



Design of a Web-Based Point of Sale System for Warung Bakso Megaria

Ariski Try Anggara¹, Endah Sudarmilah¹

¹Department of Informatics Engineering, Faculty of Communication and Informatics, Universitas Muhammadiyah Surakarta

*Corresponding Author: Ariski Try Anggara

Email: [riskianggoro2002@gmail.com](mailto:riskianguro2002@gmail.com)



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Abstract

Warung Bakso Megaria, like many other eateries, still relies on manual transaction processes that are prone to errors and time-consuming. This can hinder operational efficiency and customer experience. To address these issues and enhance competitiveness in the digital era, this study aims to design an integrated POS system for Warung Bakso Megaria. The POS system designed in this study offers several advantages: improving operational efficiency, minimizing errors, enhancing customer experience, providing accurate sales data, and increasing competitiveness. The study employs the Waterfall method from the System Development Life Cycle (SDLC) as its framework. The POS system is designed considering the needs and scale of Warung Bakso Megaria's business. System testing was conducted using the blackbox method and the System Usability Scale. The outcome of this research is an information system that has undergone two stages of testing. The first test used the blackbox method to validate features through input and output processes, yielding valid results in ten tests. The second test employed the System Usability Scale, achieving a score of 70, which falls into the "Good" category (scale 68-80) and is deemed acceptable.

Introduction

In today's rapidly developing digital era, information technology has become one of the most important aspects in the business world. Using technology such as computer information systems, data can be collected and analyzed quickly and easily, which allows them to make decisions quickly and accurately (Meisak, 2021).

Businesses, including traditional food stalls, need to adapt to technological developments to stay competitive in an increasingly competitive market. One technology that has brought significant changes in the business world is the internet, which allows various types of businesses to expand their reach through the internet.

Small and medium-sized businesses (MSMEs) act as a counterweight and an important component of economic development in Indonesia. 99% of businesses in Indonesia are MSMEs, with the remaining 1% being medium to large-scale enterprises (Sarfiyah et al., 2019). This shows that MSME players dominate most businesses in Indonesia. Warung Bakso Megaria, as an important part of the Indonesian culinary industry, has not escaped the impact of this digital transformation. Due to the intense competition in retail trade, aspects of payment costs, sales organization and queue length greatly affect business profitability and business success of a Company (Bayu et al., 2019). In an effort to remain relevant and efficient in its operations, the megaria meatball shop needs a modern cashier system that is integrated with the latest technology. Therefore, this research aims to design and implement a website-based

point of sale system that will help increase efficiency and productivity in the daily operations of the megaria meatball shop.

It is very important to introduce the background of the problem that underlies the need for this web-based cashier system. Megaria meatball stall, like many other traditional food stalls, may experience challenges in financial management, inventory tracking, and sales reporting. Using a point of sale system, it is expected that there will be improvements in terms of accuracy in recording transactions, efficiency in inventory management, and the ability to analyze sales data more effectively.

Literature Review

An information system is a series of organized information in a system, to process existing data and produce outputs that are useful for users, both organizations and individuals. The definition of point of sale is an activity that focuses on sales and systems that support the transaction process. POS has an important role in the business world because it is considered a payment terminal where buyers make payments to merchants. This payment becomes an indicator for entrepreneurs to assess their income level. The computer becomes a platform in technology because it has advantages in terms of speed, accuracy, and accuracy (Trilaksono, 2022).

Previous research conducted (Kuncoro et al., 2015) and (Azwanti, 2017) stated that the point of sale system or cashier system that uses technology is expected to improve from the previous system which is classified as still using manuals. The goal is to increase the efficiency of the cashier's work and make optimal use of technology to increase productivity and ensure more guaranteed stock data collection, besides that it is expected to reduce errors in sales data processing. The automated cashier system presents a technologically managed product interface, facilitating cashier work more efficiently (Söderlund, 2018).

Other research conducted (Hasbi & Istabil, 2023) also states that the development of this point of sale system is to improve the transaction process, efficiency, transaction accuracy, and reduce the risk of data loss or errors that may occur in the manual process. This research also uses the waterfall method because it is very suitable for the development of the software, this method goes through the stages of analyzing software requirements, using case diagrams, incoming relationship diagrams, implementing systems, and testing.

Researchers conducted (Sani et al., 2018) took a case study at Pecel Pincuk Bu Tinuk Restaurant, which experienced problems in carrying out its business processes and in collecting information about income, expenses, and stock from each outlet. Functional testing of the system in the study showed that the functional features that have been developed on the system fully meet user needs. Research (Wiguna et al., 2019) Creating a Point of Sales Distro Management System application using the React Native Framework by utilizing the Classic Life Cycle Method. After going through a series of tests that meet expectations, the application was successfully created and has been adjusted to the needs of the distro. Development of a Web-Based Point of Sales Information System at Colony Amaranta Bekasi conducted (Cahyadi & Arifin, 2017) applies the Waterfall and Linear Sequential development methods. The design of this information system includes main features such as master data processing interfaces, customer registration, transaction processing, and various types of transaction-related reports (Mendoza, 2019) developed a Point of Sale System with Inventory application for ARM's Food and Delicacies using the SDLC development model. The results showed that the Point of Sales system was able to assist in filtering various types of data quickly and easily through computerized records.

