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Designing an Information System "Online Cashier (OK)"

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ABSTRACT

Micro, Small, and Medium Enterprises (MSME) play a crucial role in Indonesia's economy, yet many still face obstacles in adopting digital technology, particularly in financial transaction recording, which often leads to inefficiency and errors. This study aims to design and develop an "Online Cashier (OK)" system as a solution for Warung Makan Soto Lamongan Cak Munif, which still relies on conventional transaction methods. The system was developed using the Agile method, emphasizing iterative and adaptive development tailored to user needs. The design process applied system modeling tools, including Use Case, Activity, and Class Diagrams, while system performance was evaluated through Black Box Testing. The results showed that the Online Cashier system achieved an overall design success rate of 98.75% and testing effectiveness of 94%, with features such as transaction recording, inventory management, user access control, and report generation functioning properly. The system significantly improves transaction accuracy, reduces operational inefficiency, enhances financial data transparency, and strengthens business management control. Furthermore, the Online Cashier (OK) system provides an opportunity for MSME owners to become more familiar with digital business management, supporting the broader agenda of digital transformation in Indonesia. This study implies that the implementation of web-based cashier systems can enhance MSME competitiveness by enabling structured, efficient, and data-driven decision-making.

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1. INTRODUCTION

Micro, Small, and Medium Enterprises (UMKM/MSME) play a vital role in Indonesia's economy. According to data from the Ministry of Cooperatives and SMEs, the MSME sector contributes more than 60% to the national Gross Domestic Product (GDP) and employs the majority of the workforce (Supari & Anton, 2022). However, despite their significant contributions, many MSME still face various challenges, particularly in the adoption of digital technology. The accelerating pace of digital transformation should present an opportunity for MSME to enhance their competitiveness, efficiency, and service quality. However, in reality, many small business owners are unable to fully leverage technology due to limitations in resources and knowledge.

Warung Makan Soto Lamongan Cak Munif is a one of UMKM in the culinary sector located in Bengkulu City. In conducting transactions such as sales, this food stall still operates using conventional methods. This reliance on conventional systems is due to several factors, including a lack of knowledge about technology and limited availability of practical and affordable devices for small business owners. As a result, transaction records are unstructured and prone to human error, making it difficult to detect profits and losses because the data is not properly recorded.

This situation illustrates a common problem faced by many UMKM in the culinary sector, namely weak financial recording and transaction management. However, transaction recording is crucial as the foundation for strategic decision-making, such as determining selling prices, calculating profits, managing raw material inventory, and designing marketing strategies (Siddique et al., 2023). Without proper and structured recording, UMKM risk facing difficulties in growing due to the lack of valid data for business analysis (Khadim & Choudhury, 2024).

Previous studies have discussed and designed web-based applications to support various needs in businesses, especially UMKM, including research conducted to design and build an optimized Point of Sales (POS) application for Warung Inyong (Chandra et al., 2022). The results of this study were the automation of transaction recording, the provision of transaction reports, product data, and stock data, which can facilitate sales analysis and inventory management. The next study involved the application of the Design Thinking method in the development of the UI/UX of a food ordering application for traditional eateries (Aziz et al., 2023). Through five stages (Empathize, Define, Ideate, Prototype, and Test), this research produced an application with high user satisfaction scores based on the System Usability Scale (SUS) and User Experience Questionnaire (UEQ). The results showed that the application is easy to use, but the up-to-date aspect still needs improvement for further innovation.

Based on the problems faced and findings from previous research, the design of "Online Cashier (OK)" is the right solution for Warung Makan Soto Lamongan Cak Munif in overcoming the constraints of the conventional transaction system. With this web-based cashier system, transactions can be carried out in a more structured and efficient, from recording sales to generating reports that are automatically stored. The Online Cashier (OK) system is expected to contribute to sales transaction recording and simplify overall business management.

In addition, Online Cashier (OK) also has the potential to become a learning tool for UMKM subjects in understanding the benefits of business digitalization. By adopting a web-based cashier system, business owners not only gain convenience in recording transactions, but also become accustomed to using technology to support daily operations (Prasetyo et al., 2023). This is in line with the national digital transformation agenda that encourages UMKM to be more adaptive to technological developments (Purnomo et al., 2024).

By the Online Cashier (OK) system, transaction processes can be conducted in a more structured and efficient manner, from sales recording to the automatic generation of reports. The presence of this system is expected to enhance operational efficiency, reduce the risk of recording errors, provide a clearer financial overview, and support more modern and competitive business management.

