

From Street Stalls to Digital Sales: The Development of AnyStall Mobile App

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ARTICLE INFO

Article history:

Received: 20 December 2025
Revised: 10 January 2026
Accepted: 3 February 2026
Online first
Published: 10 April 2026

Keywords:

Side income
Rental space
Ecommerce
Share stall
Find stall

<https://doi.org/10.24191/a1b85413>

ABSTRACT

The COVID-19 pandemic significantly disrupted Malaysia's economy, leading to higher unemployment, income instability, and increased dependence on informal employment. Vulnerable populations, including single mothers, retirees, and individuals in the B40 income group, face persistent challenges in achieving financial independence due to limited access to stable and flexible income opportunities. This project presents the development of AnyStall, a mobile application aimed at empowering low-income communities by enabling side income generation through online selling and shared rental spaces. The application integrates core functionalities inspired by existing digital marketplace and delivery platforms, allowing users to register as sellers, participate in shared stalls, and market products via an online marketplace. Buyers can browse products from local sellers, place and track orders, while registered riders facilitate product delivery between sellers and buyers. An admin panel supports seller verification to enhance platform trust and security. AnyStall is developed using Flutter for cross-platform mobile deployment and Firebase for backend services, including authentication, real-time data management, and cloud storage. The proposed system consolidates space-sharing, e-commerce, and delivery services into a single digital platform. The project demonstrates the potential of mobile technology to promote micro-entrepreneurship, improve income accessibility, and support financial resilience among vulnerable communities in Malaysia, contributing to sustainable economic participation and improved work-life balance.

INTRODUCTION

The COVID-19 pandemic has profoundly reshaped labour markets worldwide, accelerating unemployment, income insecurity, and reliance on informal work, particularly in developing economies. In Malaysia, vulnerable populations such as single mothers (Jusoh & Latada, 2021), older adults, and individuals from the B40 income group have been disproportionately affected,

facing persistent barriers to stable employment and limited access to flexible income-generating opportunities. Although economic recovery has begun, structural challenges including caregiving responsibilities (Zakaria, Manaf, & Zain, 2022), age-related employment constraints, and insufficient digital access continue to restrict participation in formal labour markets.

In response to these constraints, informal economic activities such as micro-entrepreneurship, street vending, online selling, and gig-based delivery work have become essential livelihood strategies (Ghorpade, Fanning, & Yadav, 2024). These forms of work offer flexibility and low entry barriers, making them especially attractive to individuals who must balance income generation with caregiving or health-related responsibilities. However, participation in the informal sector is often fragmented and inefficient due to limited access to affordable selling spaces (Kaur, 2025), lack of integrated digital platforms, weak market visibility, and logistical constraints. As a result, many low-income individuals struggle to sustain their income-generating activities despite strong motivation and entrepreneurial potential.

This study addresses this gap through the design and development of AnyStall, a mobile application aimed at supporting low-income individuals in Malaysia by facilitating flexible income generation. The platform integrates three core components: (i) shared and affordable physical retail spaces, (ii) an online marketplace for micro-sellers, and (iii) a rider module that enables flexible, on-demand delivery services. By consolidating these functions into a single mobile system, the platform seeks to lower entry barriers to micro-entrepreneurship, improve market access, and enhance work–life balance for users.

The primary objectives of this research are to (1) identify key functional and design requirements for a mobile platform that supports flexible, informal income generation, and (2) develop and evaluate a system architecture that connects sellers, buyers, and delivery riders within an integrated digital ecosystem.

LITERATURE REVIEW

Evolution of FoodStall to E-commerce

Street food and informal food vending have long played a crucial role in urban economies by providing affordable meals and livelihood opportunities, particularly for lower-income and migrant populations. Historical evidence from ancient Roman, Greek, and Chinese cities shows that decentralised food provision systems emerged as responses to limited domestic cooking facilities, time constraints, and dense urban living (Dustin, 2024). These early practices established enduring characteristics of informal food economies, including low entry barriers, spatial flexibility, and close producer–consumer interaction, which continue to define street food operations across cultures.