Methods

The research method that will be used to create a postal system at the Megaria meatball shop is the System Development Life Cycle (SDLC) waterfall model. The waterfall model is a classic linear sequence or life cycle pattern. The waterfall model provides a sequential or sequential approach to the software life cycle starting from the design analysis, coding, testing, and support phases (Apriyanto & Salwa, 2018). Waterfall model, a model that is often used in software development and information technology project management. This method has several stages that must be carried out in order such as requirements analysis, design, programming, testing, and implementation. The following illustration of the research flow is depicted in Figure 1.

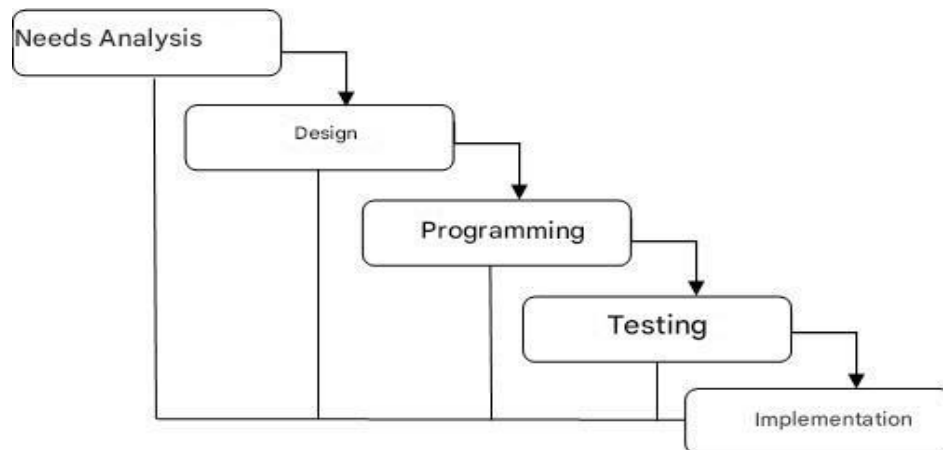


Figure 1. Waterfall method

Needs Analysis

Needs analysis is the first step taken for system development in the waterfall method, where an evaluation of the needs needed to be carried out to support the next system stage (Kirana & Fatmawati, 2023). The initial stage is the process of observation activities, interviews with shop owners, customers, and employees to obtain the data needed in the design of the point of sale system. Reference collection such as journals and articles is also carried out. System requirements analysis is very important to assess whether the system created is in accordance with the needs or not (Hutauruk et al., 2017). Requirements analysis is divided into functional and non-functional this process involves collecting feedback from users, testing the system, and monitoring system performance regularly

Functional Requirements

The POS system must be able to automatically calculate the total cost to be paid by customers during the transaction, record each sales transaction accurately, allow managers to manage food data such as adding, editing, and deleting food information, and generate transaction data collection reports periodically for business analysis. According to the view of (Setiyani & Tjandra, 2021) functional requirements analysis is a process carried out to define what needs will be applied to the system.

Non-Functional Needs

Non-functional needs of the Warung Bakso Megaria POS system include responsive performance so that transactions can be made quickly, customer data security to protect sensitive information, high availability during operating hours, and easy scalability to adjust to business growth. According to (Sari & Marsa, 2022) Non-functional requirements are the needs required by users to ensure that the system can be operated properly. This includes aspects such as performance, security, availability, scalability, interoperability, ease of use, legal compliance, and technical support. These needs are important to determine what is needed so that users can use the system efficiently and effectively.

Design

The next stage in this waterfall method is the design stage. According to (Suryadi & Zulaikhah, 2019) design is the process of designing, describing, and organizing system elements into a single unit that functions optimally. At this stage, system elements are combined and arranged to create an effective and efficient system. System design includes creating methods, use case diagrams, and activity diagrams to visualize solutions using system modeling software.

Use Case Diagram

The first stage for designing this website is the use case diagram. Use case diagrams are visual representations that show the relationship between actions performed by system users (use cases) and the parties involved in these interactions (actors). These involved parties can be individuals, devices, or even other systems that interact with the system being developed (Fauzi & Wulandari, 2020). The following use case diagram is illustrated in Figure 2.