2. THEORETICAL FRAMEWORK

A. Web-Based Information System

A web-based information system is a system used to manage, store, and present information via the internet, enabling flexible data access from various locations and devices. This system plays an important role in improving operational efficiency in various sectors, such as business, education, and public services (Sijabat et al., 2020).

The advantages of web-based information systems include high accessibility, good data integration, and ease of maintenance and updating. These systems can be accessed at any time as long as there is an internet connection, thereby increasing work efficiency. Additionally, data integration enables various business processes to run in a more structured and centralized manner, reducing the risk of human error. Another advantage is the ease of system maintenance and updates, where all

changes are made on the central server without the need for reinstallation on each user device (Abdillah Putri, 2024).

In their development, web-based systems are generally created using methods such as Waterfall, Rapid Application Development (RAD), and Model Prototyping. The Waterfall method is used for a systematic approach from the analysis stage to implementation, while RAD emphasizes the creation of prototypes so that the system can be tested and refined repeatedly before being fully implemented (Kodri, 2024).

B. Cashier

A cash register is a system used to manage financial transactions in various businesses, such as shops, restaurants, and supermarkets (Widiyanti & Tisnawati, 2024). This system functions to record transactions, receive payments, manage inventory, and generate financial reports automatically. With the development of technology, cash register systems have transformed into web-based or application-based systems that can increase efficiency and reduce the risk of human error.

In the modern business world, application-based cashier systems are increasingly being used to improve transaction accuracy and simplify financial management. These systems not only support real-time transaction recording, but also help business owners monitor financial reports, manage inventory, and analyze sales data. The implementation of application-based cashier systems has been proven to improve operational efficiency, especially in small and medium-sized businesses (Firmansyah et al., 2025).

C. Previous Research

Digital-based cashier information systems are increasingly being developed to improve efficiency and accuracy in sales transactions. In this study, a web-based information system was built to manage sales, purchases, and inventory at Resto Jinggo Tutu (Setiawati et al., 2021). This system was designed using the sequential linear Software Development Life Cycle (SDLC) model and tested using the Black Box Testing method. The results of the study indicate that the system is capable of recording inventory data, sales and purchase transactions, and generating financial reports online in a spreadsheet format accessible to business owners.

Research by Rozi et al. developed an E-Cashier system at Cafe Unico Tembilahan to replace the manual cashier system, which tended to be slow and prone to errors in transaction calculations (Rozi et al., 2024). This system was built using the Waterfall SDLC model with PHP and MySQL implementation for database management. The research results indicate that the E-Cashier system can speed up transaction processes, reduce financial recording errors, and assist business owners in monitoring sales data in real-time.

The next study discusses the development of a web-based Point of Sale (POS) application for SME (Small and Medium Enterprises), particularly grocery stores, using the Agile Development Scrum method (Sulastri & Suharto, 2024). The results show that this method is effective in facilitating changes in system requirements and ensuring that the implemented features meet user needs.

The fourth study, titled "Designing a Web-Based Cashier and Inventory Application for Munawwarah Farma Pharmacy," discusses the development of a web-based system to manage sales transactions and inventory at Munawwarah Farma Pharmacy (Iqbal et al., 2023). This study was motivated by the need for more efficient and accurate data management in pharmacy operations. The Agile Software Development method was applied in the development of this application, which is equipped with sales transaction features using a barcode system and access rights management to maintain data security. The results of the study show that this application is able to speed up the transaction process and simplify inventory management, thereby improving the operational efficiency of the pharmacy.

The fifth study, titled "Analysis and Design of a Website-Based Cashier Information System for Controlling Business Management Implementation," discusses the development of a web-based cashier information system designed specifically for Micro, Small, and Medium Enterprises (MSME) (Lokesworo et al., 2022). The main objective of this system is to enable management to monitor and control business processes in real-time, which was previously impossible because the existing system could not be accessed online. With this system, it is hoped that MSMEs can improve operational efficiency and effectiveness in business management through better monitoring and direct control of business processes.

3. RESEARCH METHOD

To design the research, the Agile approach was used, which emphasizes flexibility, collaboration, and adaptability in the development of cashier applications. With this approach, development can be carried out iteratively and incrementally with a primary focus on providing added value to customers (Lutwama et al., 2024). The stages include planning, analysis, development, testing, implementation, and evaluation (Yas et al., 2023). This approach is taken so that the cashier application can be responsive to user needs, be of high quality, and be ready for implementation in a short time.

