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| RESEARCH ARTICLE

Implementation of a Mobile-Based Laundry Order Management System at Barack Laundry in Sleman

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| ABSTRACT

Barack Laundry is a laundry service business operating in Trini Sleman, a district in the Special Region of Yogyakarta. Laundry is an important household necessity, and many people are looking for trustworthy laundry service. Customer demand for laundry services continues to increase along with increasingly busy lifestyles. Although Barack Laundry's services continue to grow, there are still some problems faced by customers in the Trini Sleman area. One of the main problems is the lack of accessibility of information regarding service schedules, laundry status, and estimated costs. It is necessary to develop a mobile-based Barack Laundry application in Trini Sleman to overcome the problems that exist in Barack Laundry. The purpose of designing this mobile-based Barack Laundry application is to facilitate laundry management and customers so as to increase efficiency in the clothing ordering process. Apps can also extend the reach of laundry services to make them more accessible to customers. Features available on the app include a selection of clothing types and services with options such as washing, ironing, and both. The app also provides detailed booking information, scheduling of pick-up and drop-off times, and the option of online payment methods. The user-centered design method is used in this research by focusing on user needs. Kotlin programming language and MySQL database are also used in the process of developing this application. Based on the results of the research that has been done, it can be concluded that the mobile-based Barack Laundry application in Trini Sleman has successfully designed and implemented a mobile-based application for laundry ordering services in the region. This application has been carried out a black box testing process that has been carried out as many as 19 scenarios, with the final test results reaching 100%.

| KEYWORDS

Mobile Application, Laundry, User-Centered Design Method, Kotlin, MySQL

| ARTICLE INFORMATION

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1. Introduction

Barack Laundry is a laundry service business operating in Trini Sleman, a district in the Special Region of Yogyakarta. Laundry is the service of washing clothes and fabrics using water, detergent, softener, and deodorizer. Laundry services are not only a place to wash clothes but also a place to take care of clothes to make them cleaner and more durable (Hasanah et al., 2021). Today, many laundry businesses strive to provide efficient and practical services. In this digital era, utilizing technology is an effective solution to improve the quality and affordability of laundry services. In the business world, the positive impact of technology is now not only felt by large-scale businesses. Small and medium enterprises that are run by involve information and communication technology in running their business will be able to facilitate business actors to support their business activities (Alam et al., 2021).

The existing system at Barack Laundry still has problems. One of the main problems is the lack of accessibility to information regarding service schedules, washing status, and estimated costs. This can cause inconvenience and uncertainty for customers who use laundry services. In addition, the ordering process that has not been digitally automated is also an obstacle to improving service efficiency. To overcome these problems, it is necessary to create a new system that can facilitate customers.

In this context, to overcome the problem, the author designed an innovative solution through an application. Barack Laundry designed a mobile-based Barack Laundry app that allows customers to book, monitor, and pay for laundry services more efficiently.

This system is made in the form of a mobile application to facilitate users. With the proliferation of mobile apps and the abundance of user feedback, the task of identifying and resolving conflicts among app features has become critical to providing a satisfactory experience for users (Gambo et al., 2024). The method used in this research is user-centered design. User-centered design is used in this application to make it more efficient and usable by users (Yunanto et al., 2024). This application is developed using the Kotlin programming language as the first choice supported by Google (Mazuera-Rozo et al., 2022). While the data in the system is managed using a MySQL database. MySQL was chosen because it has several advantages, namely open source software, which means it can be used for free, high security, multi-user, which means it can be used by several users at the same time, and interface flexibility in several applications and programming languages (Ramadhan & Mukhaiyar, 2020). This application will provide a more practical and efficient solution for customers, allowing customers to order laundry services without having to visit the place directly. In addition, this application will also help the provision of laundry services in managing orders and increasing customer satisfaction. Barack Laundry's mobile-based application in Trini Sleman can improve efficiency in the laundry process and provide a good experience for customers and laundry service providers.

There are several literature reviews of research results that are used as references for developing the system being built. **Table 1** lists the research gaps that serve as the foundation for this study.

Table 1. The Research Gap

Researchers	Research Topics	Application/system features
(Yuliana et al., 2023)	Optimization of laundry services on mobile-based applications (e-laundry)	Login, registration, profile, online ordering, service options, GPS search, promotions, and discounts
(Ardhy et al., 2022	Design of an Android-based laundry service information system at Bio Clean Laundry	Login, transactions, transaction reports, total transaction amount, customer data.
(Urfan & Junianto, 2022)	Design and build a pro-wash laundry order and tracking application using the mobile-d method.	Login, registration, service ordering, order tracking, service selection, payment, branches and reviews.
(Hidayat et al., 2023)	Laundry service information system based on Android application at Citra Bersih Laundry	Login, homepage, order, payment, employee data, reports, customer data.
(Khalafi & Lumba, 2022)	Android-based laundry service ordering application	Login, main Customer, order, partner details, order confirmation, incoming order, order details, history.
Author	Barack Laundry mobile-based application design in Trini Sleman	Login, registration, select clothing and service types, detailed order information, view orders and order history, user profile.

