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Design of an Android-Based Product Ordering Application in The Bakery Industry Using Multimedia Development Life Cycle Method

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ABSTRACT

The bakery industry in Indonesia shows increasing development. One of the activities carried out by this industry is processing customer orders. Currently, there are still bakery industries where customers order products manually, either by coming directly or by using a telephone or WhatsApp. Manual product ordering causes several problems that can hinder business activities and will have an impact on customer service. This study aims to design an Android-based product ordering application in the bakery industry. The application design uses the Multimedia Development Life Cycle (MDLC) method. The application design stage consists of six stages, namely concept, design, material collecting, manufacturing, testing, and distribution. The results of this study are in the form of an Android-based product ordering application that uses multimedia to provide detailed information related to products and has interactive features to respond to customers quickly. In addition, this application can also generate a summary report of customer orders via the Dashboard. The application that has been designed is expected to support bakery industry players to manage and monitor product ordering performance and improve customer service.

Keywords: *Android Application, Product Ordering, MDLC*

1. INTRODUCTION

In the era of industry 4.0, technology is increasingly used in various business activities as an effort to improve customer service. One of the activities carried out by the company is processing customer orders. Companies can use technology to manage and monitor orders made by customers. Ordering is a process of activities carried out by customers or orderers to obtain products or services [1]. The process of ordering goods can be done in various ways, such as ordering manually by coming directly to the company or ordering online, using a mobile application. Currently, there are still industries that process customer orders manually, either by coming directly or by using a telephone or WhatsApp. In addition, the recording of these orders is also done by the industry manually without using an application so that it needs to be recapitulated based on customer orders. Ordering products that are still manual and have not used a particular application can have negative impacts both for customers and the industry.

One of the industries that can utilize product ordering technology by customers is the food industry. The bakery industry business is part of the processed food industry that uses wheat flour as the main raw material in its manufacturing process. Some products from the bakery industry are bread, cakes, donuts, biscuits, rolls, karaker, and pies [2]. In the last ten years, the bakery industry in Indonesia has shown rapid development [3].

In the bakery industry business process, the product ordering process is important. Customers need to know the price information and product menu options presented before placing an order [4]. Product orders made by customers can be made through direct orders, telephone and

using WhatsApp. However, the use of WhatsApp and telephone media can experience obstacles. If messages or telephones are not responded to immediately, it will result in customers having to wait quite a long time [5]. Manual order recording also experiences obstacles. The industry needs to manually re-record order data based on orders that have been received to find out the data recapitulation. A manual ordering process like this can certainly result in errors in data recapitulation related to products, quantities, and agreed prices [6]

Based on the previous description, it can be seen that ordering done manually causes several problems that can hinder industrial business activities and will also have an impact on customer service. Therefore, a product ordering application is needed that can be used by customers to place orders so that the bakery industry can carry out order processing effectively and responsively.

A product ordering application is a facility provided by a company to make it easier for customers to order products or services online through digital devices. This application was created with the aim of providing an easy-to-use interface to view products, determine the amount or type of product desired until the payment process. This concept emerged as a response to the increasing demand for ease of transactions in the digital era. Online-based applications have several advantages in their use, namely simplifying the process of ordering goods in an easy and practical way so that customers can order goods from anywhere and anytime using easily accessible software. In addition, the application can provide information on the availability of goods in real time so that customers can order goods that are available and according to their needs [7]. The use of the application can also provide notifications/notifications regarding product orders, order status and shipping receipt numbers [8].

Android-based applications can help with the product ordering process and reporting of order data that can be utilized by industry players [6]. The advantages of using Android-based technology are that it can be used for various purposes, simplifying the process of developing applications and information systems so that it can simplify the process of ordering products, and having open access to technology so that it can make it easier for developers to create application technology that can be accessed by users [9].

Multimedia Development Life Cycle (MDLC) method is one of the methods used to develop multimedia applications. The application of the MDLC method for application development has several advantages, including the resulting application being more interactive and interesting for users because it utilizes audio visuals so that it can improve the quality of the application [10]. MDLC uses mobile programming languages such as Android Studio, making it easier for application developers [11]. MDLC uses a structured flow and complete development stages, from concept to distribution [10].

The MDLC method has been used in several previous studies. MDLC has been used in several application developments including learning media, museum directory applications and interactive promotional media. In the development of learning media applications, MDLC is used to create more interesting and interactive learning applications [12]. For the development of the Sumsel Museum application, MDLC is used to create an interactive information media application for visitors as a virtual guide so that it can help museum tour guides [13]. The results of developing multimedia applications using MDLC can improve the quality of graphics, sound, and interaction of the application, as well as help users in using the application [14]. The MDLC method has also been used to design multimedia system learning websites [15]. The application of MDLC is also used

for literacy learning applications by utilizing augmented reality technology [16]. In addition, MDLC is also used in the creation of interactive promotional media based on Android [17].

