# Design and Development of a Rice Mill Booking Application in Langowan

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***Abstract*** *- Agriculture serves as one of the backbone sectors of Indonesia's economy, providing essential food supplies for a significant portion of the population. Langowan, situated in North Sulawesi, possesses its own distinctive characteristics in contributing to the agricultural sector within the region. Rice milling plays a crucial role in processing farmers' harvests into consumable rice. In the current era of information technology and mobile computing, leveraging mobile application technology based on the Android platform can offer an effective solution to address existing challenges. Mobile applications can facilitate access and interaction between farmers and rice mill operators, making the ordering process more transparent, fast, and efficient. However, in rice milling locations in the Langowan area, it is observed that there is a scheduling uncertainty due to a lack of clear information regarding milling schedules, thus posing difficulties for farmers. Therefore, there is a need to design an Android-based mobile application to facilitate the rice milling ordering process effectively online. This research adopts the Prototyping model method and utilizes software such as React Native, Figma, and Firebase. The result is a designed and developed application that can assist in online rice milling ordering in the Langowan District, and the application's functionality operates effectively.*

***Keywords***— Rice Milling, Langowan Subdistrict, Application

## I. INTRODUCTION

Agriculture is one of the backbones of the Indonesian economy, providing essential food for most of the population (Marwanti, 2022). This statement emphasizes the importance of agriculture in the context of the Indonesian population's food needs. Most of the Indonesian population relies on agriculture to meet their daily food needs, making it an essential part of everyday life. One crucial agricultural subsector is rice production, which is the staple food for most of the Indonesian population (Sutardi et al, 2023). Therefore, rice production is crucial in maintaining adequate food availability for the community. The availability of sufficient and affordable rice is a key factor in maintaining food stability and the well-being of the Indonesian people (Rachman, 2010).

Langowan, as an agricultural area located in North Sulawesi, Indonesia, has its own unique characteristics in terms of the contribution of the agricultural sector to the region (Mamahit et al, 2016). There are eight rice mills in North Langowan, twelve in East Langowan, four in West Langowan, and one in South Langowan, for a total of twenty-five rice mills across Langowan (Dien, 2014) and a total of twenty-three operational rice mills spread across specific villages. Rice mills process farmers' harvests into ready-to-consume rice (Widura, 2023). These rice mills are more than just processing facilities; they are the main foundation for supporting the food supply chain in the region. The quality of service provided by these rice mills has a significant impact on overall agricultural productivity. Furthermore, the availability of quality, affordable rice for consumers also depends heavily on how rice mills in Langowan operate and consistently meet market demand.

In the current era of information technology and mobile computing, the use of Android-based mobile applications can be an effective solution to address these problems (Jon, 2015). Mobile applications can facilitate easy access and interaction (Barh, 2018)between farmers and rice mill managers, making the ordering process more transparent, fast, and efficient. Through a mobile application, farmers can view milling schedules, place orders according to their preferred time, and obtain relevant information.

However, observations and surveys conducted by researchers at rice mills in the Langowan area revealed that schedule uncertainty is a problem. This includes a lack of clear information regarding milling schedules, making it difficult for farmers to plan their harvest and resulting in delayed sales. Furthermore, unorganized queues due to the lack of real-time information from the mills, causing farmers to queue and increasing waiting times for milling services. Therefore, it is necessary to design an Android-based mobile application to facilitate the online rice milling ordering process. The application design must consider ease of use, milling schedules, and order data.

This application is expected to serve as a bridge for effective and efficient communication between the public and the rice millers. Therefore, this application is expected to become a tool that eliminates schedule uncertainty and makes ordering rice milling more convenient, easier, and faster.

## II. LITERATURE REVIEW

Agriculture is a central pillar of Indonesia's economy, providing livelihoods for rural communities and serving as the primary source of staple food for the population. Rice, in particular, holds strategic importance as Indonesia's main staple food, making its production and distribution a national priority (Haryanto, 2020). Rice milling is a critical stage in this supply chain, transforming harvested paddy into consumable rice and directly influencing product quality and market readiness (Shang et al., 2021).

