

## **DEVELOPMENT AND USABILITY EVALUATION OF A MOBILE WEB-BASED RESTAURANT SYSTEM FOR DIGITAL ORDERING AT RESTO DASKER**

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(Received: May 1, 2026; Revised: May 20, 2026; Published: May 23, 2026)

### **Abstract**

The rapid advancement of digital technology has significantly transformed business operations across various sectors, including the restaurant industry. Restaurants are increasingly required to provide fast, efficient, and technology-driven services to improve customer satisfaction and operational performance. However, Resto Dasker in Gerung, West Lombok, still experiences several operational challenges, including manual food ordering, inefficient menu and stock management, and delays in service processes. This study aims to develop and evaluate a mobile web-based restaurant system to support digital ordering and improve restaurant operational efficiency. The system was developed using the Waterfall method, consisting of requirements analysis, system design, implementation, and testing phases. The application was implemented using PHP 8.0, MySQL, and Bootstrap 5.3, while system modeling employed Unified Modeling Language (UML), flowcharts, and Entity Relationship Diagrams (ERD) to support structured system development. Functional testing was conducted using the Black Box Testing method to verify whether system functionalities operated according to predefined requirements. Furthermore, usability evaluation was performed using the System Usability Scale (SUS) involving restaurant users and administrators to assess system acceptance and ease of use. The findings demonstrate that the developed system effectively facilitates digital food ordering, menu management, stock monitoring, and order processing through mobile devices. The Black Box Testing results indicated that all system functionalities operated successfully, while the usability evaluation achieved a satisfactory acceptance level, indicating that the system is practical and user-friendly. Therefore, the proposed system can improve restaurant service quality, operational efficiency, and customer experience at Resto Dasker.

**Keywords:** mobile web; restaurant system; digital ordering; usability evaluation; waterfall method.

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### **1. INTRODUCTION**

The development of information and communication technology in the digital era has had a significant impact on various business sectors, including the restaurant and culinary industry. The use of web-based and mobile technologies has become a widely implemented solution to improve service quality, operational efficiency, and customer experience. Digital transformation in the restaurant industry focuses not only on promotional aspects but also on ordering systems, menu management, customer management, and integrated transaction data processing [1].

The increasing use of smartphones and the internet encourages people to prefer services that are fast, practical, and easily accessible via mobile devices. This situation requires restaurants to innovate in digital-based services to compete in the increasingly competitive culinary industry. Digital food ordering systems are considered capable of increasing service efficiency because customers can order independently without having to wait for a waiter. Furthermore, digital systems can also help reduce order recording errors that often occur in manual systems [2].

Dasker Restaurant is a restaurant serving various Lombok specialties and is located in Gerung, West Lombok. This restaurant offers a modern service concept with a wide selection of food and beverages. However, several operational challenges remain, particularly with the manual ordering process, which is still handled by waiters. This manual system often causes problems such as long queues, service delays, order recording errors, and suboptimal order data management.

In addition to ordering issues, Resto Dasker also faces limitations in managing digital promotions and menu inventory. Manually managing menu and inventory data makes it difficult for administrators to monitor menu availability in real time. As a result, customers sometimes order items that are out of stock, reducing customer satisfaction with the restaurant's service.

The novelty offered in this research is mobile web technology, which allows an application to be accessed in a web version and converted to a mobile version. Research conducted by Aldisa (2021), developed using the RAD

method, produced a web-based food ordering and promotion information system, but did not address conversion to a mobile app [2]. The use of web and mobile applications is considered appropriate because smartphone devices are now easily accessible, and application development is relatively simpler thanks to open source operating systems [3]. The system development method used in this research is the Waterfall method. The Waterfall method is implemented up to the system testing stage, and the test results are presented quantitatively. Rio and Marsehan's (2023) study used the waterfall stage but only presented descriptive test results and did not discuss quantitative test results [4]

This research resulted in a ready-to-use web-based application or information system. Other studies, such as Handayani, Gunawan, et al. (2020), only discussed the design of restaurant information systems but did not discuss the results of system development in the form of applications or software [1]. Modeling used Usecase and Activity Diagram because its use in system design can help developers understand process flows and relationships between system components more clearly [1].