Based on the research gap, the use of the MDLC method for Android-based product ordering applications in the bakery industry has not been done. The application designed in this study uses a multimedia application so that the display on the application can visualize bakery products. In addition, this application can also increase responsiveness to orders or questions from customers so that bakery industry players can interact with customers through the live chat feature. This application is also used to manage and monitor product orders so that it can improve customer service. Therefore, the purpose of this study is to design an Android-based product ordering application in the bakery industry using the Multimedia Development Life Cycle (MDLC) method.

2. METHODS

This study aims to produce a product ordering application that can improve customer service and is expected to facilitate companies in managing and monitoring the performance of product orders by customers. The study began with a literature study conducted by searching for and reviewing references related to goods ordering activities. After that, a problem formulation was carried out regarding the obstacles that occurred in the goods ordering activities from customers. Based on this, a system is needed to help companies manage and monitor customer order fulfillment activities. To develop the system, data collection is needed through literature studies and collection of materials in the form of media that are in accordance with the research topic so that they are in accordance with the expected needs of the system being created. The research flow is shown in Figure 1.

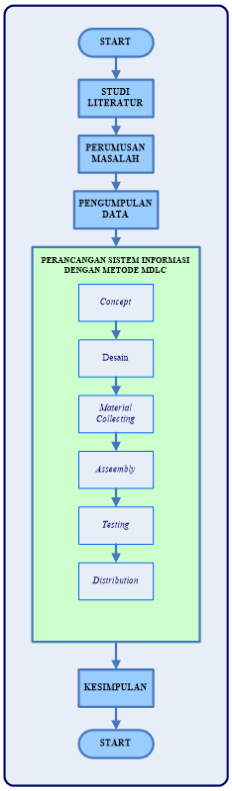

Figure 1. Research Flow

The stages used in developing a goods ordering system use the approach of the Multimedia Development Life Cycle (MDLC) method. The MDLC method is a structured reference to help

develop multimedia software when designing, building, and launching products systematically and organized [18]. This research uses the Multimedia Development Life Cycle (MDLC) method for developing goods ordering applications which consists of six stages including Sutopo (2003) in [19]:

1. Concept Stage
   The concept stage is the initial stage in designing a goods ordering system. At this stage, determine the purpose and users of the system to be created.

2. Design Phase
   The design stage is carried out after discussing the concept of the system. At this stage, a design is made regarding the program structure, theme, appearance and needs in creating the system. The system design is made using the Unified Modeling Language (UML). UML is one of the tools for designing object-based software applications [20]. The type of UML used in this study is Use Case Diagram. Use Case Diagram has a function to describe the interaction between one or more actors with the system to be built and also explains the function of the system [21]. At the design stage, the Navigation Structure is also designed as a guide to the flow of the multimedia application. The Navigation Structure functions to clearly and systematically describe the structure of the relationship of all elements in the system [14].

3. Material Collecting Stage
   At this stage, supporting materials are collected according to system requirements, including several media such as audio, photos, videos, and other media needed as materials in building the application.

4. Assembly Stage
   After the design and multimedia materials are collected, a system is created to implement the system. The application is made in the form of an Android-based mobile app using the CodeIgniter Framework with the Hypertext Preprocessor (PHP) programming language. The application in the form of an Android-based mobile app aims to accommodate the need for mobility in accessing the system. The company wants a system that can be accessed to monitor customer order fulfillment mobile and in real time without having to use a PC.

5. Testing Phase
   The testing phase is carried out after the system is created to test the reliability of the system's performance. If during testing an error occurs in the system, repairs will be made to the system.

6. Distribution Stage
   At this stage, the system that has been created and passed testing will be distributed to users for use.

3. RESULTS AND DISCUSSION

3.1 Concept Stages

The concept stage begins by identifying the objectives, users of the system and the media products to be used.

Table 1. Product Development Application Concepts

Concept Category	Description
Title	Android based Product Ordering Application
Objective	Improve customer service by being more interactive and responsive, as well as managing and monitoring orders for goods.
System Users	Bakery Company
Audio	*Greeting Voice*with .mp3 format
Picture	2D illustration image in .png format
Animation	3D animation with .mp4 format
Interactivity	Live Chat Feature

3.2 Design Stages

The next stage is to design the system design according to the concept that has been prepared. The system design uses one of the diagrams in the Unified Modeling Language (UML), namely the Use Case Diagram. In addition to the Use Case Diagram, a Navigation Structure design design for the product ordering application to be created is also made. With the navigation structure, the application to be created has more focused information guidelines. Figure 2 is a Use Case Diagram of the goods ordering application and Figure 3 is a Navigation Structure design.