Table 1 shows that there are variations in the development of application features. The author of this report provides a range of laundry service ordering options, including washing, ironing, and washing plus ironing. Customers can request laundry services without physically visiting the location, giving them a more convenient and effective option. Additionally, this application will assist laundry service companies in improving client satisfaction and order management.

2. Methodology

2.1 User Centered Design (UCD) Method

This research uses the User-Centered Design (UCD) method to help determine the application design in accordance with user needs so as to determine user attractiveness (Subhiyakto et al., 2021). The use of methods can facilitate research in finding the right solution to the problems faced by the company. The UCD method is divided into several stages. The stages in the user-centered design method include the following:

1. Specify The Context Of Use

The research began with collecting literature. The literature study was used as an object of comparison and analyzed to determine the core of the research. Furthermore, data collection was carried out through observation and interviews at Barack Laundry. In this study, researchers process data as research material to understand the needs and the right solution to be applied to Barack Laundry. So at this stage, the researcher designs the interface of the system created. Interface design begins with the creation of a system wireframe.

2. Specify User and Organizational Requirements

At this stage, researchers have found solutions to existing problems. Problems that exist in companies such as inefficient laundry management. Barack Laundry needs a system that can solve these problems.

3. Design Solution

Researchers designed the system as a solution to the existing problems. Researchers created a Mobile-Based Laundry Order Management System equipped with a database to manage Barack Laundry data. Wireframe of the application is also made to facilitate the creation of user interface design.

4. Evaluate Design

This stage is the final stage where researchers test the applications that have been made. This stage serves to check the obstacles that may arise when the application is used. The test method used in this research is Black Box Testing. This test is carried out with a testing approach to find out whether all software is running properly (Fahrezi et al., 2022). If there is a system that does not run well, then through the testing stage the cause can be found. This can make the system better after system evaluation.

2.2 Conceptual Design

Outline conceptual design used to build the Barack Laundy application in Trini Sleman. The architecture diagram created for system modeling in the new application can be seen in **Figure 1** below.

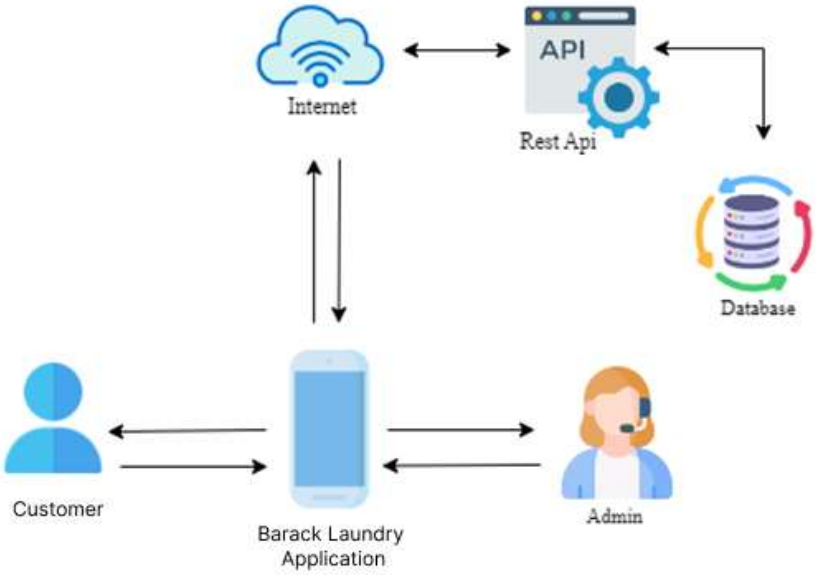

Figure 1. Architecture Diagram

1. Flowchart

   The flowchart of the Barack Laundry application system in Trini Sleman shows how the relationship between the users of the application, namely customers and admins. This diagram provides an overview of the process steps involved in the interaction between customers and admins, as well as how each action flows from one process to another. The flow chart can be seen in **Figure 2** below.