A. System Design Plan

System design is an important stage in software development that aims to describe how the system works. Use Case Diagrams are used to model interactions between users and the system, displaying various functions that can be performed by users (Ramadhani et al., 2025). These diagrams help in understanding user needs and system limitations. Activity Diagrams describe business processes or workflows within the system (González Moyano et al., 2022). These diagrams show the sequence of activities performed and possible branching conditions. These diagrams are also very useful for analyzing complex work processes to make them more efficient and easier to understand.

In addition, Class Diagrams are used to model the static structure of a system by showing the relationships between classes, attributes, and methods that each class has (Quintana et al., 2022). These diagrams help in designing object-based system architecture and determining how objects will interact.

The combination of the three diagrams: Use Case, Activity, and Class Diagrams can help developers understand the entire system. It can also help them understand how users interact, how business processes run, and how data structures and relationships between objects are implemented in the program code.

B. Place and Time

The development of the Online Cashier application was carried out over a period of 5 months from February to June 2024. The application was developed at the Faculty of Defense Technology and Engineering, Republic Indonesia Defense University.

4. RESULTS AND DISCUSSIONS

The "Online Transaction System" Use Case diagram illustrates the interaction between user and superuser with the online transaction system. User can log in, view the menu list, input transactions, manage user profiles, and view transaction reports. Superuser has additional access rights to manage menu data, including adding, editing, and deleting menus, as well as viewing overall transaction reports. This can be seen in Figure 1.

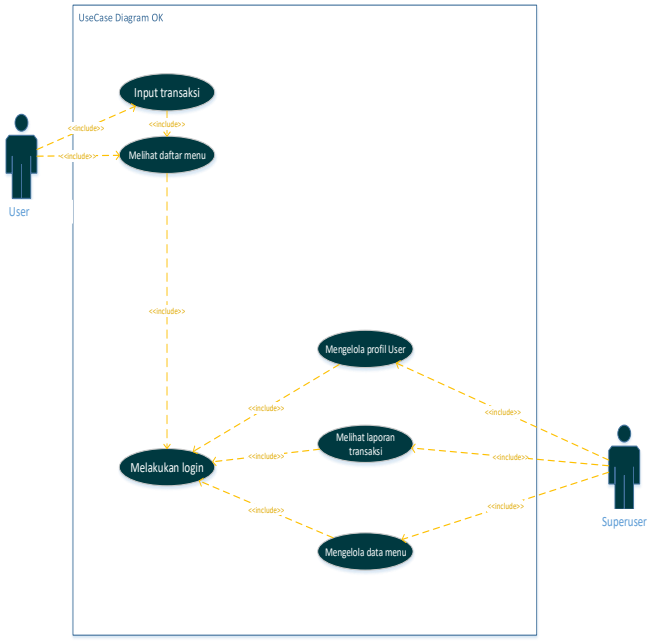

Figure 1. Use Case Diagram

An Activity Diagram consists of user and superuser activities. Figure 2 is a login activity diagram that shows the flow of the user login process on the system. It begins with the user starting the process, then the system displays a login form for the user to fill out. After that, the user enters the required login information, namely the username and password. The system checks to verify whether the entered username and password match the data in the database. If the entered data matches, the user successfully logs in and is redirected to the home page. However, if the data is incorrect, the user is redirected back to the login form.

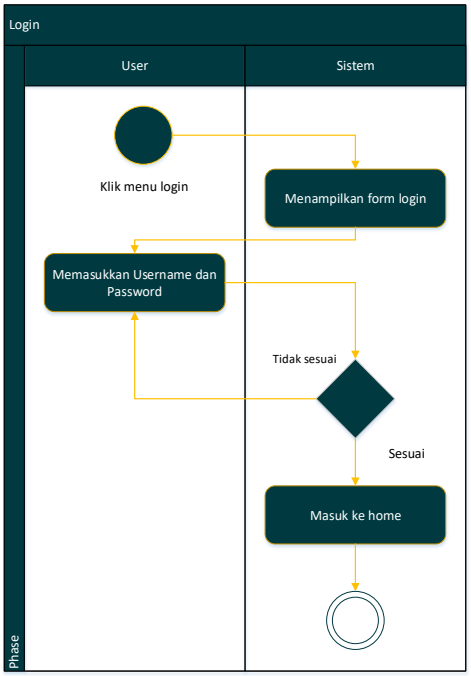

Figure 2. Activity Diagram Login

Figure 3 shows the user input transaction activity diagram. The system flow begins when the user selects the available purchase menu, then the system displays information about the selected menu. After that, the user enters the desired purchase details, and the system saves the entered data. Next, the system displays the recorded purchase data. The user then selects the type of transaction to be performed, and the system displays the transaction type options. After the payment is complete, the system prints a receipt as proof of the transaction.