During the industrialisation of the 18th and 19th centuries, rapid urban migration and extended working hours intensified reliance on street vendors. Informal food stalls and mobile vendors became essential components of daily life in cities across Europe, North America, and Southeast Asia, including colonial Malaya and Singapore, where migrant communities shaped enduring hawker traditions (Seng, 2019). In the 20th century, increasing regulation and urban planning

transformed many informal vendors into structured systems such as hawker centres, balancing food safety, economic sustainability, and cultural preservation (Yong, 2020).

In the early 21st century, digitalisation and platform-based economies have fundamentally reshaped informal food and micro-retail sectors. Social media, e-commerce platforms, and mobile applications enable vendors to reach wider audiences, adopt cashless payments, and participate in delivery ecosystems. At the same time, shared-use models such as co-kitchens and shared stalls have emerged to reduce operational costs (Hoong, 2022) and encourage collaboration among small entrepreneurs.

Review of Existing Digital Marketplaces and Space Sharing Platform

Current digital platforms demonstrate distinct strengths but also notable functional limitations when evaluated from the perspective of micro-entrepreneurs. Classified marketplaces such as Mudah.my and Carousell emphasise peer-to-peer listings and low entry barriers, making them accessible to individuals and small sellers. These platforms offer broad reach and user-friendly interfaces, they often lack integrated payment systems, structured trust mechanisms, and spatial visibility features, increasing transaction risk and operational friction.

Conversely, Grab Mart represents a logistics-driven e-commerce model that prioritises convenience, delivery tracking, and ecosystem integration (Peralta et al., 2021). While effective for consumer retail, its seller-side limitations such as restricted communication and pricing control reduce its suitability for collaborative or shared-space business models.

Platforms such as Storefront address short-term space rental by enabling pop-up retail and event-based usage (Storefront, n.d.). Although these systems provide robust spatial discovery and booking mechanisms, they typically lack embedded e-commerce functions, limiting income generation and customer relationship management. This gap suggests a need for a unified digital system that integrates space sharing, e-commerce, and communication within a single platform.

Table 1: Comparison of Existing Systems with the Proposed System (Space Booking)

Feature	Mudah.my	Carousell	Grab Mart	Storefront	AnyStall (Proposed system)
Location	□	□	□	□	□
List Store	□	□	□	□	□
Join store	□	□	□	□	□
Approve or Reject	□	□	□	√	√

Observation from Malaysia further indicate that many small businesses still rely on informal social media channels to coordinate space sharing, resulting in inefficiencies, trust issues, and poor discoverability. This gap suggests a need for a unified digital system that integrates space sharing, e-commerce, and communication within a single platform.

Technology Stack Consideration for Marketplace Platforms

Mobile Cross-platform development frameworks such as Flutter, React Native, and .NET MAUI have been widely adopted to reduce development cost while maintaining near-native performance. Flutter's widget-based architecture and unified rendering engine enable consistent UI experiences and rapid iteration, making it suitable for visually intensive marketplace applications (Kaushik, 2023).

From a data management perspective, NoSQL databases such as Firebase and MongoDB are frequently selected for marketplace systems due to their schema flexibility, scalability, and real-time capabilities (Gillis & Botelho, 2023). Firebase supports rapid prototyping and synchronised updates, which are critical for features such as live chat, order tracking, and availability updates.

The payment system integrates the trusted platform Stripe to handle financial transactions securely. When a user proceeds to payment, the application sends the payment amount and currency to a secure backend server to create a Payment Intent, which generates a clientSecret required to complete the transaction. The app then uses this clientSecret to launch Stripe's native Payment Sheet, allowing users to enter card details within Stripe's PCI-compliant environment. This ensures that sensitive payment data is encrypted and processed directly by Stripe rather than the application, maintaining payment confidentiality and data integrity (Stripe, 2025).