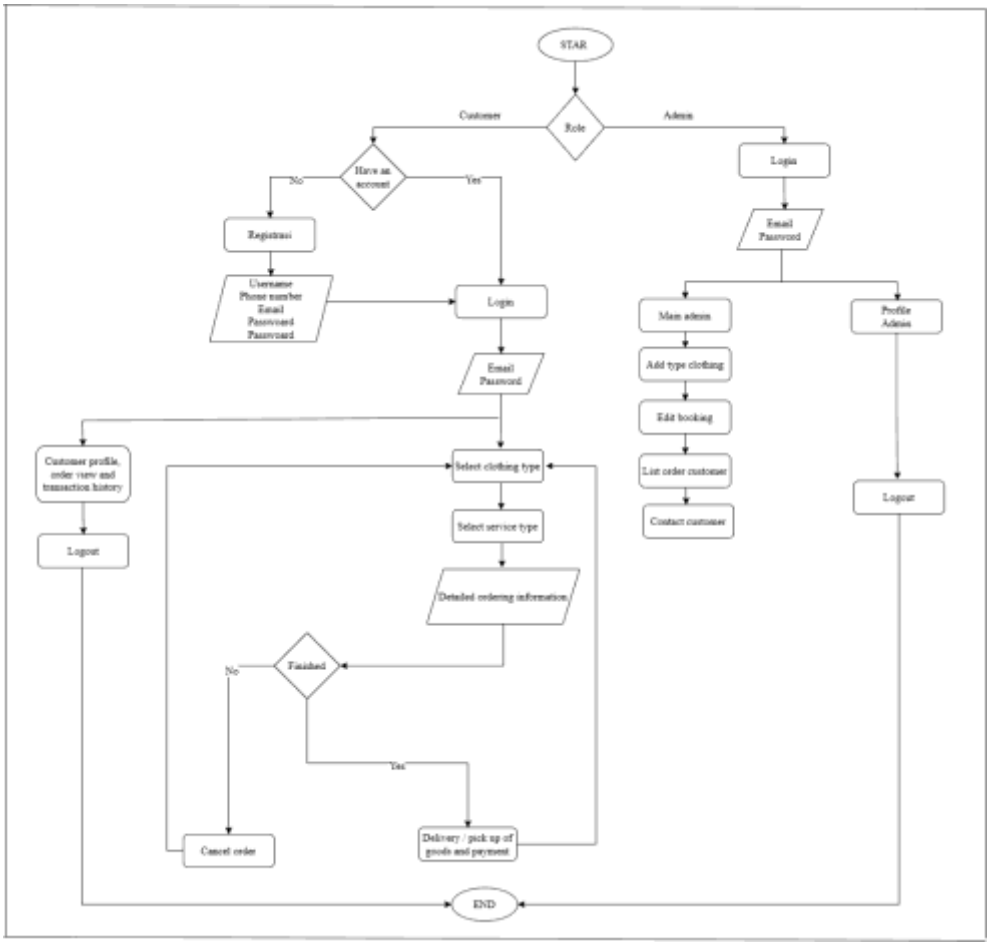

Figure 2. Flowchart

2. Context Diagram

A Context Diagram is a basic overview of the entire system that describes the relationship between outside entities, inputs, and outputs of the system. In this diagram, all the processes of the laundry application system at Barack Laundry Trini Sleman are shown in the form of a big circle that represents all the main processes. The context diagram can be seen in **Figure 3** below.

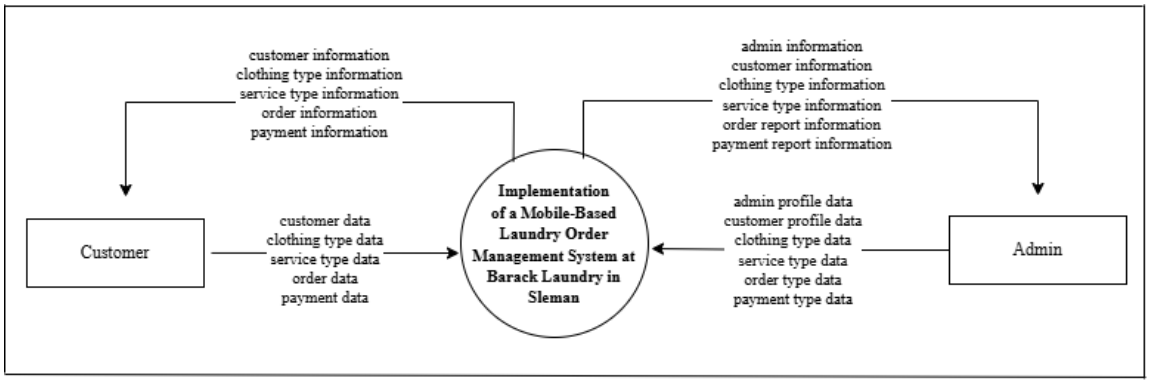

Figure 3. Context Diagram

3. Ladder Diagram

A ladder diagram is a diagram that describes the structure of a system with a hierarchical model. Each section in the system has a specific process. The first section consists of master data management, which includes customer, admin, clothing type, and service type data. The second part is transaction data management, which includes order and payment data. The last section is the report process. The ladder diagram can be seen in **Figure 4** below.