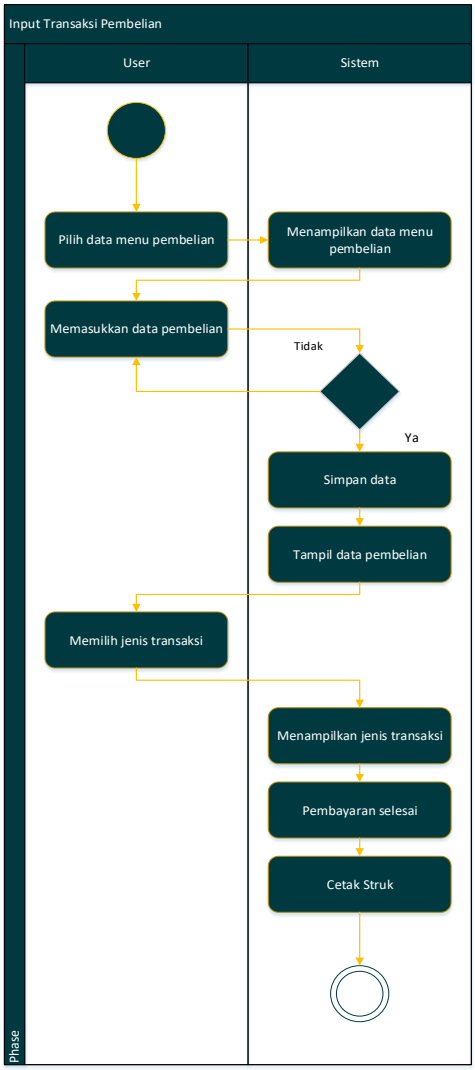

Figure 3. Diagram User Input Transaction

Figure 4 shows the Activity Diagram of a superuser viewing a report. This system flow begins when the super user selects the report menu, which then displays the report form. After that, the superuser clicks the print button, which causes the system to display the print page. Next, the superuser clicks the print button to print the report. This process produces a printed report as the output of the activity performed.

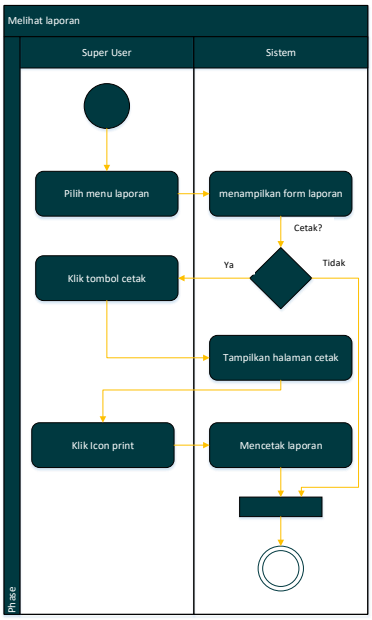

Figure 4. Superuser Report Activity Diagram

Figure 5 shows the process of a superuser managing users. The process flow begins when the superuser clicks on the setting menu, causing the system to display a list of accounts. The superuser then clicks on the account list and selects the type of account management, such as adding, editing, or deleting an account. After selecting the action, the system displays a page to perform the selected action. If the action is to add or edit, the data is saved, and the system displays the message "successfully saved." Next, the system updates the display to show the updated data with the latest details.

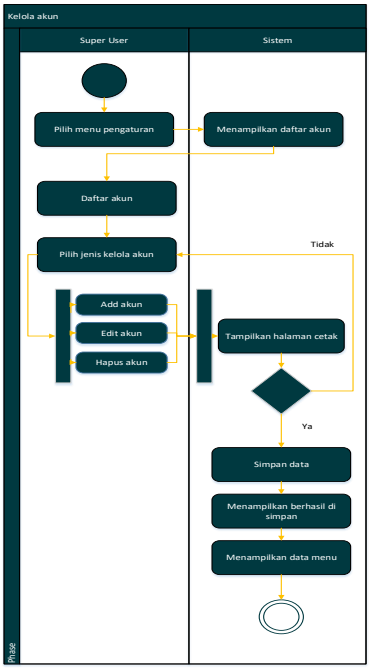

Figure 5. Superuser Activity Diagram Manage Users

Figure 6 shows the process of the superuser managing menu data. The process begins when the superuser clicks on the settings menu, which causes the system to display a list of menus. The superuser then clicks on the menu list and selects the type of menu management, such as adding, editing, or deleting a menu. After selecting the action, the system displays a page to perform the selected action. If the action is to add or edit, the data is saved, and the system displays the message "successfully saved." Next, the system updates the display to show the updated menu data with the latest details.

