experience.

Keywords: WeChat Mini Program; Community convenience service; Platform development; Digital community; User demand

Online publication: October 26, 2025

1. Introduction

Digital transformation is profoundly changing the model of community services. Traditional offline community services have many limitations and are difficult to meet the needs of modern residents for convenient and personalized services. As a lightweight application form, WeChat Mini Programs have a large number of potential users relying on the WeChat ecosystem. They can quickly connect community managers, service providers, and residents, realizing the online and intelligent transformation of community services. Developing a community convenience service platform based on WeChat Mini Programs can integrate government service resources, life service resources, and neighborhood interaction resources within the community, simplify service processes, shorten service response time, and thereby improve the accessibility and efficiency of community services. Based on community convenience service scenarios, this paper conducts a systematic exploration of the platform's development ideas and implementation paths, providing technical and practical support for the construction of digital community service platforms.

2. Platform development background and demand analysis

2.1. Development background

At present, community services are facing multi-dimensional challenges. In terms of service resources, resources such as government affairs handling, utility bill payment, housekeeping services, and neighborhood mutual assistance activities in the community are scattered across different channels. To access services, residents need to use multiple platforms or visit offline windows, resulting in a complicated and inefficient process. From the perspective of service response, traditional community services mostly rely on manual connection. After residents put forward service demands, the demands need to go through a multi-level transmission, leading to a long response cycle. As a result, some urgent demands cannot be handled in a timely and proper manner. In terms of user experience, some residents, such as the elderly group, find it difficult to operate complex APPs. In contrast, the simple operation feature of WeChat Mini Programs is more in line with the usage habits of residents of all age groups^[1].

2.2. Demand analysis

The core demands of the platform are clarified through surveys conducted among community residents, community managers, and service providers. Regarding residents' demands, it is necessary to realize online handling of government services, such as residence permit application, social security inquiry, and community notice checking; to conveniently access life services, such as housekeeping reservation, maintenance reporting, courier collection on behalf, and utility bill payment; and to have neighborhood interaction functions, such as neighborhood communication, idle item exchange, and community activity registration. From the perspective of community managers' demands, service management functions are required, such as releasing community announcements, reviewing service applications, and handling residents' feedback; data statistics functions are needed, such as visual viewing of data, including service usage frequency, distribution of residents' demands, and problem handling efficiency, to assist in management decision-making. From the perspective of service providers' demands, service display functions should be available, such as displaying various service items, specific prices, and detailed service scopes^[1].

3. Platform system design

3.1. Overall architecture design

The platform adopts a three-tier architecture of “frontend + backend + database” and integrates with the technical ecosystem of WeChat Mini Program to implement various functions. The frontend is developed based on the native framework of WeChat Mini Program, using technologies such as WXML, WXSS, and JavaScript to build user interfaces and interaction logic. This ensures a concise interface, smooth operation, and adaptation to mobile device screens of different sizes. The backend uses a lightweight development framework, responsible for core tasks such as processing frontend requests, conducting business logic operations, and performing data processing to guarantee the platform's response speed and stability. A relational database is selected to store data such as user information, service data, order records, and community announcements, thereby ensuring the security of data storage and the efficiency of data query^[2].

3.2. Functional module design

Based on demand analysis, the platform is divided into four core functional modules. Firstly, the User Center module includes functions such as login/registration, personal information management, order history inquiry, message notifications, and feedback suggestions. Users can quickly log in through WeChat authorization without additional account registration. Personal information management allows modification of basic information such as contact details and addresses, while order history enables users to view the status and details of past service orders. Secondly, the Government Service module features functions including community announcement display, government affairs handling guidelines, online applications, and progress inquiries. Community managers can publish announcements such as policy notices and

event previews, and residents can check handling procedures, submit application materials, and query processing progress online, thereby reducing the frequency of offline trips. Thirdly, the Life Service module covers functions such as service category display, online reservations, order payment, and service evaluation. Services are classified into housekeeping, maintenance, delivery, and other categories. Residents can select services based on their needs, fill in reservation details and complete payments online, and evaluate service quality after service completion. Fourthly, the Neighborhood Interaction module includes functions such as community forums, event registration, second-hand item exchange, and mutual assistance requests. Residents can post topics and participate in discussions in the community forum, as well as register for cultural and public welfare activities organized by the community^[3].

3.3. Database design

The database design strictly follows normalization principles to ensure a reasonable data structure, low data redundancy, and efficient data query. The following key data tables are mainly designed:

- (1) User Information Table: Stores fields such as user ID, WeChat openID, name, contact information, residential address, and user role.
- (2) Service Information Table: Stores fields such as service ID, service name, service type, service price, service description, and service provider ID.
- (3) Order Table: Records fields such as order ID, user ID, service ID, order status, reservation time, payment amount, and actual completion time.
- (4) Community Announcement Table: Mainly stores fields such as announcement ID, title, content, release time, publisher ID, and whether the announcement is pinned.
- (5) Feedback Table: Saves fields such as feedback ID, user ID, feedback content, submission time, processing status, and final result.

Each data table is associated through primary keys and foreign keys to achieve data consistency and integrity. Indexes are set to improve query efficiency, ensuring the platform maintains stable operation as data volume grows (**Table 1**).