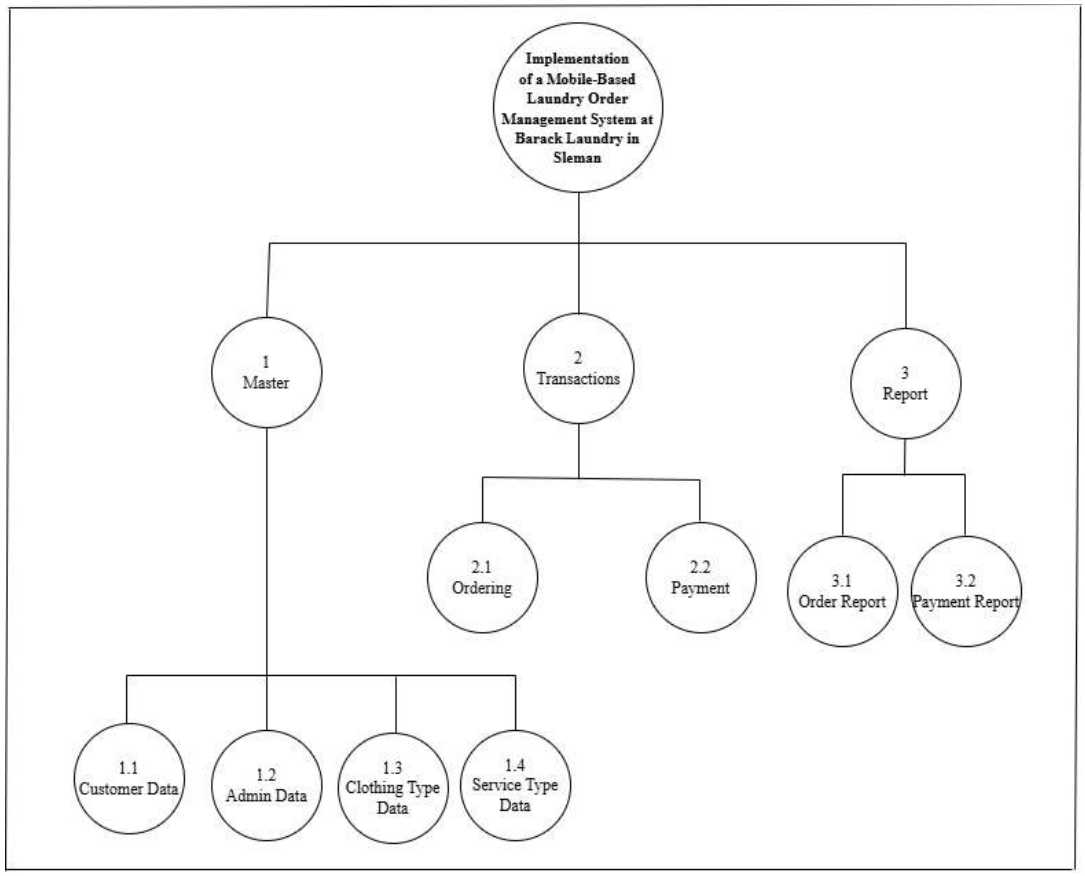

Figure 4. Ladder Diagram

4. Data Flow Diagram

Data Flow Diagram (DFD) is a diagram that describes the origin and destination of data in the system and the processes that occur in it. In DFD Level 1, there are three main processes, namely master data, transactions, and reports. This Level 1 DFD provides more in-depth details about how each process interacts with data and external entities. The DFD can be seen in **Figure 5** below.