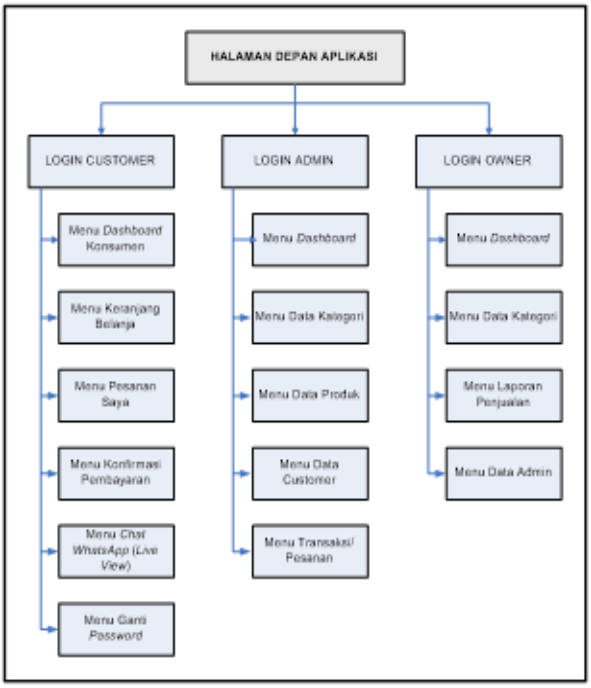

Figure 2. *Use Case*System Diagram

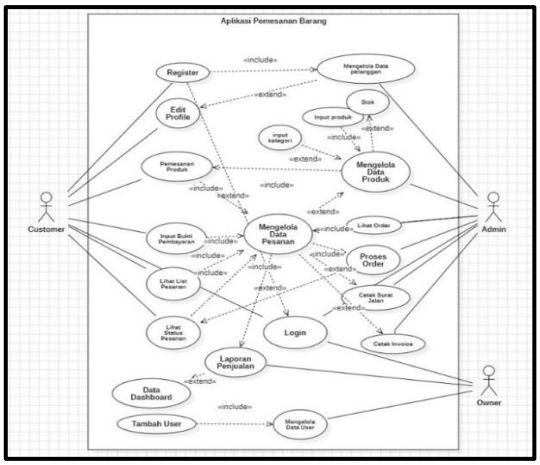

Figure 3. Navigation Structure Design

3.3 Material Collecting Stage

At this stage, material collecting is carried out from various media, both visual and audio, related to the goods ordering application. In a bakery company, the multimedia materials collected are in the form of bakery product images and Whatsapp logos in 2D, bakery product animations in 3D, and audio in the form of greeting voices on the application page.

3.4 Assembly Stage

After determining the concept, design and collecting materials, the next stage is to make an application for ordering goods. The result of the assembly stage is an Android-based goods ordering application made using the CodeIgniter Framework that can be accessed via mobile. When accessing the page from the goods ordering application, the user will enter the application's Front Page which is the initial page and then can enter the Login Page. On the Front Page there is a Greeting Voice to greet users who enter the application. Figure 4 and Figure 5 show the appearance of the Front Page and Login Page of the application.

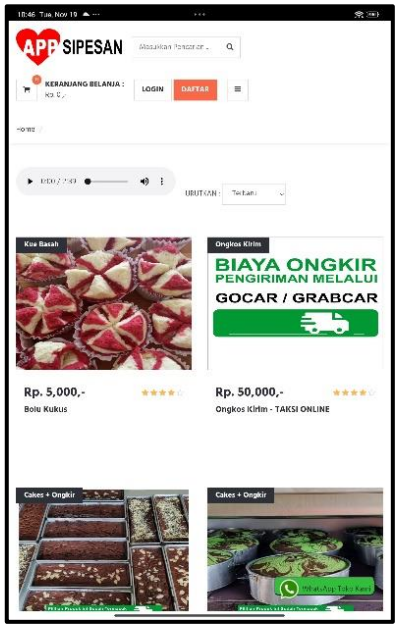

Figure 4. Front Page

To enter the main menu, the Login Page needs to be filled by the user by entering the e-mail and password that have been registered previously. The user entities in the goods ordering application are customers, admins and company owners. After filling in the e-mail and password, the user can press the Login button to enter the application. However, if the customer does not have an account before, they can register on the New Customer Registration Page. On it, users need to enter their full name, e-mail, mobile phone/WhatsApp number, full address, and password.