In summary, the successful development of the AnyStall mobile application depends on technology selection and analysis of existing platforms. Android Studio, Flutter, and Firebase were chosen to ensure efficient development, real-time interactivity, and scalability with Android-based mobile ecosystem. While current platforms offer either basic e-commerce or space rental services, none provide an integrated solution tailored to vulnerable groups. These limitations directly informed the design of AnyStall, which unifies space sharing, stall booking, online product sales, and real-time communication into a single inclusive platform.

METHODOLOGY

This study adopts the Waterfall model as the primary research and development methodology for the proposed AnyStall Android application. Each phase is completed before advancing to the next, ensuring systematic planning and documentation throughout the development process (Kirvan, Lutkevich, & Lewis, 2024).

Requirement Gathering and Analysis

The requirements analysis phase represents the foundational stage of the Waterfall model and is critical to ensuring that the proposed AnyStall system addresses real user needs. This phase involved systematically identifying and analyzing the socio-economic challenges faced by low-income individuals, particularly the B40 group, in accessing affordable selling spaces, attracting customers, and engaging with digital platforms.

The process was conducted over a period of approximately three months. Insights were derived from market research, academic literature, news reports, and a comparative review of existing e-commerce and space-sharing platforms. Based on these findings, functional requirements were

defined for key stakeholders, including sellers, buyers, and administrators. However, the process was challenging due to the limited number of applications that combine stall-sharing and e-commerce features for comparison. To manage the project timeline and ensure that each development phase was completed systematically, a Gantt chart was used to organize throughout the eight-month period. Figma was utilized to design the system prototype and provide an roughly idea of the application interface, while Draw.io was used to develop system diagrams such as use case diagrams to illustrate the interactions between sellers, buyers, and administrators within the proposed system. Collectively, this phase established a clear and justified set of requirements to guide subsequent system design and development.

Design

After completing the requirements analysis, the design phase of the Waterfall model focuses on translating system requirements into a structured blueprint for development. This phase defines the system architecture, user interface layout, and application workflow to ensure efficient development. For the proposed system, use case diagrams and flowcharts were created to illustrate system functionalities and user interactions.

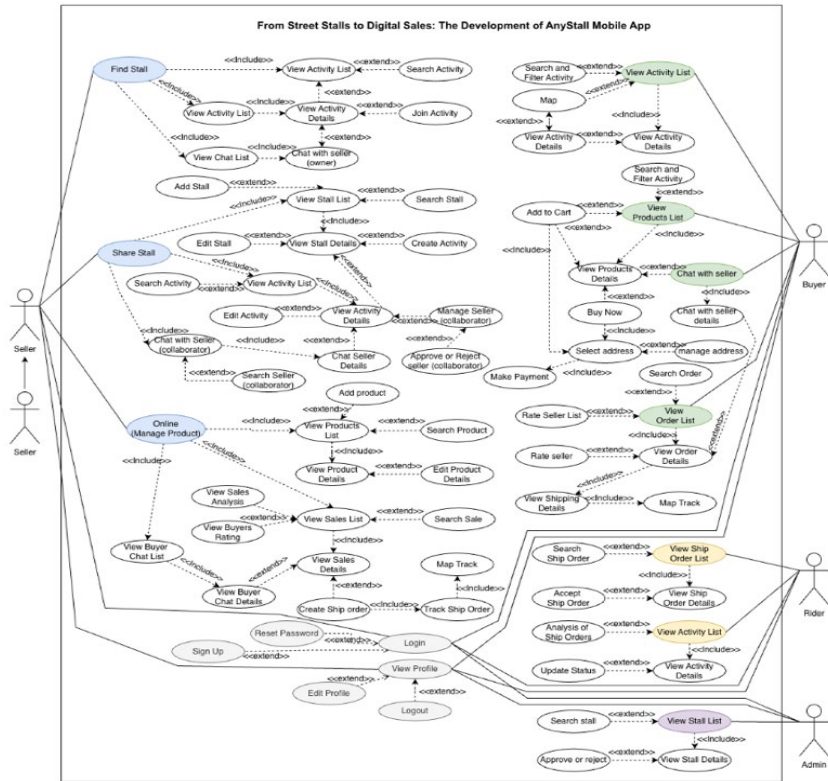


Figure 1: Use Case Diagram

The process of designing the system typically takes one month. The use case diagram of the AnyStall mobile application provides a high-level visual representation of system functionality and user interactions, serving as an essential tool for clarifying requirements and supporting system design. The figure1 illustrates four primary actors: sellers, buyers, riders, and