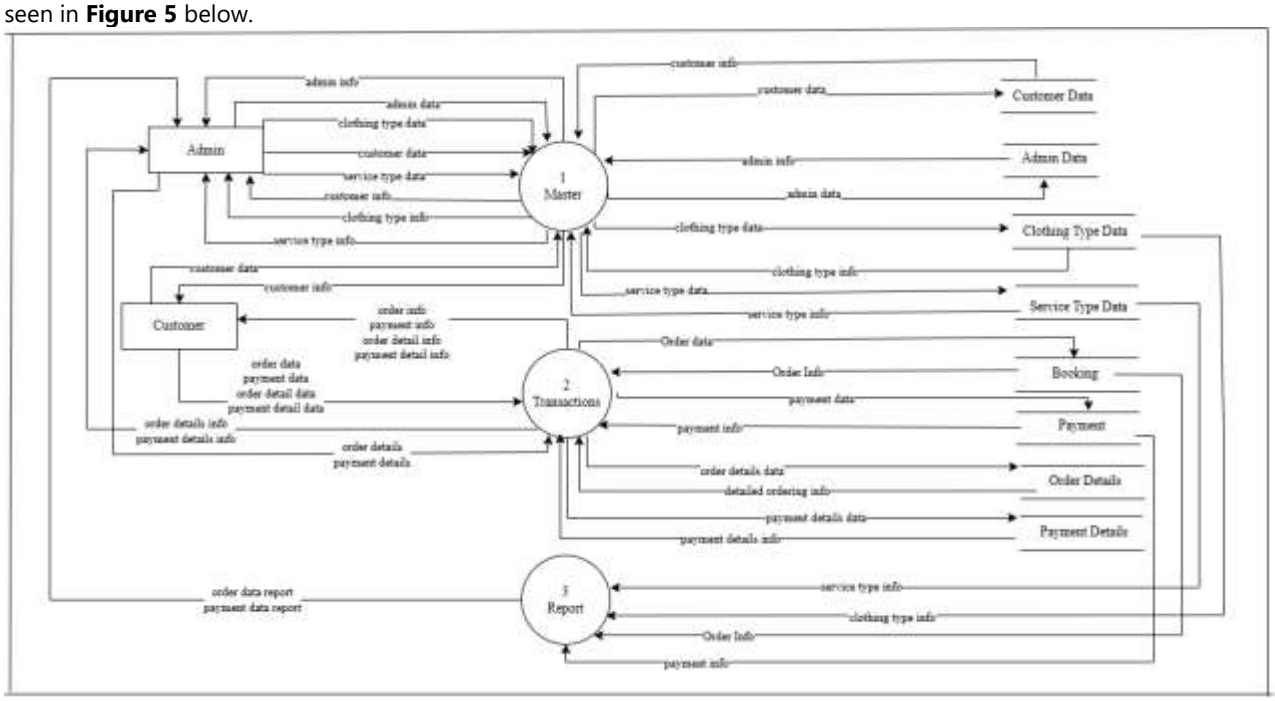

Figure 5. Data Flow Diagram

5. Entity Relationship Diagram
   Entity Relationship Diagram (ERD) is a visual representation of how entities in a database are interconnected. This representation helps in modeling the database in a way that is easier to understand and more structured. The ERD can be seen in **Figure 6** below

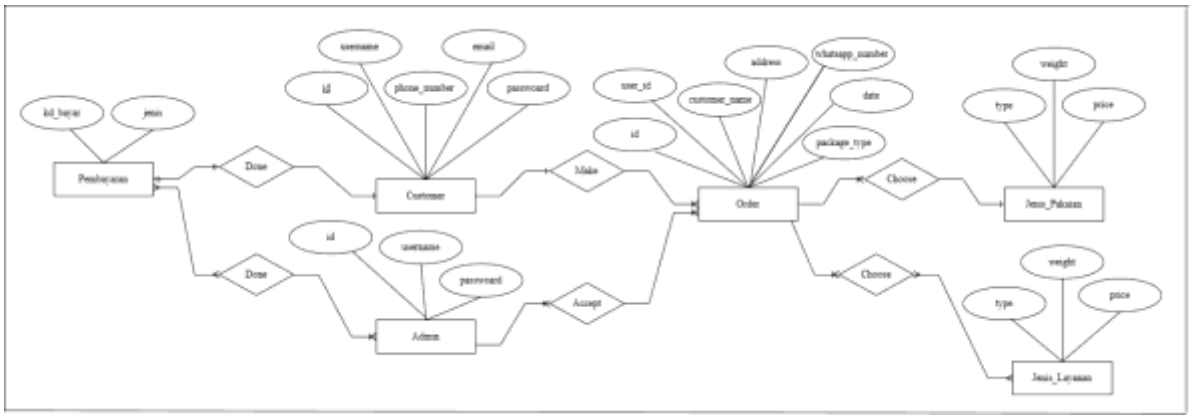

Figure 6. Entity Relationship Diagram

6. Interface Design
   Interface design is a display to determine the image that will be produced by the system. The design of information that will be displayed to the user is the result of data processing from the system. Interface design is illustrated using the wireframe shown in **Figure 7** below.

Figure 7. Interface Deisgn

3. Results and Discussion

3.1. System Implementation

The analysis of the supporting needs of the system to be created is explained at this stage. Among them are software for development, devices for testing, and so on. These needs include hardware and software as follows.

