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Development of Mobile Application for Shoe Washing Services based on Android with Kotlin

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ABSTRACT

Businesses in the form of services continue to grow, although many service providers still face challenges in improving operational efficiency and service quality because they still use manual systems to manage orders and customer data, which are often not integrated. This research aims to design and build a mobile-based shoe washing service application with a focus on Pojok Shoescare. This application aims to make it easier for customers to order shoe washing services online and provide convenience for admins in managing customer and order data. A web-based admin dashboard was developed to enable more structured data management. The development method used in application development is Rapid Application Development (RAD) because it is flexible and able to accelerate the development cycle. Results from BlackBox testing show that the application runs optimally and meets user needs related to ease of use and service efficiency. This application is expected to improve the quality of service at Pojok Shoescare and provide a better experience for customers in ordering shoe washing services and supporting business growth in the future.

Keywords: *Android, Mobile application, Online ordering, Rapid application development, Shoe washing services*

Introduction

Shoes are a type of footwear that aims to protect the feet from dirt and danger from external objects. The models, materials, and motifs vary according to the function of use. Shoes are often used in various daily activities, such as going to school, work, or for leisure and sports activities [1]. Even some people do not hesitate to spend money to buy shoes with a relatively high price. However, not all of them understand how to care for shoes properly and correctly. In addition, having a busy schedule is often the main reason why many people do not have time to take care of their shoes, even just to wash them regularly [2]. This creates a business opportunity for shoe washing service providers who are able to fulfill these needs.

Pojok Shoescare, as one of the shoe washing and maintenance service providers located in Yogyakarta. The transaction process is still done manually through social media such as WhatsApp and Instagram, which takes longer and less efficient. Customers also find it difficult to find out the status of their orders. In addition, customer data management is not optimal because transaction and customer data are not recorded properly. This problem causes difficulties in financial evaluation and future business planning. This condition makes many companies utilize computerized systems to improve development in the service sector, so that service quality can be further improved. One example is in the shoe washing service sector [3]. The existence of Android-based applications can be an effective solution to overcome these problems while speeding up the work process, increasing operational efficiency, and ensuring services run more optimally.

Applications are programs designed to carry out commands from users with the aim of getting more accurate results in accordance with the purpose of making these applications, applications can be interpreted as problem solving using one of the data processing techniques. This process is usually centered on computing which is designed to meet certain needs or objectives in data processing [4]. Android is an operating system designed for Linux-based mobile devices consisting of applications, middleware, and operating systems. In this context, Android serves as a platform that allows users to access various applications and services on their mobile devices [5].

The development of this application will utilize the Kotlin programming language. Kotlin is a programming language created by JetBrains. Kotlin is a development of the Java language that has been widely recognized before. As a development of the already popular Java language, Kotlin offers a variety of modern features that Java lacks [6]. Kotlin has become the top choice as the programming language officially supported by Google for Android app development [7]. Kotlin offers many excellent features, including simpler and easier-to-understand syntax, safer null value management, and the ability to write safer type-based code. These

advantages make kotlin more effective in simplifying and enriching the system development process, making it the right choice for designing Android applications [8].

This research discusses the development of an Android-based application designed to simplify the process of shoe washing services at Pojok Shoescare. This application aims to automate the ordering system, recording transactions, and managing data that was previously done manually. With this application, it is expected that order processing time will be faster, data recording will be more accurate, and business evaluation can be done more effectively. In addition, this application will improve customer experience by providing convenience in ordering services online without having to go through potentially time-consuming manual communication.

Research Methods

In developing an Android-based shoe washing service application using the Rapid Application Development (RAD) method. RAD is an object-oriented system development approach that includes development methods and software. The Rapid Application Development (RAD) method was chosen because the development approach focuses on short turnaround times, allowing developers to design and complete applications quickly in a shorter period of time [9]. The RAD method in system development consists of four stages including: Requirements Planning, User Design, Construction, Cutover [10]. The concept of the Rapid Application Development method can be seen in Figure 1.