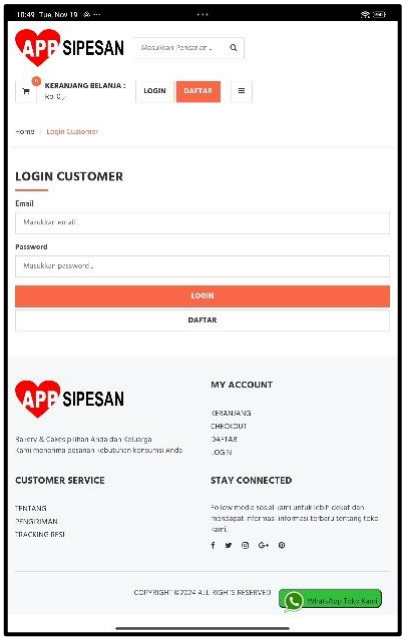

Figure 5. Login Page

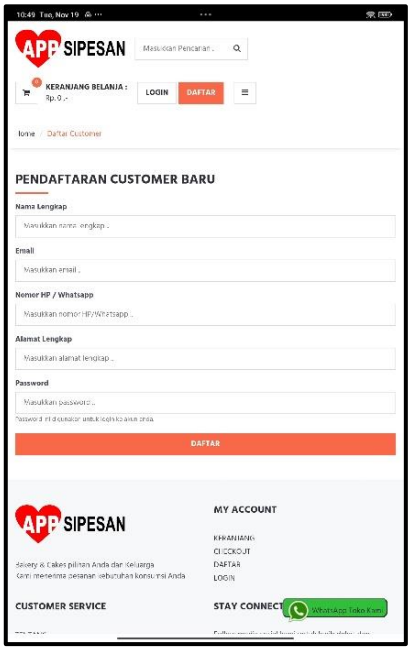

Figure 6. New Customer List Page

After all the data is filled in, the user can press the register button to register an account. Customers can also return to the login display by pressing the Login button. If the login is successful, the Main Menu display will appear according to the entity accessed by the user. According to the entity that can access it, the Main Menu is divided into three, namely the menu that can be accessed

by customers, the menu that can be accessed by the Admin, and the menu that can be accessed by the company owner.

1. Menus that can be accessed by customers

Some menus that can be accessed by customers are the Dashboard Menu, Shopping Cart Menu, My Order Menu, Payment Confirmation, WhatsApp Chat Menu (Live Chat), and Change Password.

a) Dashboard Menu

The Dashboard menu functions to display the main menus that can be accessed by customers when ordering goods and processing their orders. The information displayed on the Dashboard includes customer data such as Full Name, E-mail, Mobile Number/WhatsApp and Address.

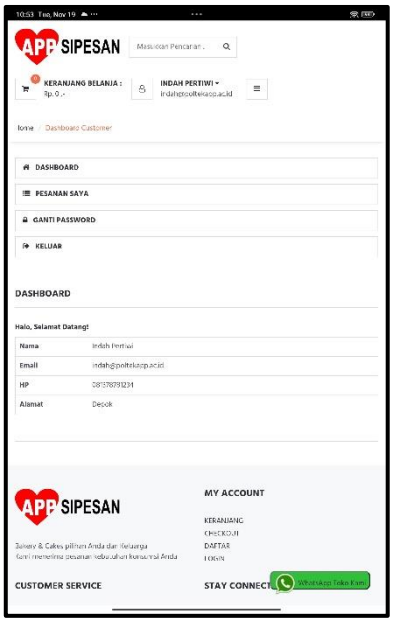

Figure 7. Customer Dashboard Menu

b) Shopping Cart Menu

On the Shopping Cart Menu View, customers can see the products currently available. Customers can also search for products by entering the product name in the search column, then the application will display the product being searched for if the product is available

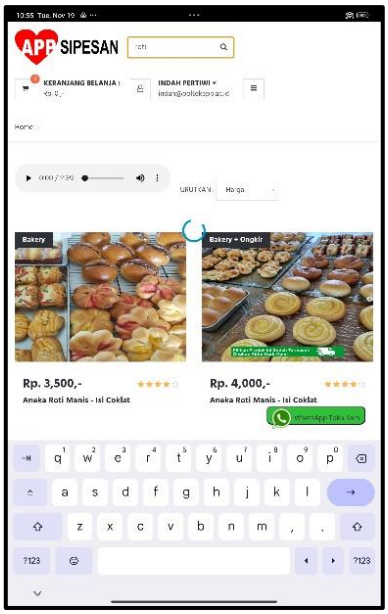

Figure 8. Product Search

If the customer wants to make a purchase, then the customer can press the image of the product to be purchased. Then the application will display the details of the product and the user can put the product into the cart by pressing the add to cart button.

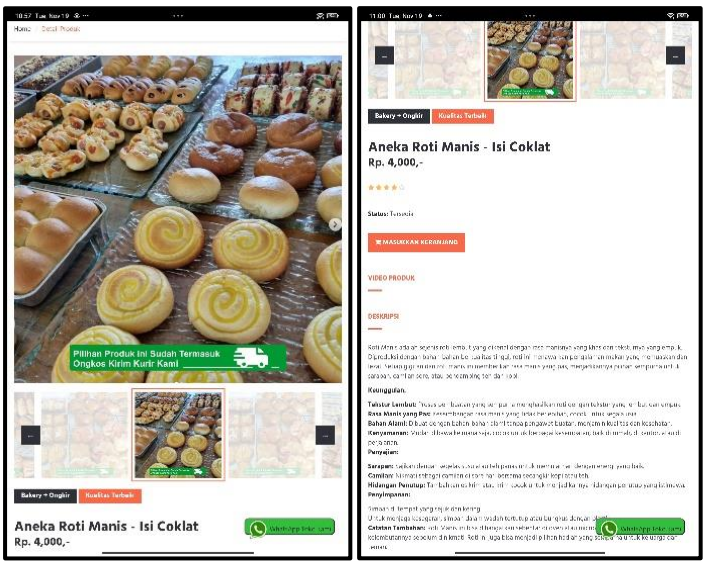

Figure 9. Product Details in Shopping Cart

c) My Order Menu

This menu will display products that have been added to the shopping cart by customers and also the total price of the product. Customers can order goods through this menu. The My Orders Menu display can be seen in Figure 10.