1. Software used in system development includes
   a) Android Studio as a text editor
   b) Draw.io is used to create flow charts, and diagrams.
   c) SDK (Android Software Development Kit) is used for application development.
   d) XAMPP to develop the database
2. Software used to run the system includes
   a) MSI Modern 14-C11M laptop with Intel core i5-1155G7 processor
   b) 8 GB RAM (Random Acces Memory)
   c) Devices that can operate windows 11

3.2. User Interface Implementation

1. Login Page and Register Page

This login page contains an email and password that is connected to the mysql database. to start entering the application. Users enter the email and password that has been registered previously. While the registration page is used to create a new account for those who do not have an account. Users need to fill in username, phone number, email, passwoard, password confirmation which is connected to the Mysql database. The following can be seen in **Figure 8**.

Figure 8. Login Page and Register Page

2. Main Page Choose Clothing Type and Select Service Type page

The main page selects the type of clothes to be washed. Users can view and know the price of each kilogram. While the service type selection page allows users to continue ordering from the previous step. After selecting the clothing type, users can add items to the cart and then select the service type option. The page can be seen in **Figure 9** below

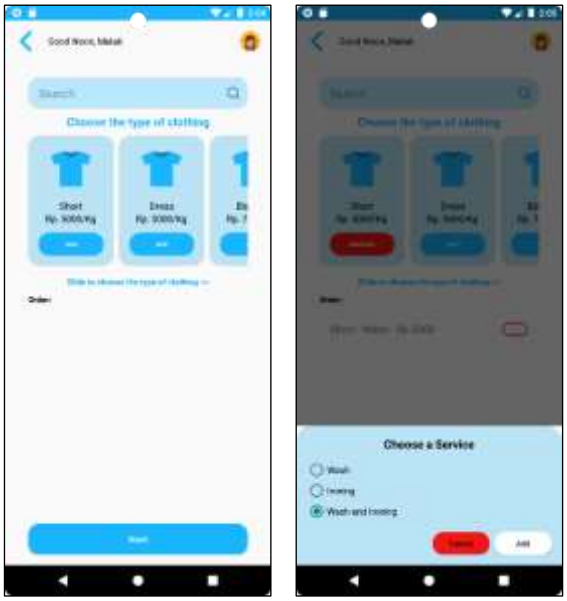

Figure 9. Main Page Choose Clothing Type

3. Ordering Page and Order Detail Information Page

The order page includes complete information about the items to be washed, the price of each item, the type of clothing, and the type of service options. While the booking details information page allows users to fill in the information needed to place an order

for laundry services. users fill in their name, address, whatshapp number, entry date time and package options with regular, express (1 day), fast (2 days), Exp (6 hours) options. The page can be seen in **Figure 10** below.

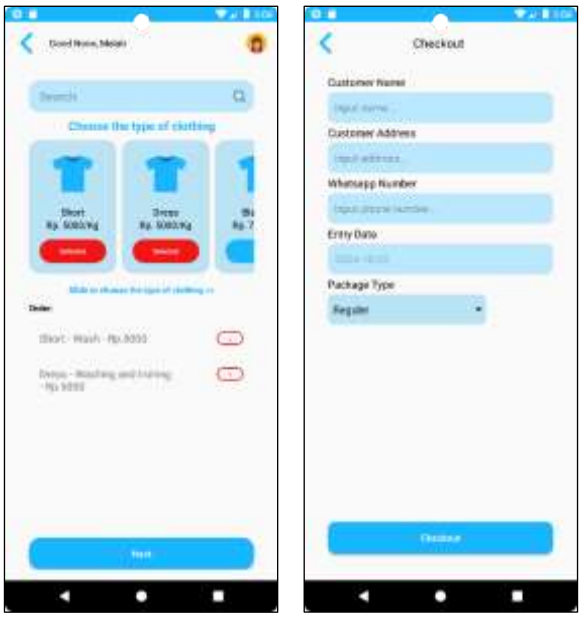

Figure 10. Ordering Page and Order Detail Information Page

4. Customer Profile Transaction History page and Admin Main Page

The customer profile and transaction history page displays personal data information, such as name, phone number, email and a complete list of transactions that have been made by customers, both completed and still in process. While the admin main page is used to manage the overall operation of the application, managing customer orders.