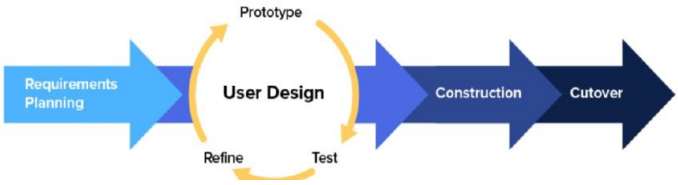

Figure 1. RAD method concept [11]

1. Requirements Planning
   The requirements planning phase includes data collection through interviews and observation methods. The purpose of this stage is to identify problems and solutions to existing problems [12]. Observations were made at the Pojok Shoescare location to obtain accurate information and data and interviews were conducted with business owners to understand the ordering and payment process, so that the system developed according to the needs of the owner and customers. The result of this stage is a list of requirements that will be the basis for developing the features of the Pojok Shoescare shoe washing service application.
2. User Design
   System design is an important stage in the creation of an application to ensure each component is designed according to user needs. This stage models the structure of the software, including the roles of actors and their access rights [13]. At this stage, the active involvement of users is very important to achieve the goal, because in this process the design is carried out as well as improvements if there is a mismatch between the design made and the analyzed user needs [14]. This process includes creating Use Case Diagrams that describe the interaction between users and the system, Activity Diagrams to model the flow of activities in the application, and Database Relationships to model the inter-table relationships in the system. This process aims to ensure that the developed system meets the needs of users and facilitates navigation and use of the application.
3. Construction
   At this stage, the author develops the application by implementing the features designed based on the prototype that was created in the previous stage. Testing is also done to ensure the application functions properly. This stage includes the development of the system based on the design plan and specifications that have been set previously. Developers quickly build an initial prototype of the system and iterate, adding or changing features and functions so that the application can optimally meet user needs [15]. The development process of the Pojok Shoescare application is carried out in stages by focusing on improving the interface and features that can facilitate user navigation. Each iteration allows the team to fix the weaknesses found and ensure that the application runs according to the previously formulated needs of Pojok Shoescare. This application is designed to be used optimally to facilitate the process of ordering shoe washing services and data management by the admin.
4. Cutover
   In this last stage is a comprehensive test. This test is carried out on the application system as a whole by checking each functionality to ensure everything works properly. The method used in this research

is the black-box method, where testing is carried out directly on the system without looking at its internal structure [16]. Black Box Testing is a software testing method that focuses on testing the functionality of the application without looking at its internal structure or working mechanism. This method can be used at various levels of software testing, such as unit testing, integration, system, and acceptance stages [17].

Results and Discussion

System Design

The system design of the Pojok Shoescare Shoe Washing Service Application is described with Activity Diagram, Use Case Diagram, and Database Relationships. Activity Diagram describes the flow of user transactions and internal processes of the system. Use Case Diagrams show the roles of customers and admins along with the features accessed by each. Database relations model the data structure and maintain system integrity.

Use Case Diagram

Use Case Diagram of the application consists of two main actors, namely customers and admin. Use Case describes the main flow in the application which includes the process of ordering services, managing transaction data, and monitoring carried out by the admin. Use Case can be seen in Figure 2.

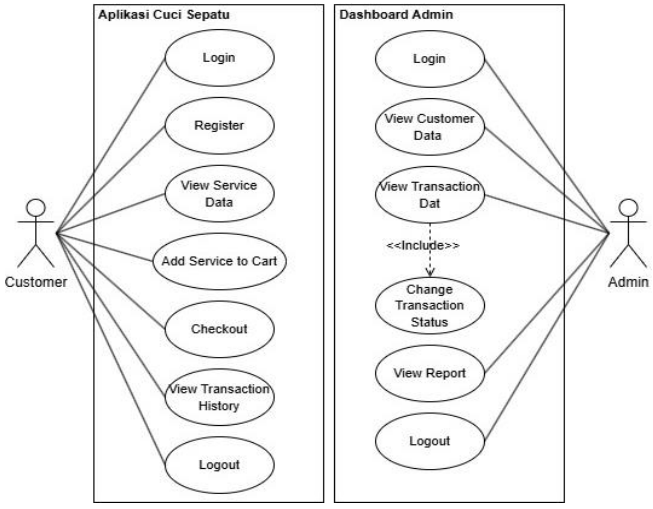

Figure 2. Use Case Diagram Customer and Admin

Activity Diagram Login and Register

Figure 3 illustrates the flow of the customer login and registration process in the application. The diagram on the left shows the login flow. The diagram on the right illustrates the registration process. These two processes show the flow of how customers can enter the application either through login or registration.