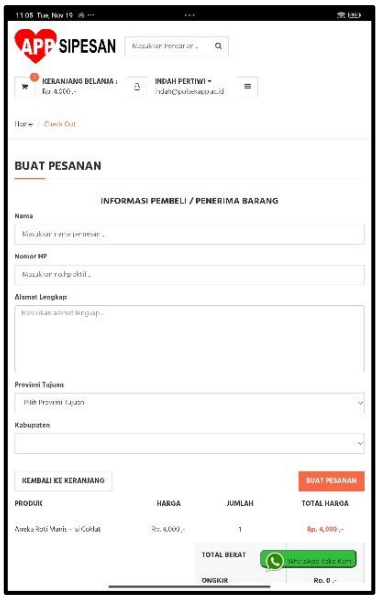

Figure 10. My Order Menu View

Figure 11. Recap of Goods Orders

d) Payment Confirmation Menu

The Payment Confirmation menu functions to send proof of payment for orders that have been made by customers. Proof of payment can be uploaded to the system then after the customer uploads proof of payment and presses the upload proof of payment button there will be a change in the payment status.

Figure 12. Payment Confirmation

e) WhatsApp Chat Menu

The WhatsApp Chat (Live Chat) menu is located at the bottom right of the application and can be used if customers have questions regarding orders. The WhatsApp Live Chat menu image is in Figure 13.

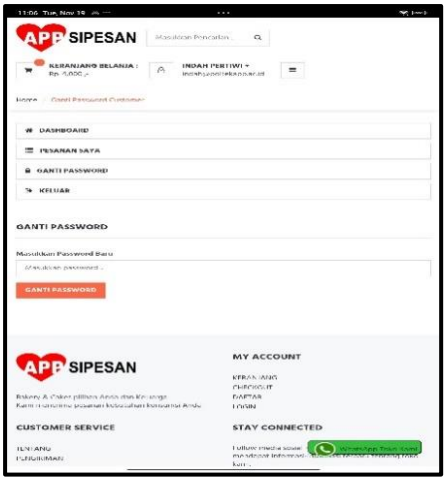

Figure 13. Menu Whatsapp Live Chat

Customers can press the chat icon then the application will direct them to WhatsApp and the company's number so they can directly submit their questions and interact with the admin. Customers must have the WhatsApp application to be able to use this feature.

f) Change Password Menu

This menu can be used by customers to change the password that has been created previously with a new password. After changing with a new password, the customer can then try to Logout from the application and Login again.

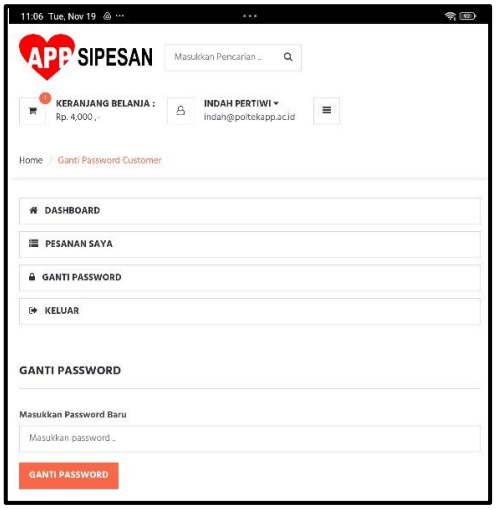

Figure 14. Change Menu Password

2. Menus that Admin can access

The next entity that can access the application is the admin. The menus that can be accessed by the admin include Dashboard, Category Data, Product Data, Customer Data, Order Transactions, and Change Password.

a) Dashboard Menu

The Dashboard menu functions to visualize information in the form of diagrams from goods ordering activities on one complete page. The information displayed on the Dashboard menu

includes the number of products, the number of customers, the number of invoices, and the number of admins.

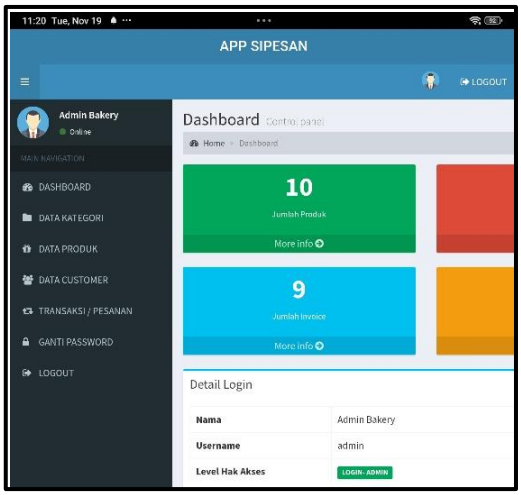

Figure 15. Change Menu *Dashboard*

b) Category Data Menu

The Category Data Menu functions to display and manage the product category database stored in the system. The Category Data Menu can be added, edited, or deleted by the admin.