administrators, and their respective roles within the platform's integrated digital marketplace. Sellers manage stalls and products, collaborate with other sellers, and monitor sales performance, thereby bridging traditional street vending with digital commerce. Buyers interact with the system by searching stalls, purchasing products, communicating with sellers, and tracking orders, ensuring a convenient and transparent shopping experience. Riders support logistical operations through order acceptance, shipment tracking, and delivery updates, while administrators oversee platform integrity by verifying stalls and managing system data.

Development

The implementation phase of the Waterfall model focuses on translating the system design into a fully functional AnyStall mobile application through coding and development. The development work was primarily carried out by the project developer, who implemented the system features and integrated the application modules. Meanwhile, the lecturer supervise, providing guidance, reviewing the progress, and giving feedback to improve the system throughout the development process. This phase employs Flutter within Android Studio for front-end development and Firebase as the back-end service, leveraging features such as authentication, real-time database, cloud storage, and scalable hosting (Hanna & Rosencrance, 2023). Core system functionalities were implemented using CRUD operations to support user interactions across different roles, including sellers, buyers, riders, and administrators. Application modules such as product listings, profile management, shared stall allocation, and order tracking were developed using Flutter widgets and integrated with Firebase Firestore to enable real-time data synchronization. Overall, this phase operationalises the system's design while supporting the project's objective of providing an accessible, scalable, and digitally inclusive platform for communities in Malaysia. The development phase took approximately four months to complete.

Testing

The testing phase of the Waterfall model is conducted after system implementation to verify that the AnyStall mobile application functions correctly and meets all specified requirements. This phase involves both functional and non-functional testing to ensure system reliability, usability, and security prior to deployment. Functional testing focuses on validating core features such as user registration, login, role-based access control, and password recovery to ensure only authorized users can access appropriate system functions (Shah, 2019). Non-functional testing, particularly security testing, evaluates system robustness by accessing data protection measures, including encryption and secure handling of sensitive user information within Firebase services. The testing phase was conducted after development and before the final deployment of the application. It involved the developer and the supervising lecturer. The developer performed system testing, while the lecturer reviewed the results and provided feedback. A test case checklist was used to verify core functions such as login, product management, and order tracking. Minor issues like incorrect data display were identified and fixed by debugging the code, adjusting Firebase database rules, and updating Flutter functions for proper data synchronization.

Deployment

In the deployment phase, the development of the proposed project will be finalized, and the application will be prepared for release to end users. Comprehensive documentation will be

provided to ensure a seamless adoption process. Additionally, feedback will be gathered from users to assess their experiences, identify any issues encountered, and pinpoint areas for future improvement or potential new features for the project. In the deployment phase, the AnyStall mobile application is finalized, compiled into an APK file using Flutter in Android Studio (Flutter, n.d.), deployed with Firebase back-end services, and installed on Android devices for users to access the system and begin using its features.

Maintenance

In the Waterfall model, the maintenance phase is the final stage of the development process. After the system is deployed and in use, this phase ensures that it continues to work properly. It involves fixing any issues that appear, making updates, and improving the system based on user feedback. Maintenance helps keep the system up-to-date, secure, and efficient over time.