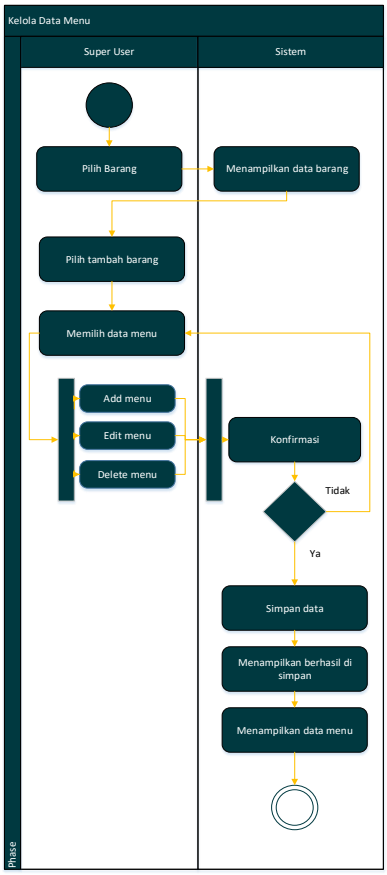

Figure 6. Superuser Activity Diagram Manage Menu Data

The class diagram in the cashier information system includes several main classes, namely Admin, Goods, Cart, Login, Admin Access, and My Reports. Admin has attributes such as login_id, user, and password. The Goods database stores information about products, including names, prices, and categories. The Cart database plays a role in temporarily storing selected items before the transaction is completed. Login handles the user authentication process with attributes such as username and password. Meanwhile, admin Access is responsible for managing admin access rights to various features within the system. The relationships between these classes ensure seamless integration in managing cashier transactions. Additionally, My Report contains financial reports that can be monitored by the owner of the food business. The class diagram can be viewed in Figure 7.

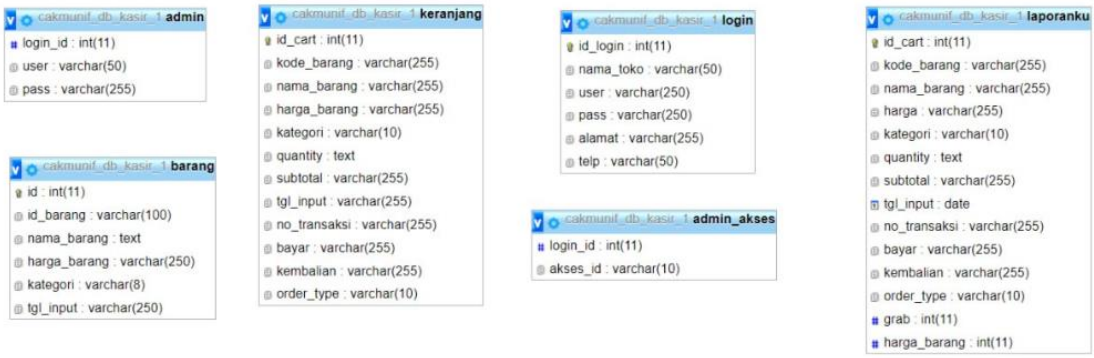

Figure 7. Class Diagram

From the results of the design that has been carried out, the results can be displayed in several views. When the system is first accessed, the admin page will appear. In Figure 8, we can see the form that must be filled in with a username and password.

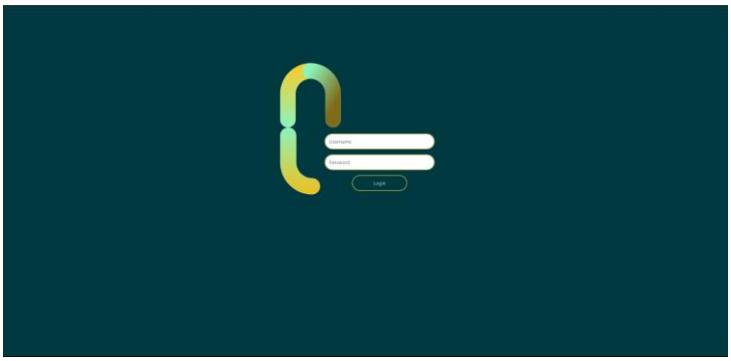

Figure 8. Login Page Display

Once logged in, the cashier can access the transaction module, which is the main function of this information system. The transaction date will be automatically filled in according to the date of the transaction. The cashier can select the type of order chosen by the buyer. The name of the item and quantity must be entered. The data entered will then be displayed on the shopping receipt draft. This can be seen in Figure 9.