The efficiency of rice milling operations depends heavily on effective scheduling and communication between farmers and mill operators. However, many rural milling facilities still rely on manual systems, leading to long queues, scheduling conflicts, and delays (Thar et al., 2021). In Langowan, where rice mills are geographically dispersed, the lack of real-time schedule information further complicates coordination.

Advances in mobile computing present viable solutions to these challenges. Agricultural mobile applications have been shown to improve operational efficiency, provide real-time updates, and enable direct stakeholder interaction (Sangeetha et al., 2023). The adoption of Android-based applications in rural areas is driven by their affordability, accessibility, and compatibility with low-cost smartphones (Alhafiz & Sela, 2025). Recent studies also demonstrate that exposure to agricultural apps significantly increases adoption rates and technical efficiency among farmers (Agriculture & Food Security, 2024).

## III. METHODS

In this study, the method used is a prototyping model. Prototyping models allow researchers to obtain user feedback more quickly, which can aid in the application design and development process. It also provides an overview of the application process flow that will be implemented in the rice milling reservation application, explained through the application's conceptual framework.

### 3.1 Research Design

The author uses a prototyping model research design method, which is described in Figure 1. This prototyping model consists of five stages, with each stage explained in detail as follows.

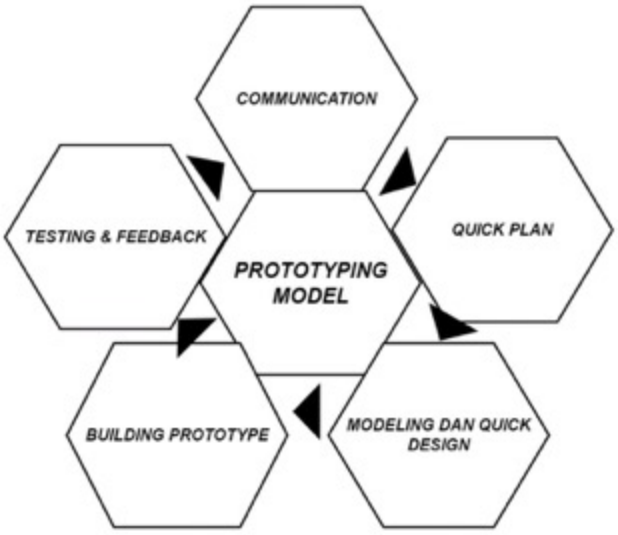


Figure 1. Prototyping Model

1. Communication: This stage involves collecting detailed data related to the application to be developed by communicating directly with customers and rice mill owners. Through a series of interviews and observation sessions, researchers identified the desired functions of the application. From this stage, researchers successfully collected data on requirements, such as an application that could assist in the milling ordering process, including requirements such as easy registration, a map feature, and the ability to manage operating schedules. Customers wanted an application that could provide

information on rice mill availability and facilitate ordering, while mill owners needed an application that could manage schedules and receive orders online.