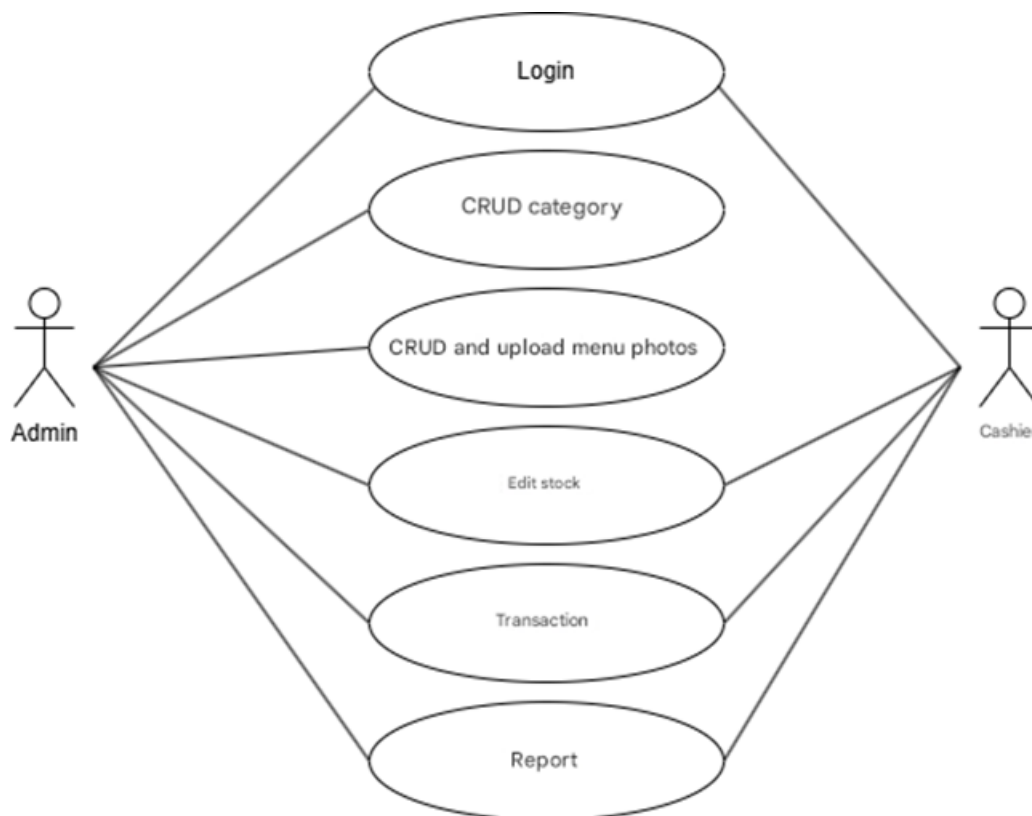


Figure 2. Use Case Diagram

Activity Diagram

The second stage for designing this website is the activity diagram. Activity diagrams are intuitive and flexible representations of semantic specifications used to show how systems behave and the logic behind complex operations. As a result, it is often used as an early tool in designing software or hardware systems (Al-Fedaghi, 2021). The appearance of the activity diagram design in Figure 3 dan Figure 4.