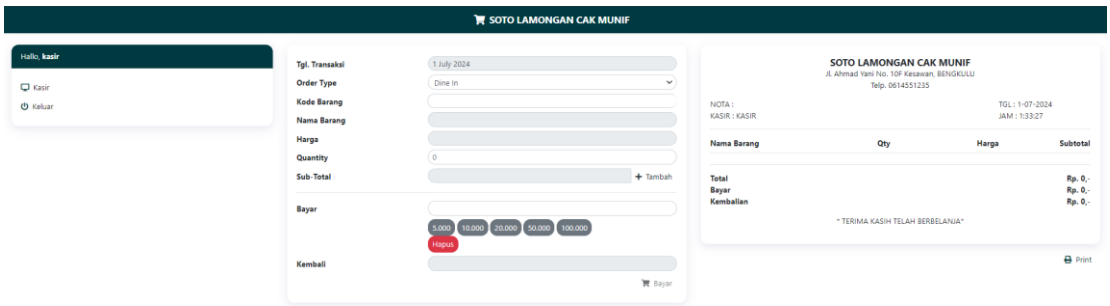

Figure 9. Cashier Main Page Display

The next screen is about setting up item names, which can only be changed by superuser. This can be done once the superuser has successfully logged into the system. On this page, superuser can change things like product names, prices, and categories. These changes will then show up on the cashier's main page. We can see what this looks like in Figure 10.

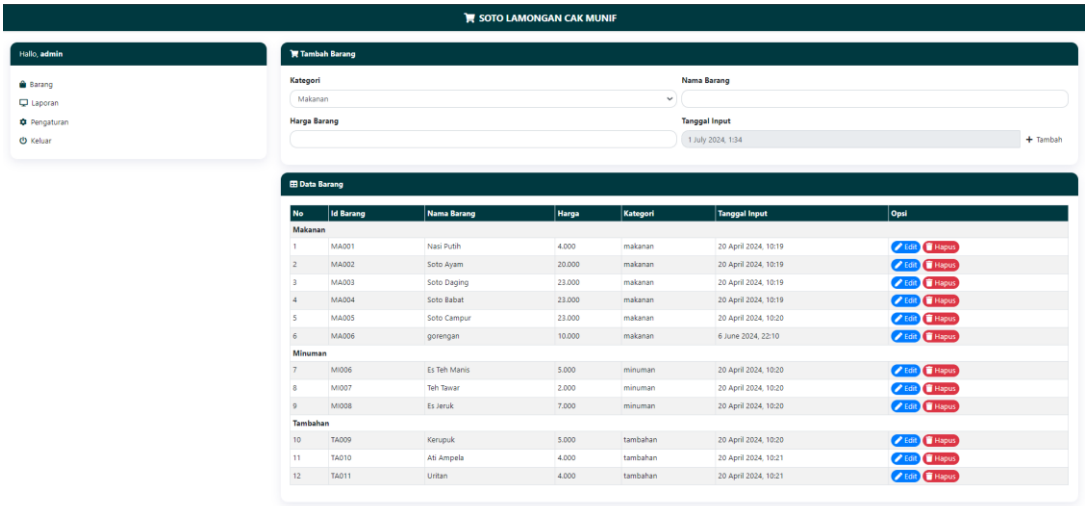

Figure 10. Item Settings Page Display

The next screen shows the sales report. This screen can also only be accessed by superuser. This screen can be seen in Figure 11.