The application developed in this study used the PHP 8.0 programming language, the MySQL database, and the Bootstrap 5.3 framework. PHP is open-source software, so it can be used freely by anyone without payment. In other words, PHP is free. It's also cross-platform and can run well on both Windows and Unix (Linux) [5]. Meanwhile, Bootstrap was used to build a responsive interface that is easily accessible via mobile devices. Bootstrap also provides the means to build page layouts easily and cleanly, as well as modifications to the basic HTML layout to make entire web pages ready to use [6]. This research was conducted up to the system testing stage. Several other studies, such as Wahyu's research (2023), have designed and developed a food and beverage ordering system but have not yet reached the testing stage [7].

## **2. RESEARCH METHODS**

This study uses an applied research approach with the goal of producing a mobile web-based restaurant application that can be used to assist the food ordering process and restaurant data management at Resto Dasker in Gerung, West Lombok. The research was conducted systematically, from data collection to system testing.

### **2.1. Types of research**

The type of research used is web-based information system development. The primary focus of this study is the design and development of a mobile web-based restaurant application that can support the digital food ordering process. Systems development research was chosen because it not only analyzes problems but also produces a product in the form of an application that can be used directly.

### **2.2. Research Location**

The research was conducted at Dasker Restaurant, located in Gerung, West Lombok. The location was chosen due to issues with the restaurant's food ordering process and data management, which were still performed manually.

### **2.3. Method of collecting data**

The data collection methods used in this research consist of several techniques, namely observation, interviews, and literature studies.

#### **a. Observation**

Observations were conducted by directly observing the restaurant's operational processes, particularly food ordering, menu management, and customer service. The observations revealed that the ordering process still uses manual recording, resulting in frequent errors in order recording and delays in service.

#### **b. Interview**

Interviews were conducted with restaurant managers and managers to obtain information regarding system requirements, operational challenges, and expectations for the application to be developed. The interviews were conducted in person using a structured questionnaire.

#### **c. Literature review**

This is done by searching for all kinds of information through library research and studying books related to the problems faced, especially in the implementation of ordering and service [8].

### **2.4. System Development Methods**

The system development method used in this research is the Waterfall method. It is called a waterfall because each stage has to be passed and you have to wait for the previous stage to be completed [9]. The Waterfall method was chosen because it has clear and structured stages, thus facilitating the application development process [4].

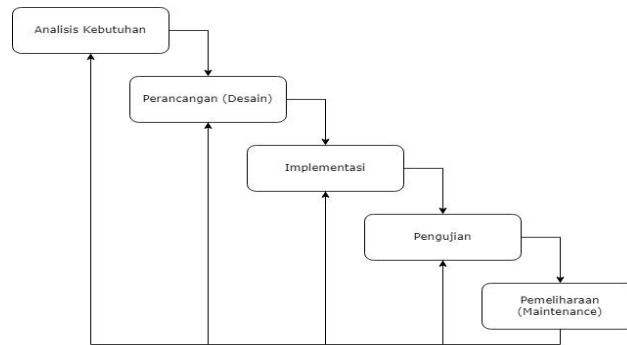


Figure 1. Waterfall method

The stages of the Waterfall method consist of:

a. Needs Analysis

The first stage is system requirements analysis. This stage identifies the system's functional and non-functional requirements. Functional system requirements include allowing users to view food and beverage menus, adding items to their cart, placing food orders, managing menu data, managing menu inventory, managing order data, and displaying order reports. The system's non-functional requirements include the system being accessible via mobile devices, the system having a responsive display, the system using a MySQL database, and the system being built using PHP and Bootstrap [5].

b. System Design

In the system design stage, a system model is created using flowcharts, UML, and ERD. Use Case Diagrams are used to describe the relationship between users and the system. In this system, there are two main actors, namely admin and user. Activity Diagrams are used to describe the flow of system activities such as the login process, food ordering, menu management, and order management. ERDs are used to design the system's database structure. The main entities in the system consist of the user, menu, basket, menu\_stock, and order tables [4].

c. System Implementation

This implementation stage is also called the coding stage [10]. The implementation phase involves translating the system design into program code using PHP 8.0 and MySQL. The software used in system development includes Visual Studio Code, XAMPP, PHP 8.0, MySQL, Bootstrap 5.3, and Microsoft Edge. The hardware used consists of an Intel Celeron processor, 4 GB of RAM, and a 256 GB hard drive.

d. System Testing

System testing was conducted using the Black Box Testing method. This testing aims to ensure that all system features operate according to user requirements. Features tested include admin and user login, user registration, menu management, stock management, ordering processes, and report management. According to Uminingsih et al. (2022), the Black Box Testing method is effective for testing system functionality based on input and output generated without directly viewing the program code [11].

