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Bubur Bakar and *Oden* Ordering Application

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Abstract

The traditional ordering process at the *Bubur Bakar* and *Oden* stall located at the Kolej Kediaman Pelajar UTHM cafeteria relies heavily on manual methods and WhatsApp-based communication. These approaches often result in long queues, slow service, order inaccuracies, and inefficiencies, especially during peak hours. This project aims to overcome these issues by developing a mobile application that digitalizes the entire food ordering process. The objectives of the project are to identify the limitations of the existing ordering system, to develop a mobile application that allows customers to browse the menu and place orders conveniently with self-pickup and delivery options, and to test the application in terms of functionality, accuracy, and user- friendliness. The application is designed for students, staff, and the public, providing features such as menu browsing, order placement, menu availability updates, and order status tracking. The expected outcome of this project is a user-friendly and reliable mobile application that improves customer satisfaction, reduces waiting time, minimizes ordering errors, and enhances operational efficiency for stall operators. Overall, the project demonstrates the effectiveness of implementing a digital ordering platform to support modern and efficient food service operations within the Bandar Universiti Pagoh, residential area.

1. Introduction

The rapid growth of mobile and digital technologies has significantly changed the way services are delivered across many industries, including the food and beverage sector. Mobile applications are widely used to improve service efficiency, accuracy, and customer satisfaction by providing faster and more organized ordering processes [1]. In environments such as university campuses and residential colleges, where students and staff often have high demand for food services, efficient ordering systems are needed to support daily operations [2]. Traditional food ordering methods may no longer be sufficient to handle increasing demand, particularly during peak hours such as lunch and dinner [3]. As a result, mobile-based ordering solutions have become a practical approach to improving food service management and enhancing the overall user experience [4], [5].

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1.1 Problem Statement

The *Bubur Bakar* and *Oden* stall at Kolej Kediaman Pelajar UTHM currently relies on manual ordering methods, including walk-in orders where customers write their orders on paper or place the orders through a community WhatsApp group. Although these methods are simple and familiar, they cause several limitations. Common issues include long queues at the stall, delayed order processing, miscommunication between customers and stall operators, and frequent order mistakes such as missing items and incorrect food preparation. These problems are especially recognizable during peak hours, such as dinner times, when the number of orders increases significantly. Furthermore, WhatsApp-based ordering lacks a structured format, making it difficult for stall operators to manage multiple orders efficiently. Such unstructured consumer-to-business interactions and unstandardized information exchanges frequently lead to misinterpretation and heighten customer dissatisfaction [6]. There is also no proper system to track order status or update menu availability in real time. This can lead to dissatisfaction. To address these challenges, this project proposes the development of a mobile application that digitalizes the entire ordering process for consumers in the Bandar Universiti Pagoh area. The application allows customers to view an updated menu, place orders easily, and choose between self-pickup or delivery options, while enabling stall operators to manage orders more systematically.

1.2 Objectives

The project was guided by the following key objectives:

i. To identify the limitations and challenges of the current manual and WhatsApp-based ordering methods used by the *Bubur Bakar* and *Oden* stall.
ii. To develop a mobile application that enables purchases, allowing customers to browse the menu and place orders conveniently, with support for both self-pickup and delivery options.
iii. To test the functionality, accuracy, and user-friendliness of the developed mobile application to ensure an efficient and reliable ordering process.

1.3 Project Scope

The scope of this project is limited to the development of an Android-based mobile application designed specifically for the *Bubur Bakar* and *Oden* stall at Kolej Kediaman Pelajar UTHM, Johor. The target users include students, university staff, and members of the general public around Bandar Universiti Pagoh who purchase food from the stall. The application provides core features such as menu browsing, real-time menu availability updates by stall operators, order placement, customer information entry, selection of self-pickup or delivery services, and order status tracking. The worker interface allows stall operators to manage orders and update menu items efficiently.

1.4 Project Significance

This project is significant, as it addresses real operational problems faced by a small food stall within a university residential area. For customers, the mobile application improves convenience by allowing them to place orders anytime without having to queue physically at the stall. It also reduces semantic errors caused by miscommunication and provides a more organized ordering experience [7].

2. Methodology

To ensure a structured and systematic development process, the Waterfall methodology is applied in this project [2]. The Waterfall methodology is a sequential software development model in which each phase must be completed before proceeding to the next. This methodology is suitable for this project with clearly defined requirements and scope, such as the proposed mobile ordering application. By following this approach, the development process can be planned, managed, and controlled effectively, reducing risks related to design errors and incomplete implementation. In this project, the Waterfall methodology consists of several phases including requirement analysis, system design, implementation, testing, and maintenance. Each phase plays an important role in ensuring that the final application is functional, user-friendly, and aligned with the needs of both users and stall operators. The phases of the Waterfall methodology adopted in this project are illustrated in Fig. 1.