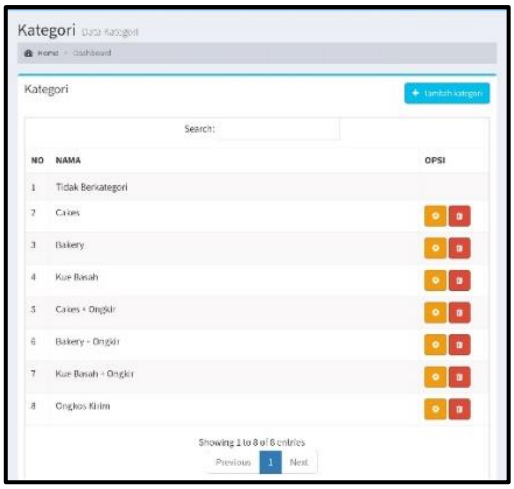

Figure 16. Category Data Menu View

c) Product Data Menu

The Product Data Menu functions to display and manage the product database stored in the application. In the Product Data Menu, you can input the product name, product stock, and product images and animations that have been collected at the material collecting stage so that customers can be clearer about their products. The Product Data Menu is divided into a sub-menu of item categories as a list of data for existing item categories, and a sub-menu of items as available item data.

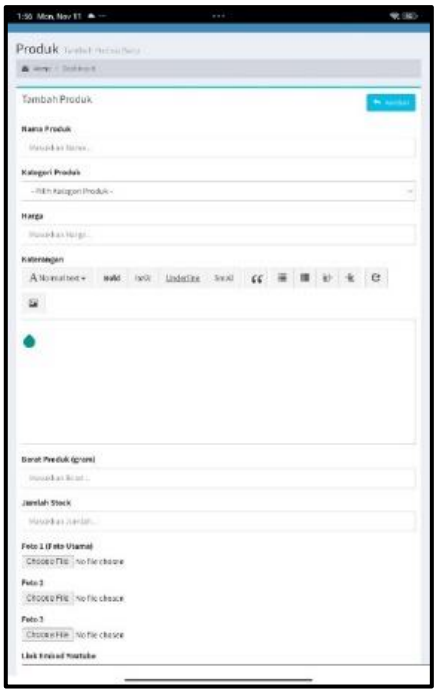

Figure 17. Product Data Input Process

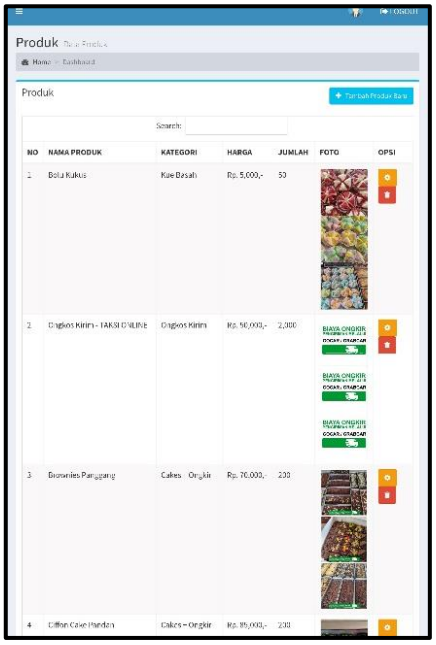

Figure 18. Product Data Menu View

Figure 19. Bakery Products 3D Animation Display

d) Customer Data Menu

The Customer Data menu functions to display and store a database of customers who order Bakery products. Every customer who purchases a product needs to input data. The data displayed is Name, Email, Mobile, and Address.

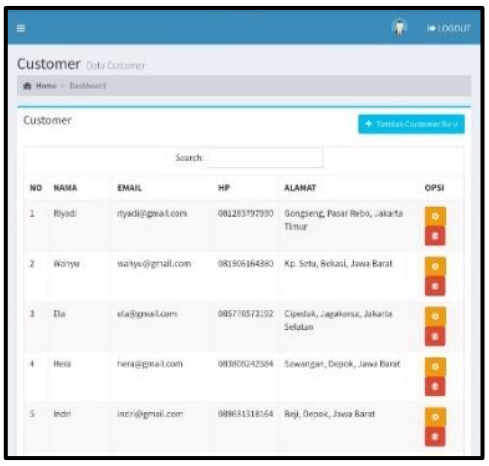

Figure 20. Customer Data Menu Display

e) Transaction/Order Menu

The order transaction menu is a menu used by the admin to view the product ordering process carried out by customers. In this menu, proof of payment uploaded by customers can be checked based on their orders. In this menu, you can also print Delivery Notes and Invoices issued by the company. In addition, there is a shipping status column used to monitor and inform the status of goods that are waiting for payment, being processed or have been sent by the courier