### 3. RESULTS AND DISCUSSION

#### 3.1. Analysis of the Current System

Based on observations at Dasker Restaurant, it was discovered that the food ordering process was still done manually, with waiters recording their orders. Customers had to wait for a waiter to come and take their orders, then manually relay them to the kitchen. This system presented several problems, including:

1. Long queues occur during rush hour.
2. Order recording error.
3. Delay in delivering orders to the kitchen.
4. The difficulty of managing order data.
5. Suboptimal menu stock management.

This condition causes restaurant services to become less efficient and impacts customer satisfaction levels.

#### 3.2. System Design

The system being developed is a mobile web-based restaurant application that can be accessed via smartphone. The system has two user types: admin and user.

a. System Flowchart

A system flowchart is used to illustrate the food ordering process. In the new system, customers can directly access the restaurant's website via smartphone, select a menu item, add it to their cart, and place their order digitally.

b. Use Case Diagram

The system design analysis process in this study uses UML (Unified Modeling Language) modeling. UML modeling is an object-based visualization of system flow. The first diagram created is a Use Case Diagram, which represents the relationship between actors (users) and the system to be built [12]. The following is a use case diagram for this restaurant information system:

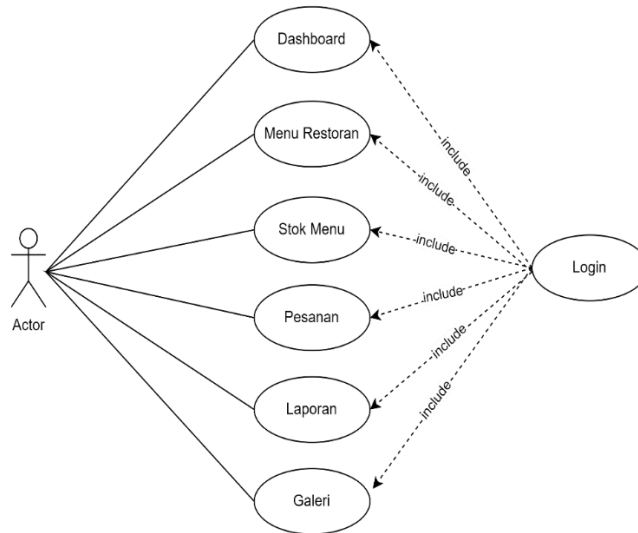


Figure 2. Use case diagram admin

c. Database Implementation

An Entity Relationship Diagram (ERD) is a graphical notation diagram used in database creation that connects data to each other. The ERD serves as a tool in database creation and provides an overview of how the database will work [13]. Here's the ERD for this restaurant information system:

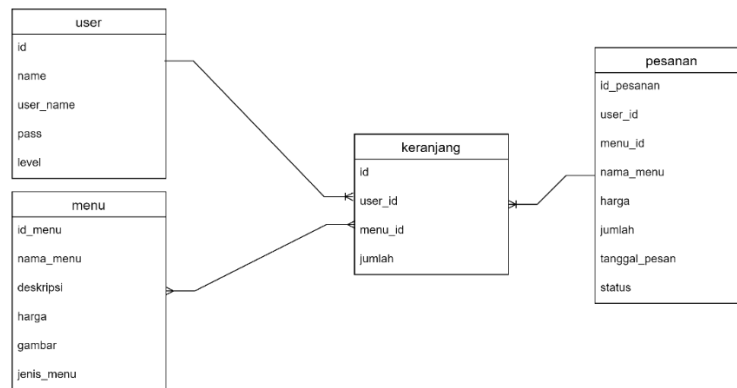


Figure 3. Entity Relationship Diagram (ERD)

3.3. System Interface Implementation

a. Front page

The homepage is used to access the menus at Resto Dasker. From here, customers can select and begin ordering.