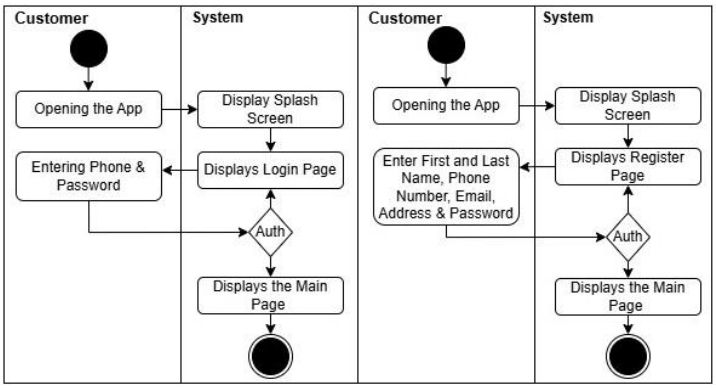

Figure 3. Activity Diagram Login and Register

Activity Diagram Service Ordering

Activity diagram Figure 4 shows the flow of ordering shoe washing services at Pojok Shoescare. The process starts when the customer selects a service from the main page, then the system displays the description and adds it to the cart. Customers can add other services or go directly to checkout. If the customer does not

want to add services the system will display the payment gateway for payment. Furthermore, customers can view the order history with the following activity diagram image.

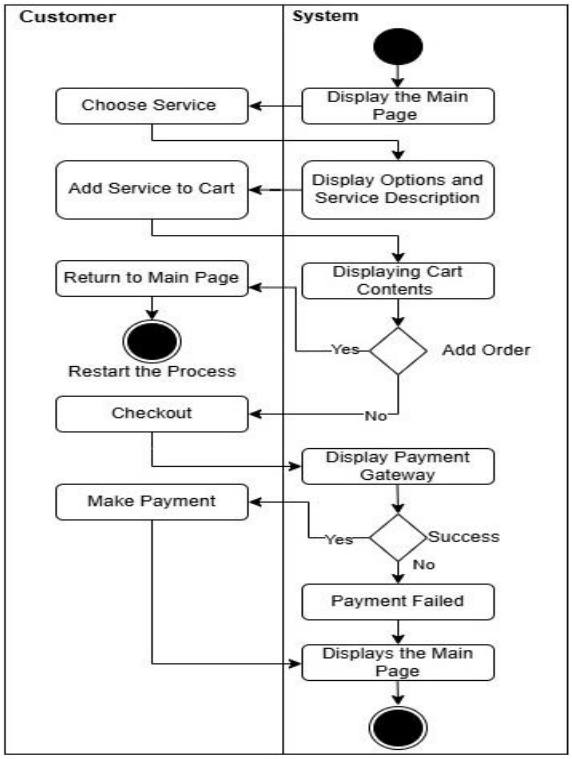

Figure 4. Activity Diagram Service

Database Table Relationship

Table relations are used to describe the relationship between tables in the database used in the application. Table relations display seven tables namely customer, cart, cart details, service, checkout, payment, and admin. Table relations can be seen in Figure 5.