2. Quick Plan: After successfully collecting data from the communication stage, the quick plan stage took further steps by focusing on initial planning and developing the application's basic structure. At this stage, researchers determined the key features that must be included in the application: for customers (farmers), features such as registration, location selection, and checking rice mill availability; and for rice mill owners, the ability to manage schedules, costs, and manage orders.
3. Quick Design Modeling: Based on data from the communication and planning stages in the quick plan phase, researchers designed the application's workflow, depicting how users would interact with each feature, from signup to logout. This was designed using the Figma platform for user interfaces, Firebase for data storage, and software such as Visual Studio Code for code editing and Android Studio for emulators. The resulting visualization of the user interface allows customers and owners to understand the application's layout and flow for the designed features. It also demonstrates the overall application process and facilitates understanding of the application's functions.
4. Building Prototyping: In this prototyping stage, researchers used software such as Visual Studio Code and an Android emulator to demonstrate the application based on the prepared design, including programming the logic and user interaction flow. Next, the front-end of the application, which interacts directly with users, and the back-end, which manages data and logic, were integrated to ensure the application could process data and provide appropriate responses. Before proceeding to user testing, researchers conducted black-box testing to verify functionality and ensure the features function properly.
5. Testing & Feedback: In this stage, the application is tested with users and feedback is gathered from customers and owners. The prototype that has been created is tested by researchers to evaluate its performance, usability, and overall effectiveness. Researchers provide a series of tests to customers and mill owners that represent scenarios of the functions that have been created in the previous stage, allowing them to interact with the application and identify issues that may not have been seen during the design and prototyping phase. The feedback obtained from these sessions is very valuable and is used to adjust and improvements. As a result, researchers can capture critical input and apply it to optimize the application, increase user satisfaction, and reduce the risk of problems in the application. Ultimately, this testing shows that the application has generally succeeded in fulfilling its expected functions.

### 3.2. Application Conceptual Framework

Figure 2 shows the application's conceptual framework, which encompasses various components and roles. The following is an explanation of each role.

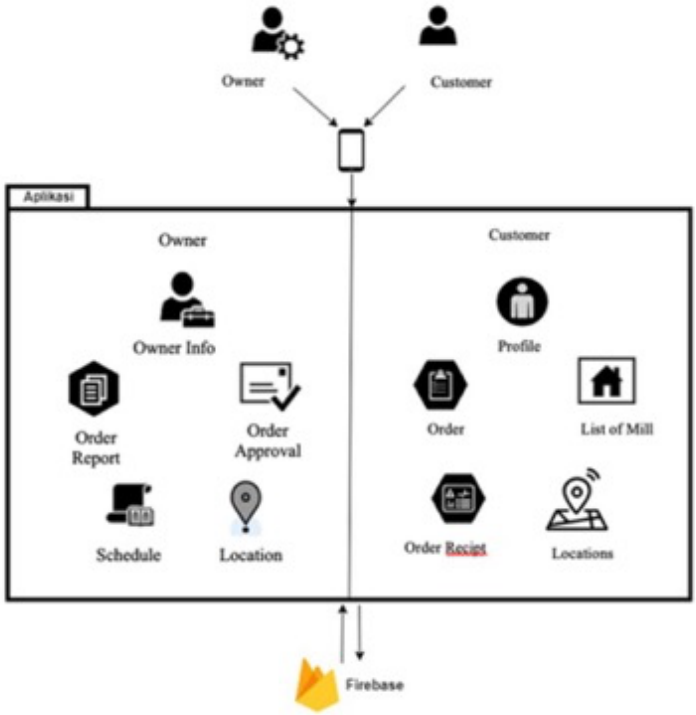


Figure 2. Application Conceptual Framework

1. **Owner**
   a. The owner starts by opening the installed application on their smartphone.
   b. The owner needs to sign up to register an account in order to log in to the application. Sign-up is done by entering the rice mill name, email address, phone number, password, location point, and ID card photo.
   c. The owner logs in to access the main menu of the application.
   d. The owner can manage the rice milling schedule.
   e. The owner can monitor order reports.
   f. The owner can approve orders by accepting or rejecting customer requests.
2. **Customer**
   a. The customer starts by opening the application on their smartphone where the application has already been installed.
   b. After entering the application, the customer needs to sign up by filling in their full name, email, password, and phone number for authentication as a customer.
   c. The customer can log in to access the main menu of the application. To log in, the customer must enter their email address and password.
   d. The customer can view their profile from the main menu.
   e. The customer can enter a location point as the pickup location.
   f. The customer can choose a place and date for the booking.
   g. The customer can select a rice mill from the list page, then they are directed to the order process page. On this page, the customer fills in the details about the amount of rice to be milled at the chosen place and date.
   h. The customer can view the order receipt in the order details menu after successfully booking a rice mill.