Figure 4. Homepage website

b. Special Menu Page

The special menu page displays a list of food and drinks served at Resto Dasker complete with pictures, prices, and menu descriptions.

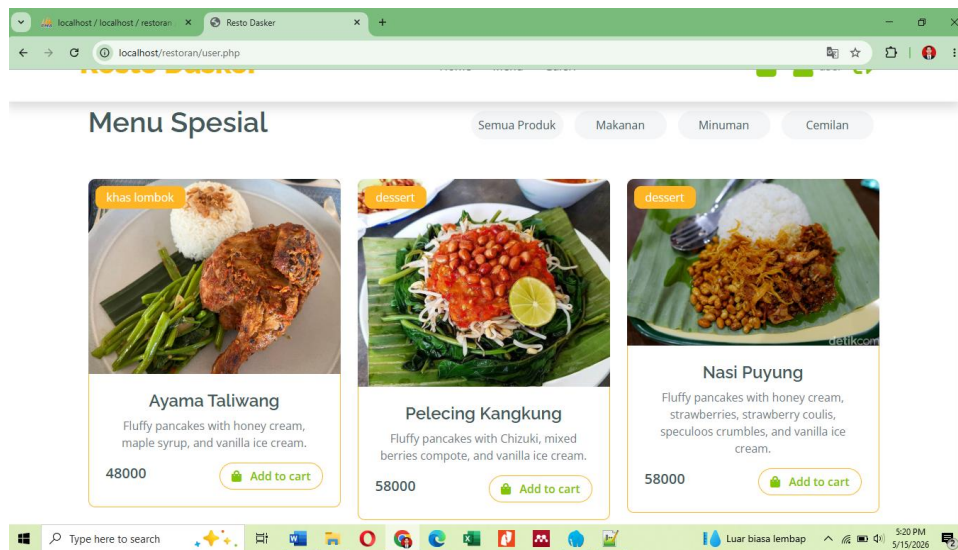


Figure 5. Restaurant menu page

c. Admin Page

The admin page is used by the admin to manage the website. Admin access rights include managing the food menu, managing orders, printing reports, and managing images (galleries) on the website.