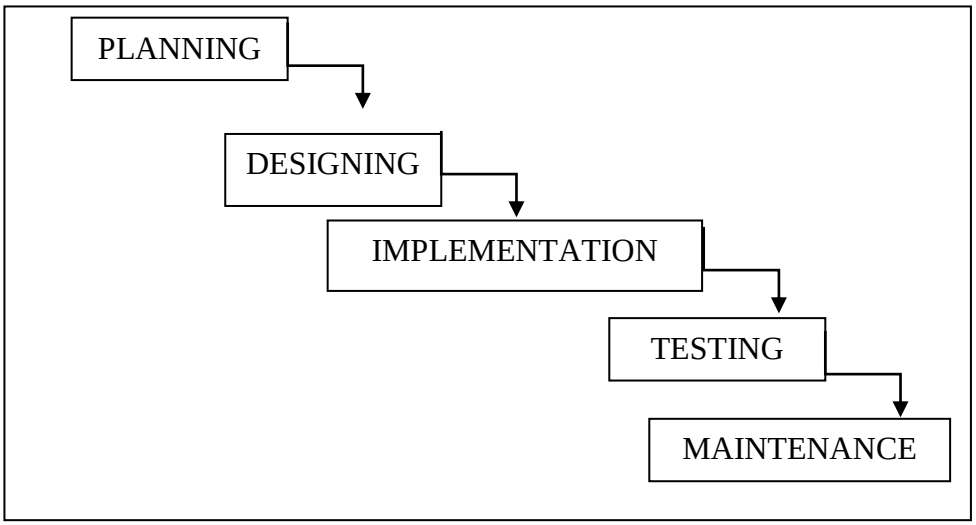

Fig. 1 *Waterfall methodology phases*

2.1 Planning

The planning phase is the initial stage of the Waterfall methodology, focusing on a preliminary investigation of the operational challenges faced by the *Bubur Bakar* and *Oden* stall. During this phase, the project's scope and objectives were defined to target students, university staff, and residents within the Bandar Universiti Pagoh area. A feasibility study was conducted to establish hardware and software requirements, such as the use of Android Studio, and a project timeline was created to allocate sufficient time for the development lifecycle. Furthermore, this phase identified specific user requirements by analyzing the inefficiencies of the existing manual and WhatsApp-based ordering methods. Currently, paper-based walk-in orders and WhatsApp chats frequently result in order inaccuracies, prolonged waiting times, and ambiguous order statuses. Both customers and stall operators experience significant friction; customers must navigate lengthy chat threads to track orders or endure physical queues during peak dinner hours, while operators waste valuable time manually scrolling through messages to locate orders, verify payments, and provide updates. To address the demand for a faster, more accurate, and transparent system, the proposed mobile application digitalizes the entire ordering workflow. The application is accessible to all customers, offering universal self-pickup options alongside location-specific delivery services.

2.1.1 Analysis of Current Limitations

To identify the limitations of the existing manual and WhatsApp-based ordering methods, a preliminary study was conducted involving observation and a brief survey of 30 regular customers and 2 stall operators during peak dinner hours at Kolej Kediaman Pelajar UTHM.

Table 1 *Analysis of current limitations*

Evaluation Metric	Manual/ WhatsApp Method Data	Operational Impact
Average Waiting/Queue Time	15 to 25 minutes per customer.	High customer frustration; lost sales from walkaways.
Order Inaccuracy Rate	12% of orders contained errors (missing items and wrong spice levels)	Food wastage, operator stress and delayed service.
Menu Visibility	85% of surveyed customers unknowingly ordered out-of-stock items.	Time wasted verifying availability via WhatsApp text.
Operator Management Time	~3-5 minutes spent per order scrolling chats to verify payment receipts.	Severe workflow disruption for food preparation staff.

The findings presented in Table 1 highlight several operational bottlenecks, including long waiting times, order inaccuracies, limited menu visibility, and time-consuming order management for stall operators.