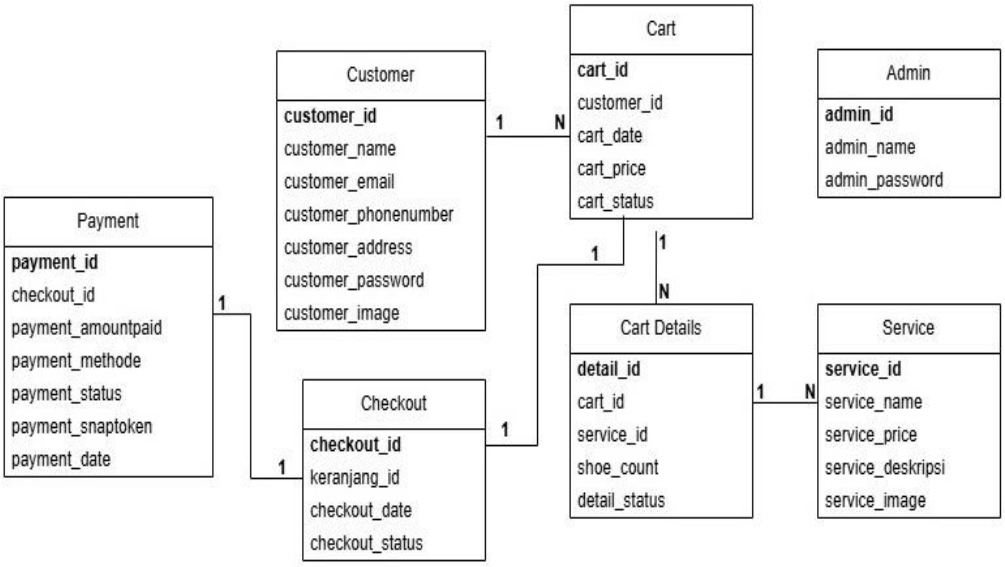

Figure 5. Database Table Relationship

System Results

The result of the system is the formation of the PojokShoesApk Application which provides shoe washing services with various functional menus. The interface for the customer application was created using

the Kotlin programming language. While the admin web interface is designed with PHP and CSS programming languages.

Login and Register Page

The Login page is used to enter the PojokShoesApk application. Customers can enter the application by entering their Phone Number and Password if they already have an account. The Register page is used to register an account so that customers can enter the application. The login and register pages can be seen in Figure 6.

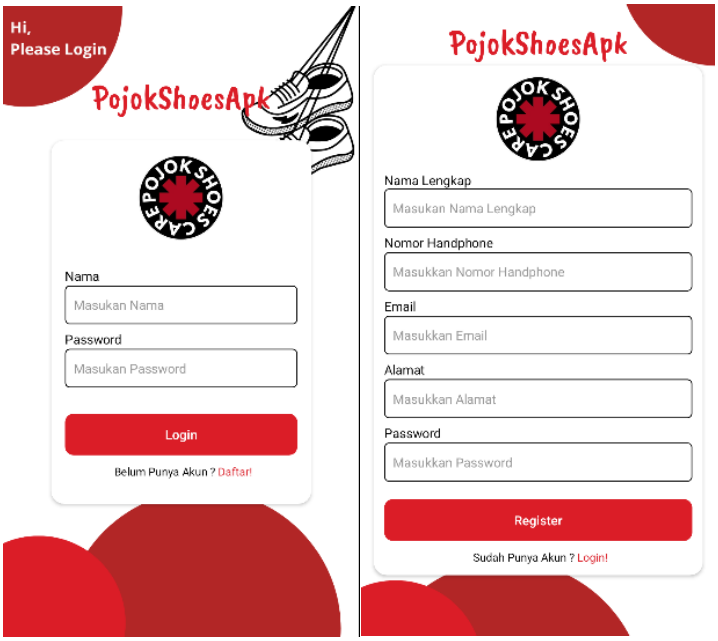

Figure 6. Login and Register Page

Home Menu Page

The home menu of the PojokShoesApk shoe washing service app features four main services: Fast Clean, Deep Clean, Reglue, and Recolor. Each selected service will display its respective order form. Furthermore, there is a basket icon that will go to the basket page. Can be seen in Figure 7.