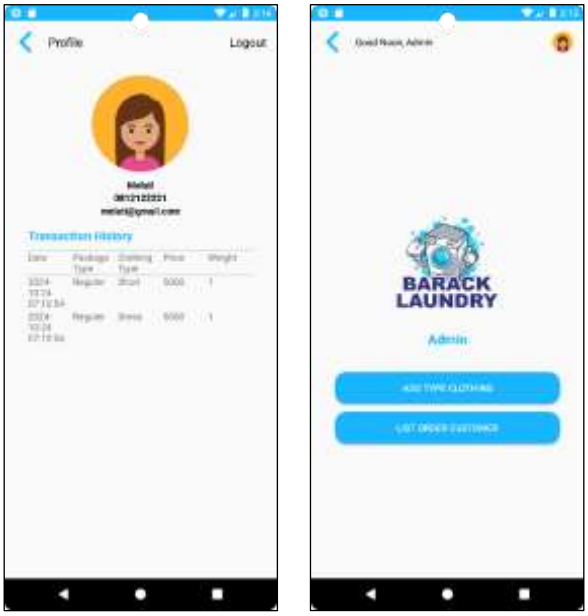

Figure 11. Customer Profile Transaction History page and Admin Main Page

5. Add a Clothing Type Page and Customer Order List Page

The add clothing type page allows admins to add, update, or delete clothing types available in the system. The customer order list page displays a list of orders that have been placed by customers, and gives admins the ability to process and monitor each order efficiently.

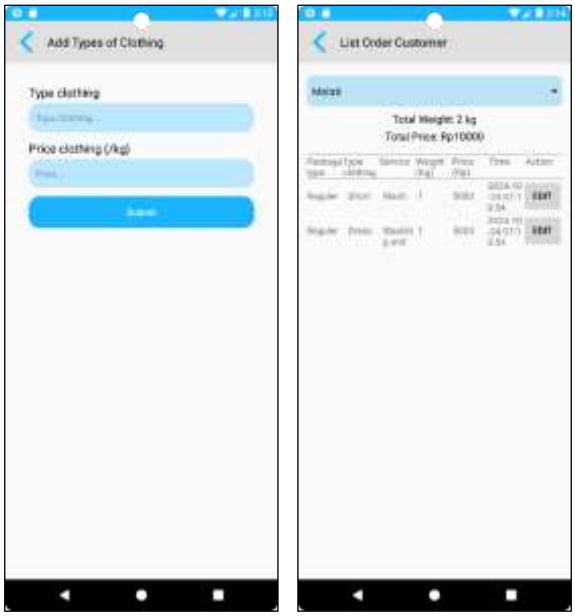

Figure 12. Add a Clothing Type Page and Customer Order List Page

3.3. Black Box Testing

The discussion of the results of this study uses Black Box Testing which is useful for testing or observing the input and output results of the software whether it has run as desired or not. Black Box Testing is used for testing application features and functionality to ensure adequate quality and performance. Black Box Testing can be seen as follows.

Table 2. Black Box Testing

No.	Testing	Test Case	Expected Result	Test Results	Conclusion
1.	Splash Screen Testing Appears for 3 Seconds	Open application	Splash screen appears when the app is opened and is displayed for 3 seconds	Splash screen displays according to the set duration	Valid
2.	Splash Screen Testing Leads to Login Page	Open the app, wait for the splash screen to finish	After the opening screen, the app leads directly to the login page	Splash screen redirects to the login page	Valid
3.	Email Validation Testing	Trying to login with an email that is not registered in the system	The system displays an error message that the email is not registered	The system successfully displays the appropriate error message	Valid
4.	Passwoard Validation Testing	Attempted login with wrong password	The system displays an error message that the password entered is incorrect	The system successfully displays the corresponding error message	Valid
5.	Login Testing Successful	Trying to log in with a registered and correct email and password	The system successfully logs in to the user account	The system successfully logs in to the user account according to the entered data	Valid
6.	Username Validation Testing	Attempting to register with a username that already exists in the database	The system displays an error message that the username is already in use	The system successfully displays the appropriate error message	Valid
7.	Passwoard Validation Testing	Registering with a password that does not meet the minimum character requirement	The system displays an error message that the password must have at least 8 characters	The system successfully displays the appropriate error message	Valid