3. **Firebase**
   Firebase is used as the database for storing application data. The data entered and managed through the application will be stored in Firebase.

## IV. RESULTS AND DISCUSSION

The results and discussion of this research are explained in the application modeling using use case diagrams. Next, the application is implemented through the user interface, and application testing is carried out to ensure its functionality.

### 4.1 Application Modeling

The use case diagram shown in Figure 3 illustrates the various functions that users can perform within the application. It shows how actors, namely users, interact with the application.

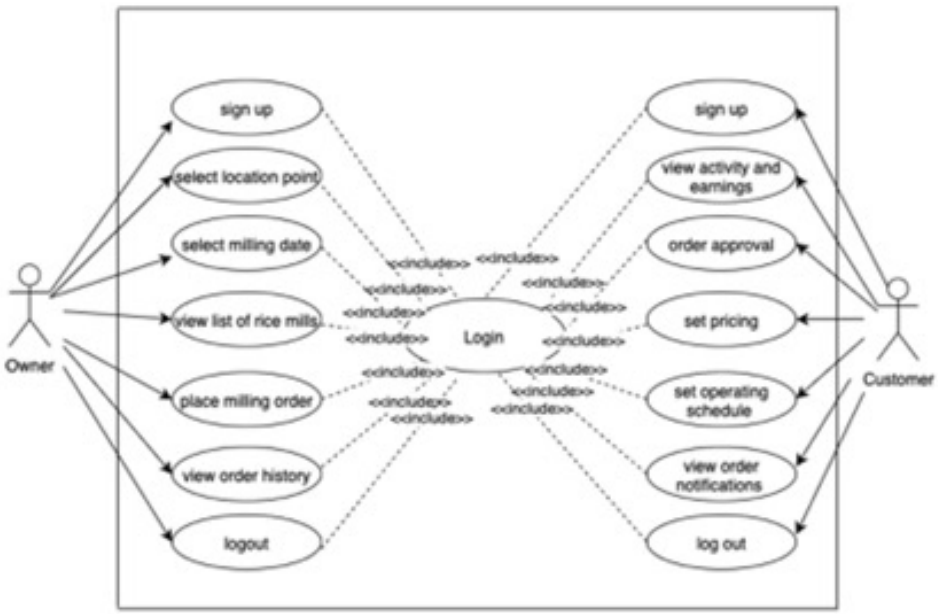


Figure 3. Use case diagram

**1.** Customer (actor)
   a. Sign Up – The customer creates a new account as a customer. This account creation process involves filling in the required information to register as a customer.
   b. Login – In this session, the customer can access the application and log in to verify their identity. Registered customers can log in by entering their email address and password.
   c. Select Location Point – The customer can enter a location point for rice pickup.
   d. Select Milling Date – The customer selects the date for the milling order.
   e. View List of Rice Mills – The customer can view and choose from the available rice milling locations.
   f. Place Milling Order – The customer places an order for rice milling.

g. View Order History – The customer can view the history of their orders.
h. Logout – In this session, to end the login session, the customer can log out of their account.

**2.** Owner (actor)

a. Sign Up – The owner can register an account by entering the required data to create an account as a rice mill owner.
b. Login – The owner can access the homepage by logging in with their registered email address and password.
c. View Activities and Earnings – The owner can view the rice milling activities and earnings.
d. Order Approval – The owner can accept or reject orders.
e. Set Pricing – The owner can set and edit milling fees.
f. Set Operating Schedule – The owner can arrange the rice mill's operating schedule.
g. View Order Notifications – The owner can view notifications for incoming orders.
h. Logout – The owner can log out to end their login session.

4.2. Application Implementation

This section presents the implementation results, covering the deployment of the application that has been designed and developed.