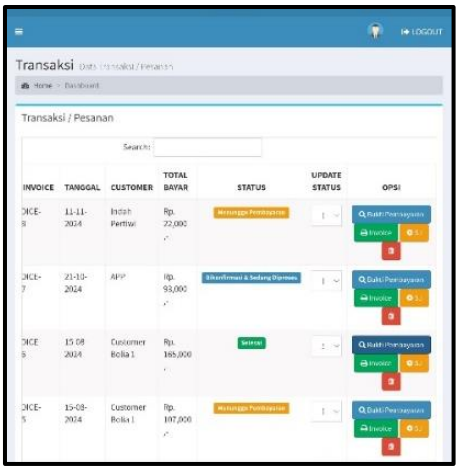

Figure 21. Customer Data Menu Display

Figure 22. Print Invoice View

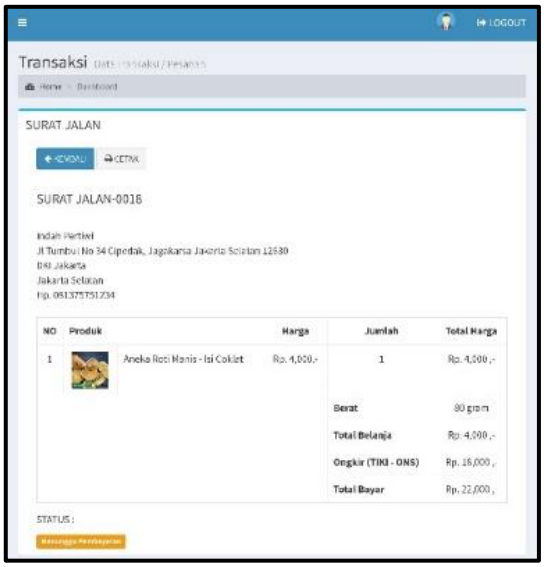

Figure 23. Delivery Note Print View

3. Menus that can be accessed by the Owner

The third entity that can access the application is the Owner of the company. The owner can monitor the performance of the goods ordering activity through the available menu. The menus on the product ordering application that can be accessed by the owner are the Dashboard Menu, Product Data Menu, Sales Report, Admin Data, and Change Password.

a) Dashboard Menu

The Dashboard menu that can be accessed by the owner has a similar display and data to that which can be accessed by the Admin. In this menu the owner can monitor product ordering activities in the company.

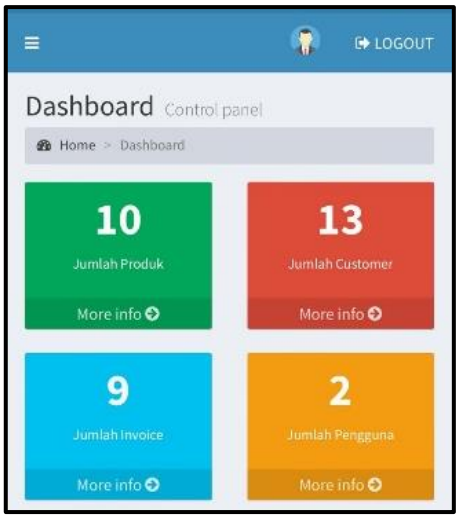

Figure 24. Owner Dashboard Menu View

b) Product Data Menu

The Product Data menu functions to display the product database stored in the application. In this menu, the owner can see what products are being sold and can be ordered by customers through the application along with the product category and price

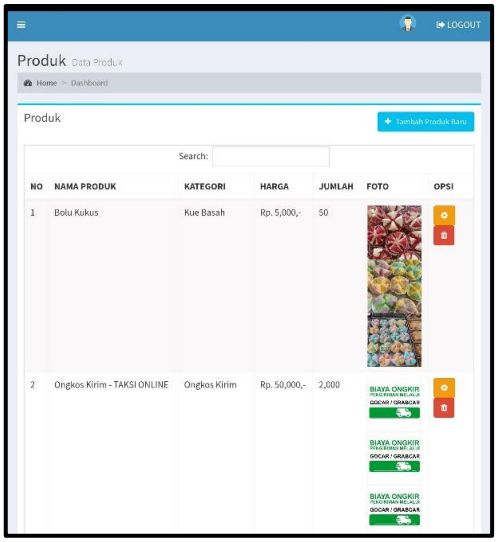

Figure 25. Product Data Menu View

c) Sales Report Menu

The Sales Report menu contains reports on product ordering activities carried out by customers within a certain time period. In this menu, the owner can view and monitor product sales performance during a certain period. Sales reports can be displayed using filters such as date filters and shipping status. If data is needed in another format, the shipping report data in the system can be exported into data in Ms. Excel format.

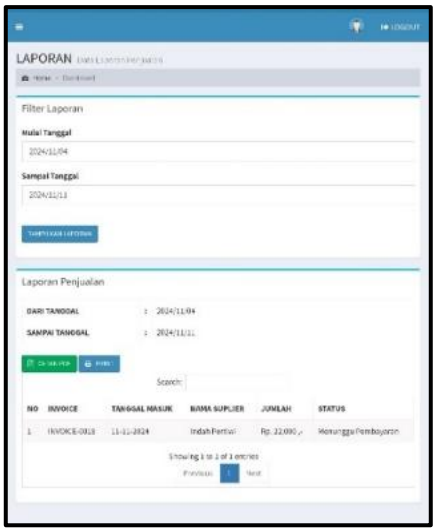

Figure 26. Sales Report Menu View

d) Admin Data Menu

The Admin Data menu contains a list of admins who can access the product ordering application. In this menu, the owner can register a new admin account that can access the application and save it to the system. This menu can only be done if the user who accesses the application is the company owner.