Table 1. Table of core content in platform system design

Design Dimension	Core Content
Overall Architecture Design	<ol style="list-style-type: none"> 1. Three-tier architecture of “frontend + backend + database” integrated with WeChat Mini Program; 2. Frontend: Mini Program native framework, adapting to multiple devices; 3. Backend: Lightweight framework for request processing and business logic; 4. Database: Relational database for storing user/service/order data; 5. Integration of WeChat Pay and authorized login to optimize user experience
Functional Module Design	<ol style="list-style-type: none"> 1. User Center: WeChat login, information management, order inquiry, feedback; 2. Government Service: Announcements, handling guidelines, online applications, progress inquiry; 3. Life Service: Classification, reservation, payment, evaluation; 4. Neighborhood Interaction: Forum, event registration, second-hand exchange, mutual assistance
Database Design	<ol style="list-style-type: none"> 1. Key tables: User/Service/Order/Announcement/Feedback Tables; 2. Primary/foreign key association to ensure data consistency; 3. Index setting to improve efficiency and maintain stability with data growth

4. Platform development and implementation

4.1. Frontend development and implementation

Frontend development relies on WeChat Developer Tools, utilizing the native framework of WeChat Mini Program combined with the concept of component-based development to improve development efficiency and code reusability. The interface design

is concise and practical, with the homepage navigating through tabBar, covering four key entrances: Home, Services, Interaction, and Mine, facilitating users to quickly switch between various functional modules. The homepage displays community announcements, popular services, activity recommendations, etc., adopting a card-style layout to make information hierarchy clear; the service page shows service lists by category, supporting keyword search and filtering operations, and clicking on service cards can enter the detail page to view service introductions and reservation processes; the interaction page includes forum topics and activity lists, where users can browse by sliding and participate in interactions; the Mine page displays entrances for personal information, orders, messages, etc., with simple and convenient operation paths. In terms of interaction design, effects such as pull-down refresh, pull-up load more, pop-up prompts, and page jump transition animations are implemented to enhance the user's operation experience. Meanwhile, for important operations such as form submission and payment, confirmation prompts and loading status feedback are added to prevent users from making incorrect operations.

4.2. Backend development and implementation

The backend selects a lightweight framework suitable for Mini Program development, providing interface services in accordance with RESTful API design principles to achieve data interaction between the frontend and backend. In terms of business logic processing, corresponding processing logic is written for each different functional module. For example, the order processing logic includes order creation, status update, payment callback processing, etc., to ensure the smooth progress of the order process; the user authentication logic obtains user information through the WeChat authorized login interface, and combines the token mechanism to achieve user identity verification and permission control, thereby ensuring the security of platform data. Interface development is carried out in accordance with a unified format, including request parameter specifications, returned data specifications, error code specifications, etc., which can facilitate frontend calls and problem troubleshooting^[4].

4.3. Database implementation

The database is built based on a relational database management system. Data tables are created according to the previously designed data table structure, and attributes such as field types, lengths, and constraints are set to ensure that data storage meets business requirements. To improve data security, sensitive data such as user contact information and payment information are encrypted for storage to prevent data leakage; a database backup strategy is formulated to automatically back up data regularly, avoiding data loss due to system failures. In the field of database optimization, indexes are created for fields involved in high-frequency queries, such as service types and order statuses, to improve query speed; pagination query methods are used to process the display of large amounts of data, thereby reducing data transmission volume and enhancing platform response performance.

5. Platform testing and optimization

5.1. Platform testing

Platform testing conducts four dimensions of testing: functional testing, performance testing, compatibility testing, and user experience testing, to ensure the stable operation and complete functionality of the platform. Functional testing uses the black-box testing method to verify whether the functions of each module meet the requirement design one by one. For example, testing the announcement release and viewing functions of the government service module, and detecting the order submission and payment processes of the life service module to check for missing functions or logical errors; performance testing tests the platform's response time, concurrent processing capability, and data query speed by simulating scenarios such as multi-user simultaneous access and high-frequency operations, thereby ensuring the platform remains stable as the number of users grows; compatibility testing tests the platform's operation on mobile devices of different brands and system versions, checking whether the interface display and functional operations are normal, so that the platform adapts to different device screen sizes; user experience testing invites community residents to actually use the platform, collects users' feedback on interface design, operation processes, and functional practicality, and identifies and solves inconveniences during use.

5.2. Optimization and improvement

Based on test results and user feedback, the platform is optimized in multiple dimensions. In terms of performance optimization, frontend code and image resources are compressed to shorten page loading time; the logic of backend interfaces is optimized, and data processing processes are simplified to improve interface response speed; database query statements are optimized, redundant query content is removed, and data query efficiency is improved. In terms of functional optimization, according to user feedback, quick access channels for commonly used functions are added, such as placing high-frequency functions like living expenses payment and courier query on the homepage; the message notification mechanism is improved, and push reminder functions for order status changes and announcement releases are added to ensure users can obtain relevant information promptly; the service evaluation system is optimized, and more options for evaluation tags are added to provide reference convenience for other users. In optimizing user experience, adjustments are made to the interface colors and font sizes to enhance visual comfort; the number of filling items in forms is simplified to reduce user input actions; for elderly users, operation guide prompts are added to reduce the difficulty of use.

6. Conclusion

The development of a community convenience service platform based on WeChat Mini Program effectively solves the problems of scattered traditional community service resources and delayed responses. By integrating various service resources, streamlining service processes, and improving user experience, it provides convenient and efficient community services for community residents. The development and implementation process of the platform starts with demand analysis, followed by system design, and then development and testing, fully combining the technical characteristics of WeChat Mini Program with the actual needs of community services to ensure the platform's complete functions and stable operation. In the future, with the continuous and in-depth development of digital technology, the platform can further expand intelligent and diversified functions, continuously improve the overall quality of community services, provide strong support for the construction of digital communities, and thus help achieve the modernization of community governance and the improvement of residents' quality of life.

Disclosure statement

The author declares no conflict of interest.

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