Figure 4. Landing

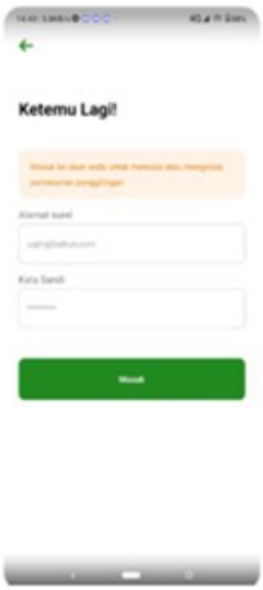


Figure 5. User Login

Figure 4 shows the landing screen of the application. This is the initial display that appears for a few seconds when the user opens the application. Figure 5 shows the login screen for users, where they must enter their registered email address and password.


Figure 6. Sign Up Customer

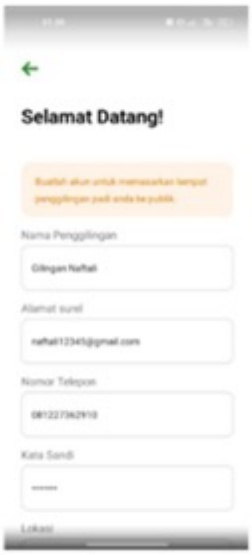


Figure 7. Sign Up Owner

In Figure 6, the screen displayed when a customer is in the process of signing up for an account can be seen. This allows the customer to enter their personal information during the signup process. The next step gives the customer the option to capture an image of their ID card as part of the identity verification process.

In Figure 7, the registration screen for owners is shown. In this process, the owner creates an account by entering information starting with the rice mill name, email address, phone number, and password. Scrolling further down, the owner proceeds to input the location point of the rice mill. Finally, the owner showcases the rice milling facility by uploading images of the premises.

4.3 Testing Results

In this study, the testing method applied was black box testing. The purpose of using black box testing was to conduct a comprehensive evaluation of the various functions within the application, focusing on ensuring that each function operates optimally and in accordance with the specified requirements. The results of this testing can be seen in Table 1, which presents the feature testing outcomes for both customers and owners.

Table 1. Testing

| No. | Scenario | Expected Output | Test Result |
|---|---|---|---|
| 1 | Sign Up | Users can register an account. | Passed |
| 2 | Login | Users can log in to the application. | Passed |
| 3 | Select Location Point | Customers can select a location point. | Passed |

| | | | |
|---|---|---|---|
| 4 | View List of Rice Mills | Customers can view the list of available rice mills. | Passed |
| 5 | Place Milling Order | Customers can place a milling order. | Passed |
| 6 | View Order History | Customers can view their order history. | Passed |
| 7 | View Activities | Owners can view milling activities and earnings. | Passed |
| 8 | Order Approval | Owners can approve customer orders. | Passed |
| 9 | Set Pricing | Owners can set milling fees. | Passed |
| 10 | Set Operating Schedule | Owners can manage the rice mill's operating schedule. | Passed |
| 11 | Order Notifications | Owners can receive order notifications from customers. | Passed |
| 12 | Logout | Users can log out of their account. | Passed |

## V. CONCLUSION

The research on the design and development of a rice mill booking application in Langowan concludes that the study successfully achieved its main objective of creating a system to facilitate the online booking process for rice mills in the district. The developed application demonstrates effective functionality, enabling smoother interaction between farmers and rice mill owners while reducing scheduling uncertainty in milling services. Beyond its technical performance, the application provides practical value by offering farmers a more reliable, accessible, and efficient way to manage their milling activities, thereby supporting local agricultural productivity.

### AUTHORS' CONTRIBUTIONS

Author 1 was responsible for the conceptualization, methodology, investigation, data analysis, writing of the original draft, revisions, supervision, and final approval of the manuscript. Authors 2 and 3 contributed to the application implementation. No other individuals contributed to the academic content or development of this work.

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