2.2 Designing

The system design phase involves planning the structure and functionality of the proposed mobile application. The application is designed to replace the existing WhatsApp-based and paper-based ordering methods, which are inefficient and lead to errors. The system flow is designed to be simple and user-friendly. Users can log in using their username and password or register by entering their phone number, username, and password. After logging in, users can view available and unavailable menu items, where unavailable items are clearly labelled and cannot be ordered. Users can add items to the cart or place orders directly from the menu. During the checkout process, users can add remarks for special requests for their order. Users can then choose between self-pickup or delivery options and select a delivery location from a predefined list (Kolej Kediaman Pagoh, Kolej Kediaman UIA Pagoh, Harmoni Vista, Pagoh Jaya). Payment is completed by scanning a QR code given and uploading proof of payment. Implementing automated Self-Service Technologies (SSTs) and mobile payment gateways has been shown to significantly enhance system service quality and operational speed [8]. Once the order is confirmed, the system generates an invoice containing order details and allows users to track order status. In this phase, user interface designs are created to visualise the appearance of the application. The database structure is also planned, along with colour themes, buttons, and system features.

2.3 Implementation

The implementation phase involves the actual development of the mobile application based on the design specifications created in the previous phase. During this phase, we started doing coding to develop all system functions and features according to the planned workflow. The mobile application is developed using Android Studio, which is selected as the main development tool for implementing both the user interface design and application functionality. Android Studio is used to design application layouts, manage user interactions, and implement system logic to ensure a smooth and responsive user experience. The application is connected to a database to enable data storage and recovery for users, orders, menu items, and payment records. Database security is achieved by applying appropriate access control and firewall mechanisms to protect stored data from unauthorized access. This ensures that user information and transaction records are securely managed. All buttons, features, and system components are implemented and integrated to ensure proper functionality. This includes user authentication, menu display, order placement, payment proof submission, order status updates, and notification delivery. At the end of this phase, the application is expected to be fully functional and ready to proceed to the testing phase.

2.4 Testing

The testing phase is conducted to verify the accuracy, stability, and reliability of the *Bubur Bakar* and *Oden* Ordering Mobile Application. Functional testing is performed on all core modules, including user authentication, menu management, cart, order processing, payment proof upload, and order tracking, to ensure each function produces the expected output. Integration testing is executed to ensure accurate communication between the mobile application and the database. This ensures that all data operations, such as storing, updating, and retrieving user, order, and menu data, are executed correctly. Basic usability testing is also performed with several users to identify interface and interaction issues [1]. All detected defects are corrected to ensure the system is stable and ready for deployment.

2.5 Maintenance

The maintenance phase is carried out after the system has been deployed to ensure consistency and stable performance of the application. During this phase, corrective maintenance is performed to fix errors such as application crashes, incorrect data processing, or failures in order submission and database updates reported by users or stall operators. Adaptive maintenance is applied to ensure the application remains compatible with changes in the Android operating system, device versions, or database environment. In addition, perfective maintenance is implemented to improve system performance, enhance the user interface, strengthen security, and add new features when required [9]. This phase ensures that the system remains stable, usable, and relevant for long-term usage.

3. Results and Analysis

This section discusses the results obtained after testing, focusing on the workflow of the application and how customers and stall operators interact with the system.

3.1 Application Development Outcomes

Based on the limitations identified in Subsection 2.1.1, the mobile application was successfully developed using Android Studio to digitalize the ordering pipeline. The system was structured to fulfill all targeted deliverables, enabling a seamless purchase flow.

- Menu & Availability Management: Stall operators can toggle item availability in real-time, completely eliminating the 85% out-of-stock ordering error rate observed in the manual method.
- Order Placement & Checkout: Customers can successfully add items to a cart, input special remarks, and select between Self-Pickup or Delivery (restricted to Kolej Kediaman Pagoh, Kolej Kediaman UIA Pagoh, Harmoni Vista, and Pagoh Jaya).
- Payment & Verification: A centralized QR-code payment gateway allows customers to upload payment receipts directly linked to their specific Order ID, bypassing the need for WhatsApp chat scrolling.

3.2 System Testing and Evaluation

To ensure the application is reliable and efficient, User Acceptance Testing (UAT) was conducted focusing on functionality, accuracy, and user-friendliness. The testing phase involved 20 participants (18 students/staff and 2 stall operators).

3.2.1 Functionality and Accuracy Testing

Integration testing verified the communication between the Android interface and the backend database. A total of 50 orders were processed to evaluate data accuracy. The results of the functionality and accuracy testing are presented in Table 2.

Table 2 *Results of functionality and accuracy testing*

Core Module	Test Case Description	Expected Result	Actual Result	Pass/Fail
Authentication	User login and registration via email/password.	Access granted; details stored in database.	Successful	Pass
Cart Operations	Add, remove, and calculate total price of items.	Accurate dynamic total calculation.	100% Accurate	Pass
Order Processing	Submit order with self-pickup/delivery selection.	Order routed to Admin dashboard.	100% Accurate	Pass
Payment Upload	Upload receipt image to confirm the order.	Image successfully saved and linked to database.	Successful	Pass
Status Tracking	Admin updates status to "Preparing" or "Completed".	Customer interface reflects real-time status.	Successful	Pass

As shown in Table 2, all tested core modules successfully met their expected results, with all test cases achieving a pass status.