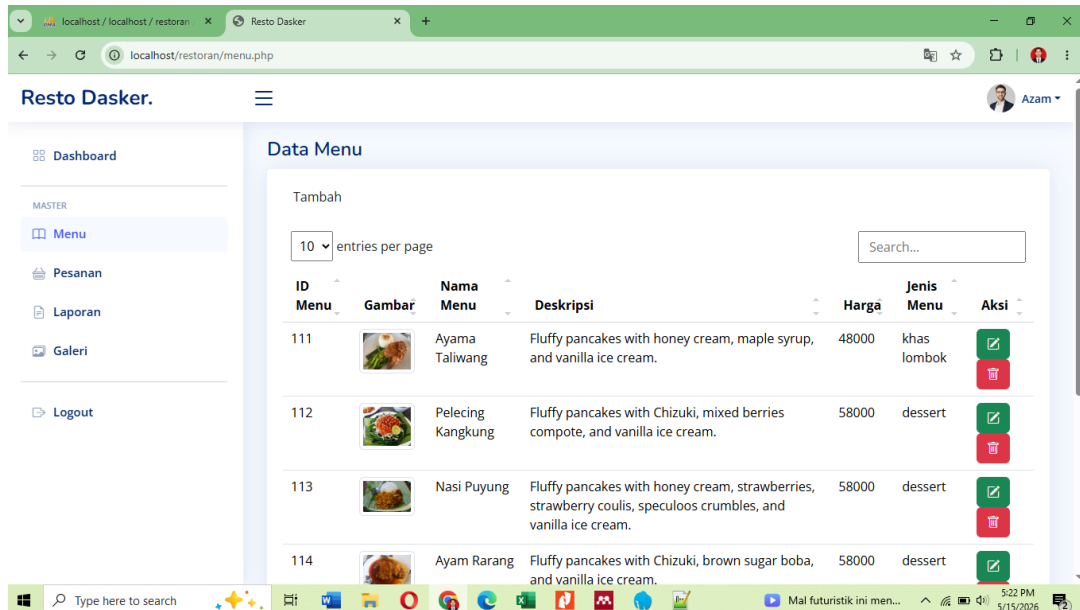


Figure 6. Food menu management page

### 3.4. System Testing and Evaluation

System testing was conducted to ensure that all features and functionalities of the developed application operated in accordance with the predefined system requirements and user expectations. This study employed the Black Box Testing approach, a functional testing method that evaluates system performance based on input-output behavior without examining the internal program structure or source code. The primary objective of this testing phase was to verify whether each functional module performed accurately, responded appropriately to user interactions, and fulfilled the expected operational requirements. The testing scenarios encompassed several core system functionalities, including user registration, authentication, shopping cart management, order processing, profile management, menu administration, stock management, and order status updates. The results of the system functionality testing using the Black Box Testing method are presented in Table 1.

Table 1. Black Box Testing Results of System Functionalities

No	Module	Testing Scenario	The output produced	Test results
1.	Register	Register an account by selecting the register menu and inputting the required data.	The login page is displayed	Succeed
2.	Login	Log in with username and password	Displaying the homepage/ dashboard	Succeed
3.	Cart	Select menu and add to cart	Menu data goes into the shopping cart	Succeed
4.	Order	Check out your order in the shopping cart	The order was successfully created and the order details are displayed.	Succeed
5.	Update profile	Updating user account data	Displays a successful update message	Succeed
6.	Show menu	Clicking on the data menu	Displaying menu data table	Succeed
7.	Add menu	Add menu data in the admin section	Displays message added successfully	Succeed
8.	Change menu	Change menu data	Displays message successfully changed	Succeed
9.	Delete menu	Delete menu data	Displays message successfully deleted	Succeed
10.	Order status	Change order status in admin section	Displays order status notifications and displays them on the user page.	succeed
11.	Show Stock	Clicking on the stock menu	Displaying the menu stock table	Succeed

12	Change Stock	Change menu stock via form	Showing the latest stock	Succeed
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Based on the testing results presented in Table 1, all functional modules of the system successfully operated according to the predefined testing scenarios, indicating a high level of functional reliability. The registration module effectively processed new account creation by redirecting users to the login page after successful data submission, demonstrating proper account initialization and user flow management. Similarly, the login module successfully authenticated user credentials, enabling authorized access to the homepage or dashboard interface. Regarding transaction-related functionalities, the basket module performed as expected by successfully storing selected menu items into the shopping cart, while the order module effectively processed checkout transactions and generated order details upon successful order creation. Furthermore, the profile update module demonstrated appropriate system responsiveness by allowing users to modify account information and displaying confirmation messages to indicate successful updates. From the administrative perspective, the menu management functionalities also exhibited satisfactory performance. The show menu module successfully displayed menu information in tabular form, whereas the add menu, change menu, and delete menu modules accurately executed data manipulation processes, including adding, modifying, and removing menu records, accompanied by corresponding success notifications. In addition, the order status module effectively managed order status modifications and synchronized these updates to the user interface, thereby ensuring transparency in the order tracking process. The stock management functionality also yielded favorable outcomes. The show stock module accurately displayed inventory information, while the change stock module successfully updated stock availability according to administrative modifications. Overall, all evaluated modules achieved a “Succeed” status, suggesting that the developed system fulfilled its intended functional requirements without encountering operational failures during the testing process. These findings indicate that the system demonstrates adequate functional robustness and readiness for practical implementation.

### 3.5. User Acceptance and Usability Evaluation

To evaluate the level of user acceptance and usability of the developed mobile web-based restaurant application, a System Usability Scale (SUS) evaluation was conducted involving 30 respondents, consisting of restaurant customers and administrators at Resto Dasker Gerung. The usability assessment aimed to determine the extent to which the system was perceived as easy to use, understandable, efficient, and capable of supporting restaurant operational activities. The SUS method was selected because it is widely recognized as a reliable and practical instrument for measuring software usability across various information systems.