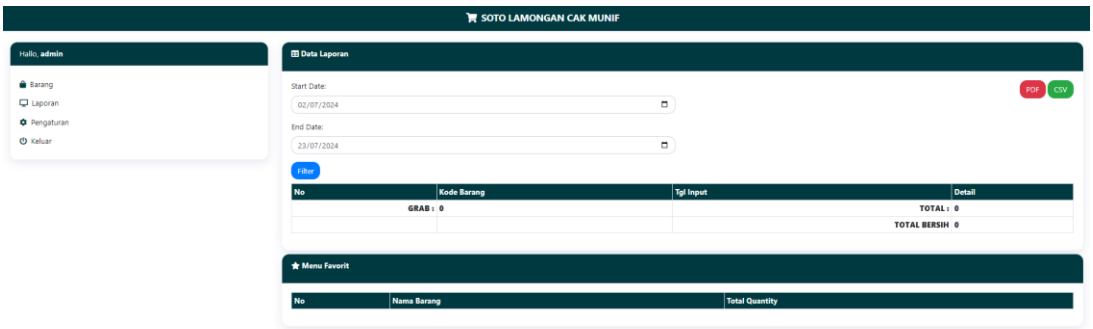

Figure 11. Transaction Report Page Display

User access rights can only be set by superuser. This page can be accessed once the superuser has successfully logged into the system. The user access rights display can be seen in Figure 12.

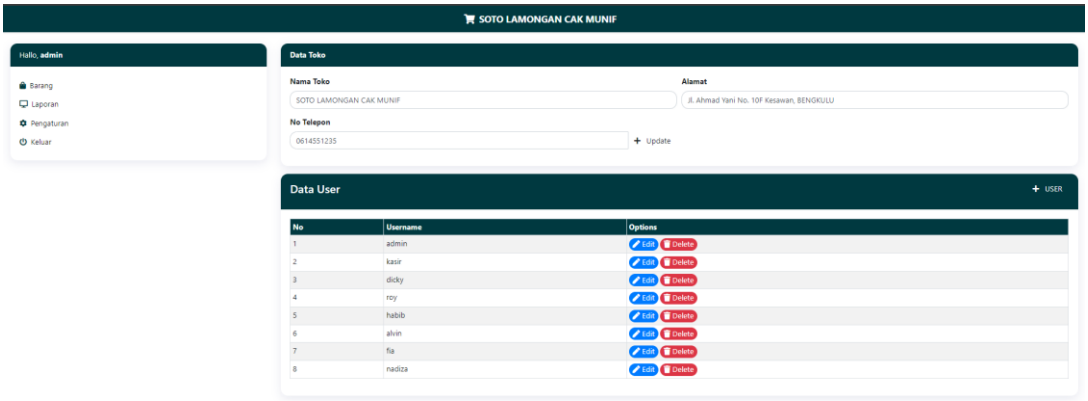

Figure 12. Access Rights Settings Page Display

As the final stage of the information system design, Black Box Testing is conducted and tested directly by the client. This testing aims to ensure that every function in the cashier information system runs according to user needs. In Black Box Testing, the main focus is to evaluate inputs and outputs without considering the internal structure of the code. The client will test various key features, such as the login process, inventory management, transactions through the shopping cart, and admin access rights. If any errors or discrepancies are found in the system, the development team will make the necessary corrections before the system is fully operational. By this testing, it is hoped that the cashier information system will operate optimally and facilitate transaction processes for users. Overall, the main functions of this system are operating as intended. This can be seen in Table 1.

Table 1. Black Box Testing System

Testing Scenarios	Test Case	Expected Results	Test Results	Conclusion
Login	Username : "kasir" Password: 'kasir"	The user successfully logged in and was redirected to the main page (cashier).	Suitable	Valid
	Username: "kasir" Password: "password123"	Displaying the message "Sorry, username or password is incorrect"	Suitable	Valid
	Username: "" Password: "kasir"	Displaying the message "please enter your username and password"	Suitable	Valid
	Username: "Kasir" Password : ""	Displaying the message "please enter your username and password"	Suitable	Valid
Transactions	Item code: "MA001" Quantity: '2' Pay: "50,000" Click add	The transaction process continues to display the sales receipt.	Suitable	Valid
	Item code: "MA001" Quantity: '2' Pay: "50,000" Click pay	Displaying "Please fill in this field"	Suitable	Valid
	Item code: "MA001" Quantity: '2' Pay: "50,000" Click add, then click pay.	Menampilkan " please fill out this field"	Suitable	Valid
	Item code: "" Quantity: "2" Payment: "50,000"	It does not change the item data	Suitable	Valid
Goods	Category: "Food" Item Name: "Chicken Soup" Item Price: "20,000" Click Add	Add items displayed in the item data table	Suitable	Valid