8.	Phone Number Validation Testing	Registering with an invalid phone number (e.g., incomplete phone number)	The system displays an error message that the phone number is invalid	The system displays the corresponding error message	Valid
9.	Email Validation Testing	Registering with an invalid email (e.g. no '@' or invalid domain)	The system successfully displays an error message that the email is invalid	The system successfully displays the appropriate error message	Valid
10.	Choose a clothing type test	Choose the type of clothes you want to wash.	The system displays the list of selected clothes correctly.	The system successfully displays the list of selected clothes as expected.	Valid
11.	Consistency Testing of Select Clothing Type	Selecting multiple types of clothing and removing one type of clothing from the selection.	The system updates the display to reflect changes in the choice of clothing types.	The system successfully updated the display to reflect the change in clothing type options.	Valid
12.	Select Outfit Validation Testing	Trying to continue the process without choosing any type of clothing.	The system displays an error message that at least one type of clothing must be selected.	The system successfully displays the appropriate error message.	Valid
13.	Service Type Selection Testing	Select the type of service available, "Wash"	The system displays the information corresponding to the selected laundry service type.	The system successfully displays information about the "Wash" laundry service correctly.	Valid
14.	Select Service Consistency Testing	Selecting one type of laundry service and changing the selection to another type of laundry service.	The system updates the display according to the newly selected laundry service type.	The system successfully customized the display with the newly selected laundry service type.	Valid
15.	Choose clothing type test	Select the "Top" category.	The system features options for different types of clothing such as shirts, shorts, and jeans, blankets, jackets, sheets, and more.	The system successfully displays options that match the selected category.	Valid
16.	Select Service Type Testing	Select the "Wash" service.	The system displays the "Wash" service option accordingly.	The system successfully displays the "Wash" service option	Valid
17.	Testing Filling in Name, Address, Whatshapp Number, Date	Fill in the name, address, whatshapp number, date fields with valid details.	The system accepts the filled name, address, whatshapp number, date and displays the name, address, whatshapp number, date.	The system successfully accepts the filled name, address, whatshapp number, date and displays the corresponding ones.	Valid
18.	Package Selector Testing.	Plan selection is valid for laundry orders.	The system accepts the selected package options	The system successfully accepts the selected package options and displays them.	Valid
19.	Profile Testing Displays Correct Customer Information	Log in as a customer, Access the "Profile" page	Full information (name, telephone number, email) of the customer is displayed	Customer information is displayed correctly	Valid
20.	Testing Customers Can View	Log in as a customer, access the	Customer transaction list is displayed in full	Transaction history is displayed with correct data	Valid

	Transaction History	"transaction history" page			
21.	Testing Admin can access clothing types add/edit/delete items	Login as admin, Click add clothing type add/change/delete related data	Admin can add, edit, or delete items	Functions can be used without problems	Valid
22.	Testing Order Statistics Displayed Correctly	Log in as admin, access the admin main page	Order statistics (number of orders, revenue, etc.) are displayed	Order statistics appear according to existing data	Valid
23.	Testing Admin Can Open the Add Clothing Type Page	Log in as admin, access the add clothing type menu	The add clothing type page opens without error	Page successfully opened	Valid
24.	Testing Admin Can Add Clothing Types With Valid Data	Fill in the name of the clothing type, click the "save" button	The clothing type was successfully added to the list	Clothing types successfully added and displayed	Valid
25.	System Testing Displaying Confirmation Orders When Data is Successfully Saved	Fill in a valid clothing type name, Click the "Save" button	A confirmation message "clothing type saved successfully" appears	Confirmation order appears after successfully saving data	Valid
26.	Testing Displaying Customer Order List	Log in as admin, access the "order list" page	Customer order list is displayed correctly and completely	Customer order list appears with complete data	Valid
27.	Testing the Auto-update Order List After a New Order	Admin is on the "order list" page, create a new order as a customer	Booking list automatically updates with new orders	Order list is updated automatically	Valid

In black box testing carried out on 27 scenarios, conclusions can be drawn for the test weight with the following results

$$testing = \frac{27}{\sum 27} \; x \; 100\,\%$$

Based on the results of the calculation of the weight of the black box test that has been carried out, the results of this test have a success percentage value of 100%, therefore the system is suitable for use.

4. Conclusion

Based on the problems related to the transaction process at Barack Laundry, a solution was found through this research. This research produces a mobile-based laundry application developed using the user-centered design method by applying the Kotlin programming language and MySQL as a database manager. The Barack Laundry application successfully implements a mobile-based application for laundry ordering services in the region. This application can facilitate customers by offering various features that facilitate the process of ordering and managing laundry.

The features available in the application include the selection of clothing types and services with options such as washing and ironing. Features available in the app include the selection of clothing types and services with options such as washing, ironing, and washing and ironing. The app also provides booking detail information, user profiles, as well as booking and transaction history views. This application will provide a more practical and efficient solution for customers, allowing customers to order laundry services without having to visit the place directly.

This application has been carried out a black box testing process that has been carried out as many as 27 scenarios, with the final test results reaching 100%. In addition, this application also provides additional benefits for customers, such as ease of tracking order history and customer service. At the moment, this application is limited to mobile devices running the Android operating system. The author therefore hopes that it will be possible to build it on the iOS operating system in the future.

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Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

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