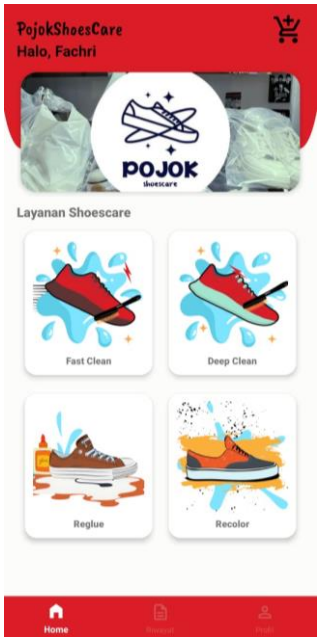

Figure 7. Home Menu Page

Service Ordering Page

The booking page displays the services provided. There is also a description and price of each service. Furthermore, there is a cart input button to order services. Service ordering page can be seen in Figure 8.

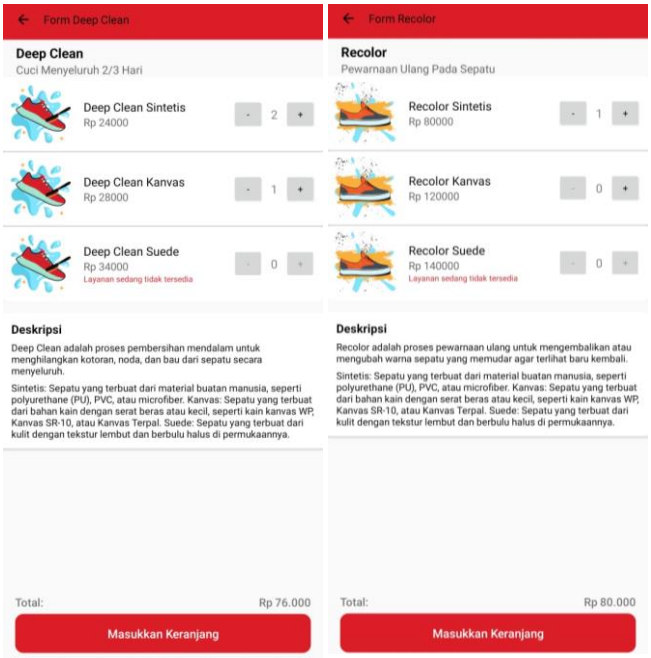

Figure 8. Service Ordering Page

Checkout Cart and Order History Page

The cart page displays the service selected by the customer, a pick-up fee of Rp 32,000, calculated based on a distance of 8 km from the location of Pojok Shoescare at a rate of Rp 4,000/km. While the history page displays bookings that have been checked out. Can be seen in Figure 9.

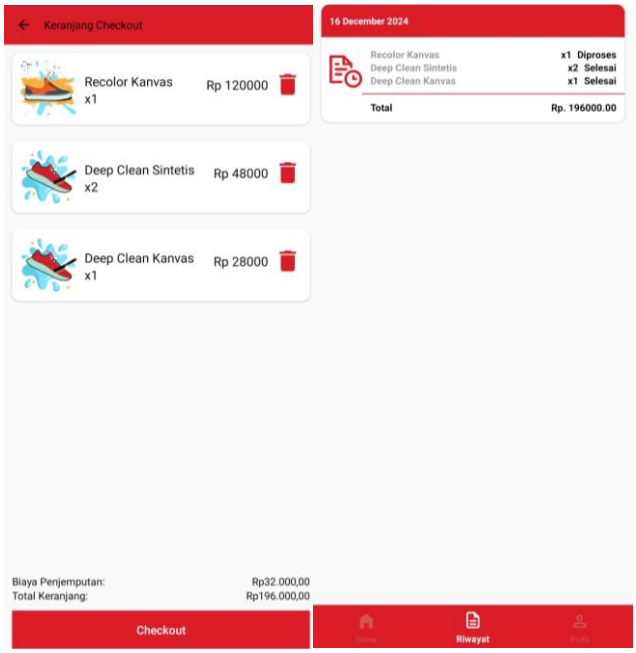

Figure 9. Checkout Car and Order History Page

Payment Gateway Page

The payment page is the total checkout payment page. The left image displays the payment method. The right image displays payment details. Payment gateway page can be seen in Figure 10.