	Category: "Food" Item Name: " " Item Price: "20,000" Click Add	Unable to proceed to display sales receipt	Suitable	Valid
	Category: "Food" Item Name: "Chicken Soup" Item Price: "20,000" Click Add	Unable to proceed to display sales receipt	Suitable	Valid
	Item ID: "MA001" Item Name: "Chicken Soup" Item Price: "25,000"	Displaying "Please fill in this field"	Suitable	Valid
Report	Start date: 02/06/2024" end date : "10/06/2024" klik filter	Displaying transaction report data based on the time range from June 2, 2024, to June 10, 2024.	Suitable	Valid
	Start date: "10/06/2024" end date : "02/06/2024" klik filter	Displaying an empty table	Suitable	Valid
	Start date: "10/06/2024" end date : "02/06/2024"	Only displays report data from the previous date	Suitable	Valid
Settings	Store name: "Soto Cak Munif" Address: "Jl. Pramuka" Phone number: "0813138234" Click update	It will update the receipt at the cashier page	Suitable	Valid
	Store name: "Soto Cak Munif" Address: "Jl. Pramuka" Phone number: "0813138234"	It does not change the appearance on the cashier page	Suitable	Valid
	Phone: "0813437485" Address: "Jl Subroto" Username: 'kasir2' Confirm password: "kasir2"	It does not change the cashier account	Suitable	Valid

Overall, the achievement of the Online Cashier information system design was 98.75%. This shows that the application development execution stage was carried out well, with the implementation of application features in accordance with the plan and timely completion of tasks. However, there are still shortcomings in the order receipt printing module because the receipt printing function has not been implemented properly. Finally, the Testing Program achieved a percentage of 94%. This indicates that the application testing phase has been carried out effectively, with testing of various functional and non-functional aspects of the application to ensure its quality.

In designing the "Online Cashier (OK)" system, the author used the PIECES framework as an analytical tool to evaluate the needs and benefits of the system as a whole. The PIECES analysis covers six main aspects, namely Performance, Information, Economy, Control, Efficiency, and Service (Ula et al., 2021). By using this framework, the author can identify areas that need improvement while ensuring that the designed system can provide added value for overall business management.

1. Performance (Performance)

In terms of performance, the system is expected to improve the speed and accuracy of transaction recording processes. Through automation, human errors commonly associated with manual recording can be minimized. Additionally, the system enables business owners to process transactions more quickly, thereby enhancing service efficiency and improving the customer experience. Performance analysis also considers the system's ability to handle increasing transaction volumes as the business grows.

2. Information

The system is designed to provide accurate, complete, and easily accessible information. Sales data, inventory levels, and financial reports can be accessed in real-time. This information facilitates business owners in making strategic decisions, such as determining selling prices, planning inventory, and identifying the most popular products. With transparent and reliable information, business management becomes more targeted.

3. Economy

Economic analysis emphasizes that the implementation of the Online Cashier system can reduce operational costs typically incurred for manual record-keeping and document management. With this

system, human resources can be allocated to more productive activities. Additionally, reduced transaction errors lead to cost savings due to losses or recording errors.

4. Control

This system provides effective control mechanisms, including user access rights settings, transaction history recording, and structured data management. With these controls in place, the risk of data misuse or loss can be minimized. Business owners can monitor all transactions transparently and conduct regular audits to ensure compliance with operational procedures.

5. Efficiency

From an efficiency perspective, the system helps shorten operational time, simplify workflows, and reduce redundancy in transaction recording. Every process, from sales recording, stock reduction, to report generation, can be done automatically. This efficiency allows business owners to focus on developing business strategies and improving customer service.

6. Service

The system also plays a role in improving the quality of service to customers. With fast transaction processes, accurate order recording, and transparent reports, customers can enjoy a better shopping experience. Additionally, the system enables business owners to respond to customer needs more quickly, thereby increasing customer satisfaction and enhancing the potential for customer loyalty.

Based on this PIECES analysis, the "Online Cashier (OK)" system is expected not only to improve internal business management but also to significantly contribute to service quality and operational efficiency. The implementation of this web-based system supports faster, more accurate, and data-driven decision-making, enabling the store to be more adaptive to market needs and future business developments.

5. CONCLUSION

This study has successfully designed and built an online cashier information system by applying the Agile system development method. This system development method allows the system to be developed iteratively and adaptively according to user needs, thereby increasing flexibility in the development process. To ensure the functionality of the system, testing was conducted using the Black Box method. The test results showed that all the main features of the system could operate properly without significant errors. Thus, the online cashier information system that has been built can be used optimally to support cashier transactions and operations effectively and efficiently.

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