RESULT

A System Overview

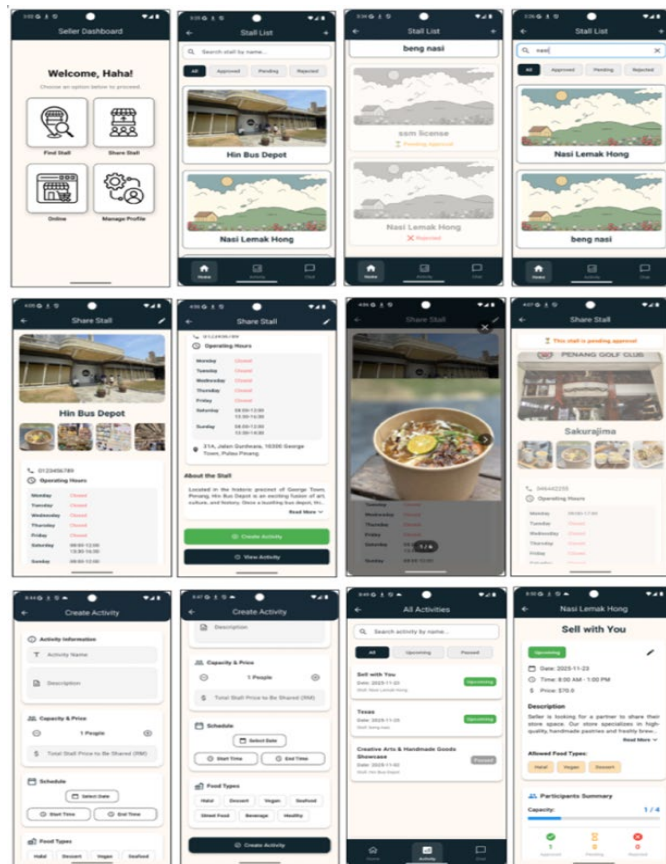


Figure 2: Share Stalls Page of Seller

The Seller Home Page functions as the central dashboard for sellers, providing authenticated access to the platform's four core operational modules: Share Stall (hosting collaborative activities), Find Stall (joining activities hosted by others), Online (e-commerce product sales), and Manage Profile. From this dashboard, sellers can manage their business activities through a structured and intuitive interface. Within the Share Stall module which shown in Figure 2, sellers can register and manage stalls, view stall approval statuses, and organise collaborative activities. The system supports comprehensive stall registration through detailed forms capturing operating hours, images, and mandatory legal documentation, including encrypted SSM licence uploads to ensure security and regulatory compliance. A structured submission and approval workflow ensures that only verified stalls are activated, preserving platform integrity and trust.

Once a stall is approved, sellers gain access to advanced activity management features through the Stall Details and Activity Management pages. Sellers can create, schedule, and configure collaborative activities by defining capacity, pricing, timing, and food categories, with all records securely stored in Firestore. The platform provides full lifecycle management of activities, including viewing activity histories, editing event details, and monitoring participant applications through real-time status tracking and capacity indicators. Hosts can approve or reject applicants, document decisions, and manage participant lists efficiently.