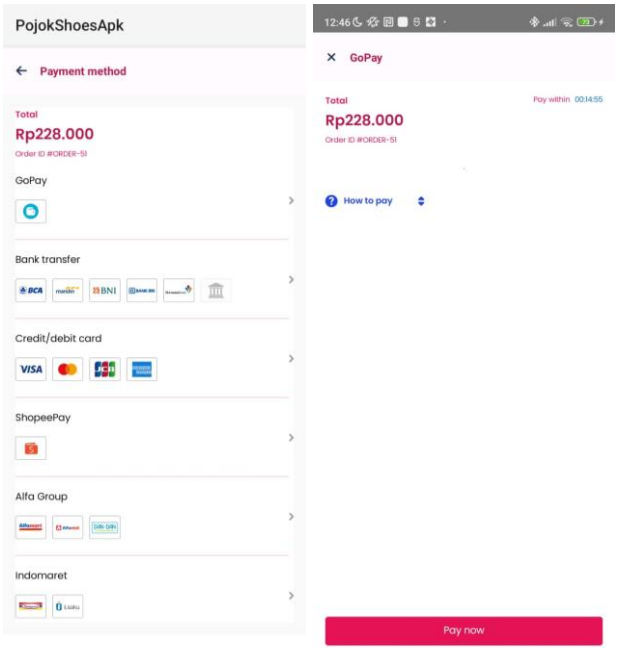

Figure 10. Payment Gateway Page

Admin Transaction Page

Figure 11 is used to manage customer transactions. This page displays the transaction details of the customer who placed the order. There is information on what services are ordered as well as the total payment and status of the ordered services.

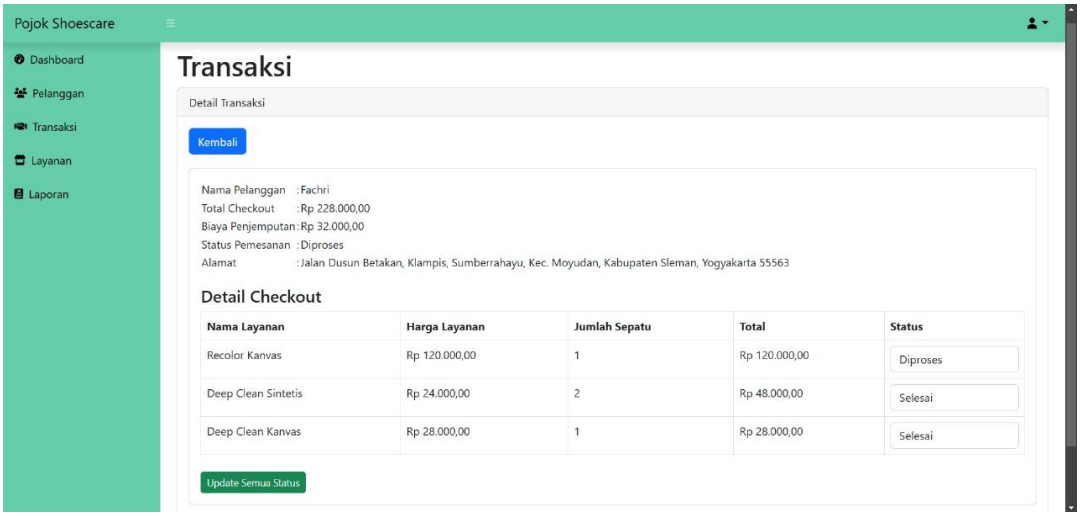

Figure 11. Admin Transaction Page

Black Box Testing

Table 1. Application Black Box Testing

Testing	Expected Results	Testing Results	Results
Customer account registration	Customers can register	Customer account successfully registered	As per
Customer login	Customers can login	Customer login to the app homepage	As per
Selecting the ordered service	Customers can choose services	Display services and descriptions	As per
Add services to cart	Customers can add services to cart	Service added to cart	As per
Checkout	Enter the payment gateway page	Display the payment gateway	As per
Make payment	Successful payment and return to home page	Display the home page	As per

Select the history menu	Enter the order history page	Display order history	As per

User Data Security

User data security is a very important aspect for online-based applications. Personal information such as names, addresses, phone numbers, and financial information can easily be stolen or misused by irresponsible parties. Threats to personal information security of app users are diverse, including malware attacks, phishing, hacking, and identity theft. The impact of a personal data security breach is not only financially detrimental to the user, but can also damage the user's reputation in the community [18]. The following are some of the steps implemented:

1. Data Encryption
   The data transmitted between the user and the server is encrypted using HTTPS to ensure that the transmitted information cannot be accessed by third parties. In addition, sensitive data stored on the server is protected to keep it confidential.
2. Password Hashing
   Passwords entered by users are not stored in original text form on the server. They are processed through the bcrypt algorithm. Bcrypt is hashing passwords with a larger number of illustrations to make it slower and last longer against brute-force search attacks and increase computing power by incorporating salt to protect against rainbow table attacks [19].
3. Role Based Acces Control (RBAC)
   This system uses Role Based Access Control (RBAC) to restrict access to data based on the user's role in the application. In this application, only admins have access rights to manage sensitive data, such as customer data, transaction history, and transaction status. Meanwhile, customers can only access information such as the services they ordered, order status, and their personal transaction history.

Evalution Data

Before the application was implemented, the manual order processing process took an average of about 16 minutes. This process involved various stages, such as recording orders by the admin, confirming orders to customers, and checking payment and payment status. After the application was implemented, the processing time became 8 minutes. This is due to the automation of several processes, such as ordering directly by customers through the application, structured data storage, and payment system integration that speeds up order verification and confirmation. With a reduction in processing time by 7 minutes per order, the app provides an efficiency of about 50%. This efficiency can be calculated by subtracting the manual time (16 minutes) from the app time (8 minutes) and dividing it by the manual time, resulting in significant time savings. A time comparison chart can be seen in Figure 12.

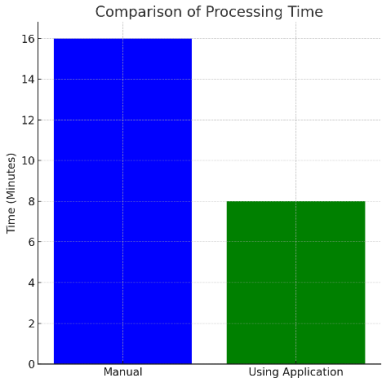

Figure 12. Time Comparison Chart

In addition to saving time, the app can also increase the number of orders processed each month. Before the application was implemented, the average order that could be handled was 100 orders per month. After the app is implemented, it is estimated that the number of orders will increase by 40%, from 100 orders to 140 orders per month. This increase is due to several factors, such as easy access for customers to order services at any time through the app, as well as a faster and more efficient ordering process. With the app, customers can easily find out the various services available, which encourages them to book more services. In addition, the more organized system allows the admin to manage more orders. Therefore, the app not only improves time efficiency, but also increases the capacity of services and transactions that Pojok Shoescare can handle. The graph of the increase in orders can be seen in Figure 13.

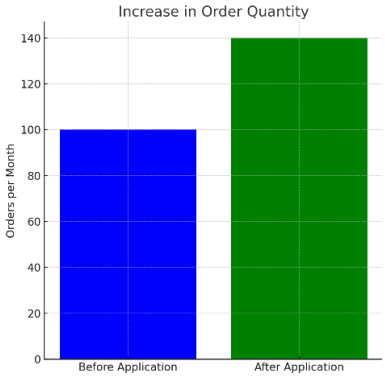

Figure 13. Order Increase Graph

Conclusion

The conclusion of this research is that the development of an Android-based shoe washing service mobile application at Pojok Shoescare has succeeded in improving the efficiency and quality of service. The application designed makes it easy for customers to order services online, and provides information about the various types of services available. The application has been integrated with a payment gateway, making it easier for customers to make payments. Management of orders and customer data becomes more efficient through a web-based admin dashboard. Admins can easily manage transaction data, customers, and available services. This implementation is expected to improve the quality of service at Pojok Shoescare and support business growth in the future. Data security measures have been implemented to protect user data and ensure that customer data remains secure and can only be accessed by authorized parties.

Some suggestions for further development are as follows: adding and enhancing existing features, such as notifications, and improving the application's security system. These efforts are expected to make the application more optimal in providing services and improving user experience.

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