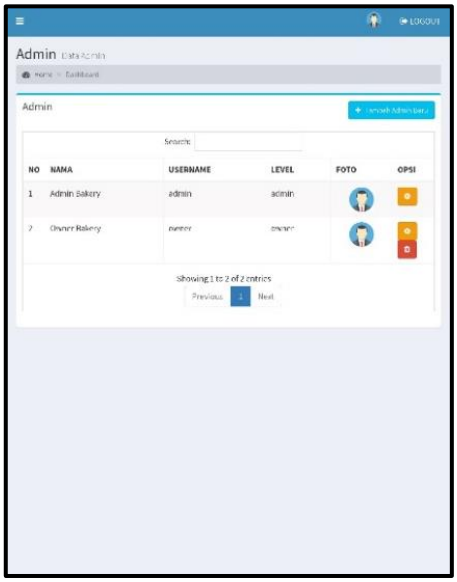

Figure 27. Admin Data Menu View

3.5 Testing

Testing is done to ensure that the product ordering application has been created properly and to ensure that the system is free from errors. Testing is done for three entities that can access the system, namely Customer, Admin and Company Owner. Testing uses the Black Box Testing method to test the functionality of the system that has been created. The test results can be seen in Table 2, Table 3 and Table 4.

Table 2. Customer Entity Test Results

No	Test Items	Expected results	Test Results
1	Perform New Customer Registration and Login	1. Can register new customers 2. You can log in by entering the username and password that you have registered and if successful you will enter the Main Menu.	In accordance
2	Customer Dashboard Menu	Can access and display customer-specific information	In accordance
3	Shopping Cart Menu	Can see the products that customers have put into their shopping cart, and display the products that are being sold in the application.	In accordance
4	My Order Menu	1. Can view and display products in the shopping cart that have been ordered by customers 2. Can see the payment status for products ordered by customers	In accordance
5	Payment Confirmation Menu	Can upload proof of payment	In accordance
6	WhatsApp Chat Menu (Live Chat)	Can connect with company WhatsApp and communicate	In accordance
7	Change Password Menu	Can change new password	In accordance

Table 3. Test Results on Admin Entity

No	Test Items	Expected results	Test Results
1	Login	By entering the correct username and password, the login will be successful and the Main Menu will be displayed.	In accordance
2	Dashboard Menu	Can access and display the dashboard	In accordance
3	Category Data Menu	Can add, edit or delete product category data	In accordance
4	Product Data Menu	Can input product data and view product database	In accordance
5	Customer Data Menu	Can input customer data and view customer database	In accordance
6	Transaction Menu /Order	1. Can view product order transaction database 2. Can print Delivery Notes and Invoices, 3. Can view order status and update order status	In accordance

Table 4. Owner Entity Test Results

No	Test Items	Expected results	Test Results
1	Login	By entering the correct username and password, the login will be successful and the Main Menu will be displayed.	In accordance
2	Dashboard Menu	Can access and display the dashboard	In accordance
3	Product Data Menu	Can input product data and view product database	In accordance
4	Sales Report Menu	1. Can view reports of goods orders within a certain time period 2. Can filter data based on date and delivery status 3. Can export data to Ms.Excel	In accordance
5	Admin Data Menu	1. Can register admins who can access the application 2. Can see admin list	In accordance

Based on the test results in Table 2, Table 3 and Table 4, the product ordering application has passed the test so that it is suitable for use by users.

3.6 Distribution Stage

At this stage the system that has been created and passed the test will then be distributed to the Bakery company so that it can be used. The application will be stored in an Android-based apk format that can be downloaded by the user.

By using the application, the ordering process for the Bakery company becomes more effective because previously the company did not have a recap of ordering data and the progress of ordering goods could not be monitored. In addition, with the live chat feature, customers can directly contact the admin through the feature without having to first search for a contact number that can be contacted so that the Bakery company can be more responsive in responding to customer desires.

CONCLUSION

Based on the results and discussions that have been conducted, this study has produced an Android-based product ordering application that can manage and monitor the ordering process and improve customer service. This application uses multimedia that can provide visualization and information related to products and can interact with customers through the live chat feature. This system can also reduce errors in recapitulating customer orders and provide the latest reports regarding product orders. This can support industry players, especially the bakery industry, in managing and monitoring the business they do and increasing responsiveness to customer service. This study has limitations, including the Live Chat feature still using other applications. Customers must have the WhatsApp application to be able to use this feature. In addition, this application can only be accessed with the Android operating system, it cannot be run with other operating systems such as Windows and IOS. The scope of the application in this study only focuses on product ordering, so that further research can be expanded by adding other activities such as warehousing, inventory, and integrating with other external technology devices.

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