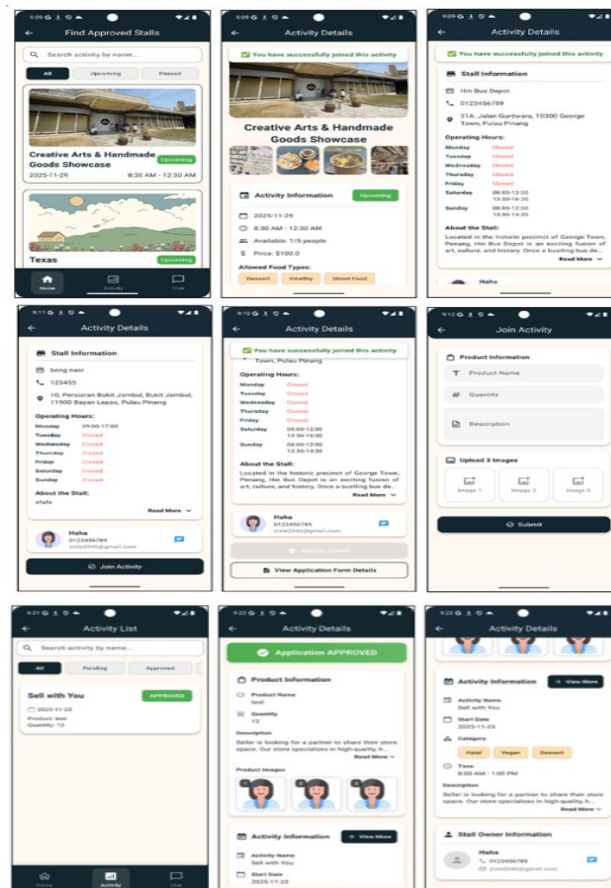


Figure 3: Find Stalls for Seller

The Find Stall module provides sellers with a structured and efficient workflow for discovering, applying to, and managing participation in collaborative stall activities hosted by other sellers. The Find Stall Home Page as shown in figure 3, presents a curated list of ongoing and upcoming activities from approved stalls, excluding the current user's own listings, and supports intuitive discovery through search and status-based filters. Sellers can review detailed activity and host stall information on the Join Activity Details Page, communicate directly with hosts, and submit participation requests via a validated application form that captures product details and images. The system tracks applications in real time, offering an Application History view with clear status indicators and filtering options, while the Activity Details Page consolidates submitted product information, activity context, and host contact details.

Functional Testing

Table 2: AnyStall Functional Testing Summary

Test Case	Expected Outcome	Result
Duplicate User Registration	System prevents registration with an existing email	Pass
Password Strength Validation	Weak passwords are rejected with validation feedback	Pass
Role-Based Access Control	Users can only access features permitted by their role	Pass
File Upload and Conversion	The files are validated, converted and then stored in Firebase.	Pass
Unsupported File Type Upload	System rejects unsupported formats with clear messages	Pass
Error Handling and Notifications	System displays meaningful error messages for failures	Pass
User data is protected and accessible only to authorised users	User data is protected and accessible only to authorised users	Pass

Non-Functional Testing

The application implements strong encryption mechanisms to protect sensitive documents uploaded during seller and rider registration, ensuring confidentiality, integrity, and compliance with data protection best practices. For seller stall registration, the SSM license image is encrypted on the client side before storage by converting the image into raw bytes and applying AES-256 encryption in CBC mode with PKCS7 padding using a securely generated 32-byte key (Insights, 2023). A unique 16-byte initialization vector (IV) is generated for each encryption operation to prevent pattern-based attacks (Awati, 2025), and the IV is prepended to the encrypted data before uploading it to Firebase Storage as a generic binary file. A similar end-to-end encryption workflow is enforced for rider registration, where sensitive documents such as the driving license and personal face photo are first compressed into byte streams and then encrypted using the same AES-256 mechanism prior to upload. This consistent encryption strategy across seller and rider workflows ensures that confidential business and personal identification data remains protected throughout the registration process, reinforcing user trust and adherence to secure data handling standards.

CONCLUSION

In conclusion, the AnyStall application integrates digital technology with social impact by providing a hybrid platform that combines e-commerce and physical stall management to support low-income communities. The system's success was verified through system testing conducted by the developer and reviewed by the supervising lecturer, confirming that core functions work

correctly after debugging and improvements. A viva session was conducted to ensure that the overall workflow and functionality of the application operated correctly. Developed using Flutter, Android Studio, and Firebase, the platform provides a scalable, user-friendly, and real-time system for sellers, buyers, riders, and administrators. Unlike typical e-commerce platforms that focus only on online selling, AnyStall introduces collaborative selling, stall space sharing, and integrated communication features to help small entrepreneurs who lack affordable selling spaces and digital tools. Overall, the project shows how mobile technology can support sustainable entrepreneurship and improve economic opportunities for small businesses in Malaysia.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisor, Ms. Nor Hanina, for her invaluable guidance, constructive feedback, and continuous support throughout the development of this project. I appreciate all individuals who contributed directly or indirectly through research participation, testing, and feedback, as their input significantly enhanced the quality of the system.

Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

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