3.2.2 User-Friendliness (Usability) Evaluation

The 20 testing participants were asked to rate the application's user experience using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The quantitative feedback validates the system's ease of use shown in Table 3. Streamlining the checkout process and reducing customer effort directly cascades into higher customer satisfaction scores [10]. Furthermore, personalized digital touchpoints reduce cognitive barriers, fostering higher satisfaction and loyalty among consumers [11].

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Table 3 *Functionality and accuracy testing*

Usability Metric	Average Score (Out of 5)	User Feedback Summary
Ease of Navigation	4.6	The interface is intuitive, and the menu is easy to browse.
Checkout Efficiency	4.8	Uploading payment proof and choosing delivery/pickup is faster than WhatsApp.
Order Tracking Clarity	4.7	Real-time status updates provide clear expectations for food collection.
Admin Usability	4.5	Operators found it significantly easier to manage orders on a single dashboard.

The data presented in Table 3 proves that the developed mobile application drastically reduces processing time, eliminates order tracking confusion, and achieves a high level of user satisfaction compared to the previous manual methods. This aligns with recent findings that perceived utilitarian value, checkout efficiency, and system reliability positively influence customer trust and long-term loyalty in digital platforms [12].

3.3 Stall Operator

The workflow for the stall operator when using the mobile application starts with a secure login page. Once logged in, the operator is taken to the homepage, which acts as the main control panel displaying available menu items and management functions. From this page, the operator can move to different sections of the system. When the edit button on a menu item is clicked, the system takes the user to the Edit Menu page where menu information, such as name and price, can be easily updated. Additionally, clicking the Order button at the bottom of the screen opens the Update Order Status page. Here, the operator can update the order status, which automatically syncs to the customer's view. The Profile button allows the operator to view account details and log out after their shift. Overall, this workflow offers a straightforward navigation process, helping the stall operator manage menu information and orders efficiently. The user flow for the admin/ stall Operator is illustrated in Fig. 2.

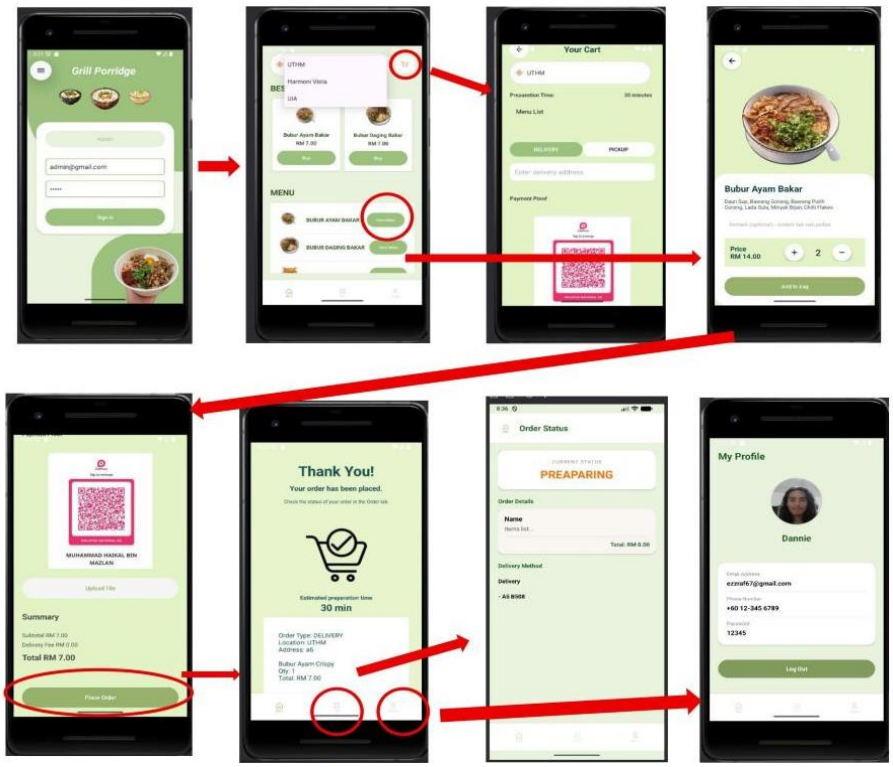

Fig. 2 *User flow for admin/ stall operator*

3.4 Customer

When the customer opens the application, they are required to log in using a registered email and password. If valid, the system redirects to the homepage, which serves as the main navigation hub displaying best-seller menus, the cart, delivery locations, user profile, and order status. Tapping the cart icon redirects the user to review selected items and proceed to place an order. Before confirmation, the customer must upload payment proof; the "Place Order" button only enables once this is successfully uploaded. Clicking "View Menu" provides detailed information on selected items, including price and description. The system automatically calculates total costs upon adding items. After placing the order, the customer can monitor real-time status updates (e.g., pending, preparing, completed) from the order section. The user flow for the customer is illustrated in Fig. 3.