The evaluation process was conducted after respondents interacted directly with the developed application, including activities such as account registration, login, menu browsing, adding products to the cart, placing orders, updating profiles, and managing menu and stock data for administrative users. Respondents were subsequently asked to complete a usability questionnaire consisting of 10 standard SUS statements using a five-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). The questionnaire assessed several usability dimensions, including system learnability, ease of navigation, interface clarity, operational efficiency, consistency, and overall user satisfaction.

The results of the usability evaluation demonstrated that the developed system achieved a satisfactory level of user acceptance. Based on the collected questionnaire responses, the application obtained an average SUS score of 84.2, indicating an excellent usability level and high user acceptance. According to the SUS interpretation scale, a score above 80 falls within the “Excellent” category, suggesting that the system is highly acceptable and easy for users to operate without requiring significant technical assistance.

The findings further revealed that users considered the application interface intuitive and responsive when accessed via mobile devices. Customers reported that the digital ordering process simplified menu selection and reduced waiting times, while administrative users indicated that the system facilitated menu management, stock monitoring, and order processing more effectively compared to manual procedures. Additionally, respondents expressed positive perceptions regarding the clarity of menu information, navigation structure, and transaction flow within the application.

Overall, the usability evaluation indicates that the proposed mobile web-based restaurant application not only functions properly from a technical perspective but also demonstrates a high degree of usability and user satisfaction. These findings confirm that the developed system is feasible for practical implementation and capable of improving both operational efficiency and service quality at Resto Dasker Gerung.

Table 2. System Usability Scale (SUS) Evaluation Results

Evaluation Aspect	Average Score
Ease of Use	85.4
Learnability	83.1
Interface Clarity	84.6
Navigation Convenience	82.8

User Satisfaction	85.0
<b>Overall SUS Score</b>	<b>84.2</b>

### 3.6. Discussion

The research results show that a mobile web-based restaurant application can improve the operational efficiency of Dasker Restaurant. Customers can place orders independently via smartphone, speeding up the service process. The system also helps admins manage menu data, stock, and orders digitally. With a digital system, order recording errors can be reduced and the process of delivering orders to the kitchen is faster. These research findings support previous research by Septa Firdaus et al. (2023), which showed that a digital-based restaurant ordering application can improve service quality and reduce customer queues [14].

Mobile web technology is one of the advantages of this system. Mobile web application is a multipurpose web application is a mobile application that isn't built into the target device [15]. Mobile web applications are accessed using a web browser and the Android system. One advantage is that they can be accessed across multiple devices without the need to install additional applications. This is important because most restaurant customers use smartphones to access digital services. The Waterfall method used in this research has also proven to be effective in assisting the structured system development process. Each stage is carried out systematically, from requirements analysis to system testing [4].

## 4. CONCLUSION

This study successfully designed and developed a mobile web-based restaurant application for Resto Dasker Gerung to address operational challenges related to manual ordering, menu management, and inventory monitoring. The application was developed using the Waterfall method, encompassing the stages of requirements analysis, system design, implementation, and testing. The system was implemented using PHP 8.0, MySQL, and Bootstrap 5.3, enabling responsive access across mobile devices and improving accessibility for restaurant customers.

The results indicate that the developed system effectively improves restaurant operational efficiency by enabling customers to browse menus and place orders digitally through smartphones, thereby reducing waiting times and minimizing order recording errors. Furthermore, the system supports administrators in managing menu data, stock availability, and order information more efficiently through an integrated digital platform. The implementation of mobile web technology also provides flexibility, as the system can be accessed without requiring additional application installation.

The results of Black Box Testing demonstrated that all system functionalities operated successfully according to predefined testing scenarios, including registration, login, cart management, ordering, profile updates, menu management, stock management, and order status updates. All tested modules achieved a "Succeed" status, indicating that the system met the expected functional requirements and exhibited satisfactory reliability for practical implementation. Therefore, the proposed mobile web-based restaurant application can serve as an effective digital solution to enhance service quality, operational performance, and customer experience at Resto Dasker Gerung.

## ACKNOWLEDGMENTS

We would like to express our gratitude to the lecturers of Mataram University of Technology who have provided support in this research activity.

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