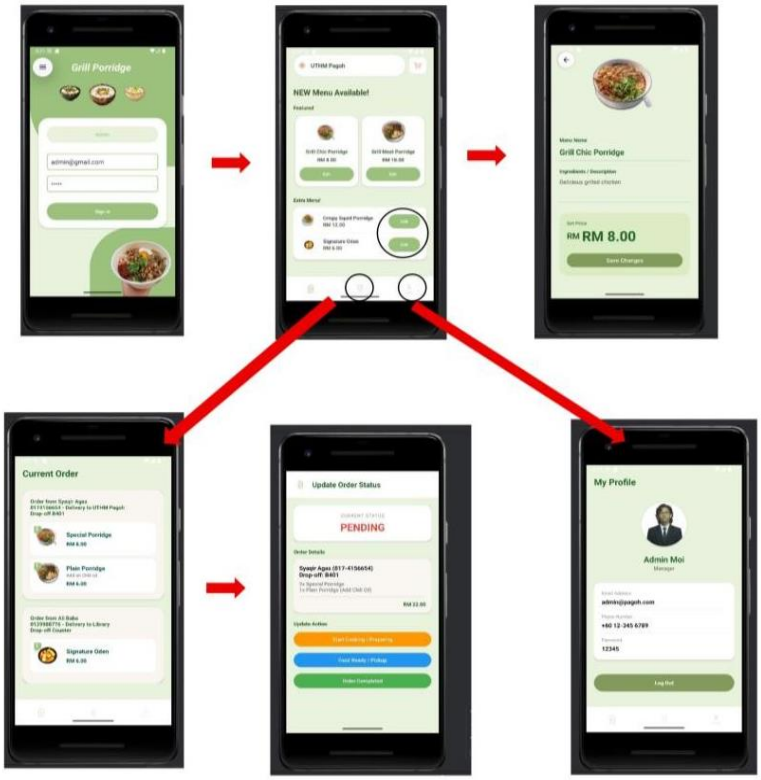

Fig. 3 *User flow for customer*

3.5 Accuracy and User-Friendliness

Testing verified that the mobile application is highly accurate and user-friendly. By standardizing order placements and requiring mandatory payment proof uploads before checkout, the application effectively eliminated the miscommunication and incorrect food preparation errors previously caused by unstructured WhatsApp texts. Usability tests conducted with university students and stall operators indicated that the straightforward interface significantly reduced the learning curve, verifying that the system is both functional and reliable during high-volume periods [1].

4. Conclusion

This project presented the development of a mobile ordering application for the *Bubur Bakar* and *Oden* stall to overcome the limitations of the existing manual and WhatsApp-based ordering methods. The system was developed using the Waterfall methodology, covering requirement analysis, system design, implementation, testing, and maintenance phases. The application provides core functions such as menu browsing, order placement, payment proof submission, and order tracking for customers, as well as order and menu management for stall operators. The developed application successfully achieved the objectives of this project by providing a more structured, efficient, and user-friendly ordering process. The results show that the system helps reduce ordering errors, minimizes waiting time, and improves order

management efficiency for stall operators. Compared to the previous approach, the proposed solution offers better organization, clearer order tracking, and improved overall user experience. For future improvement, several enhancements can be considered to further improve the system functionality and usability. These include the integration of automatic online payment verification, push notification features for order status updates, and a sales report module for stall operators. In addition, the application can be extended to support different platforms, such as iOS. The delivery system can also be enhanced with live tracking and detailed delivery status updates. These improvements would make the system more robust, scalable, and suitable for wider real-world deployment.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of the paper.

Author Contribution

The authors confirm their contribution to the paper as follows: ***system design and user interface development****: Aidil Syahmi and Daniel Arshad;* ***backend development and database integration****: Dannie Ezzraf;* ***testing, deployment, and documentation****: Muhammad Sufi Naufal;* ***supervise****: Mizani Mohamad Madon. All authors were involved in project planning, sprint discussions, and review of the final system. All authors reviewed and approved the final version of the manuscript.*

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