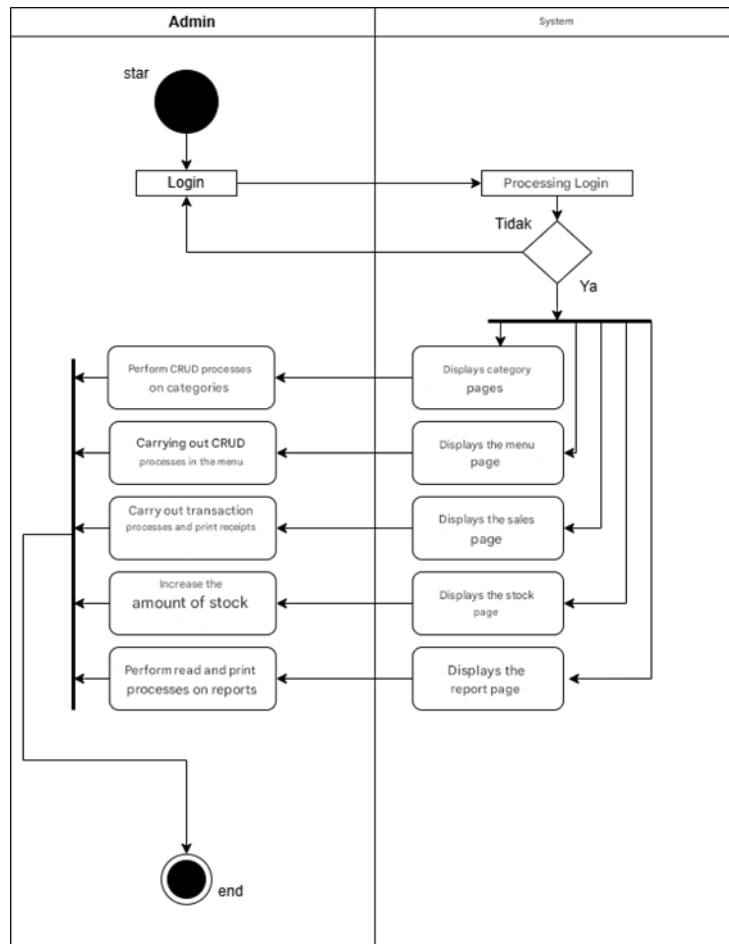


Figure 3. Activity Diagram

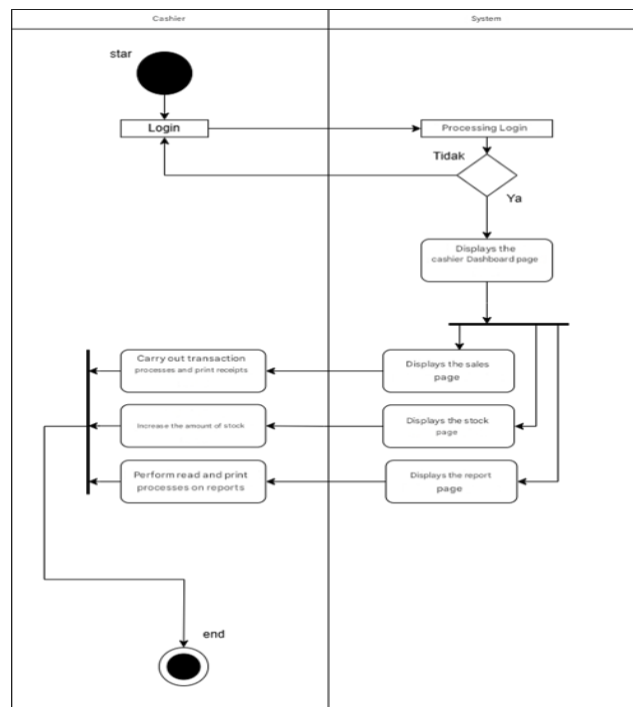


Figure 4. Activity Diagram

User Interface Design Mockup

The third stage for designing this website is user interface design. According to (Muhyidin et al., 2020) UI or User Interface is about visual design and user interaction on a website or

application. Includes all elements that can be seen and used by users, such as buttons, text, images, and input fields, as well as layouts, animations, and transitions. UI designers choose color schemes, button shapes, and fonts, with the goal of creating an intuitive and engaging user experience. Design involves a holistic approach to the problem at hand, not only focusing on functionality but also paying attention to the social experience of the user. This is a crucial factor in innovation, including in the development of information systems that must be in tune with the times (Makalalag et al., 2021). The initial page of the system is the login page illustrated in Figure 5. This mockup is the initial page when the system is used.

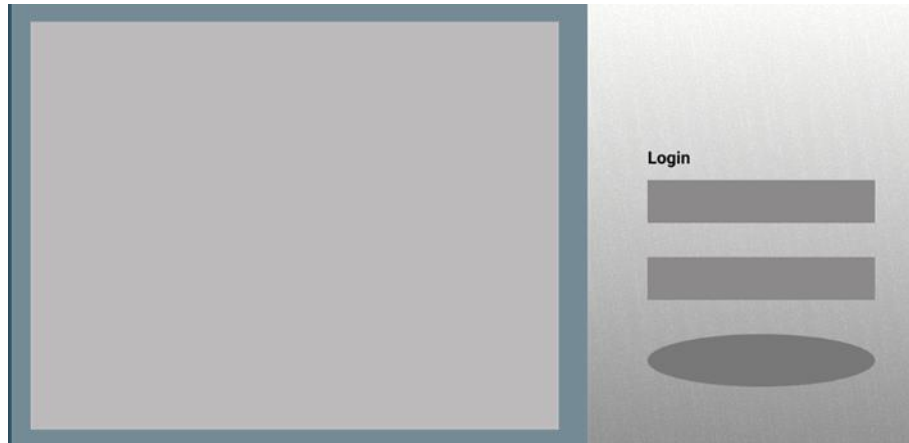


Figure 5. Login Mockup

Furthermore, in Figure 6, is the menu page displayed on the admin view which contains dashboards, categories, menus, sales, stock, and reports.



Figure 6. Admin Mockup

Figure 7 is a view of the cashier menu, containing dashboards, sales, stock, and reports.



Figure 7. Cashier Mockup

Entity Relationship Diagram

Entity Relationship Diagram (ERD) is an important tool in designing databases for information systems. An ERD is used to map relationships between entities in a boarding house management system, including the attributes of each entity. In system development, databases act as a medium for storing and managing data (Nur Azizah & Nurgiyatna, 2021). The ERD design helps developers create a database structure that is efficient and aligns with system requirements. Figure 2.8 shows the ER diagram.

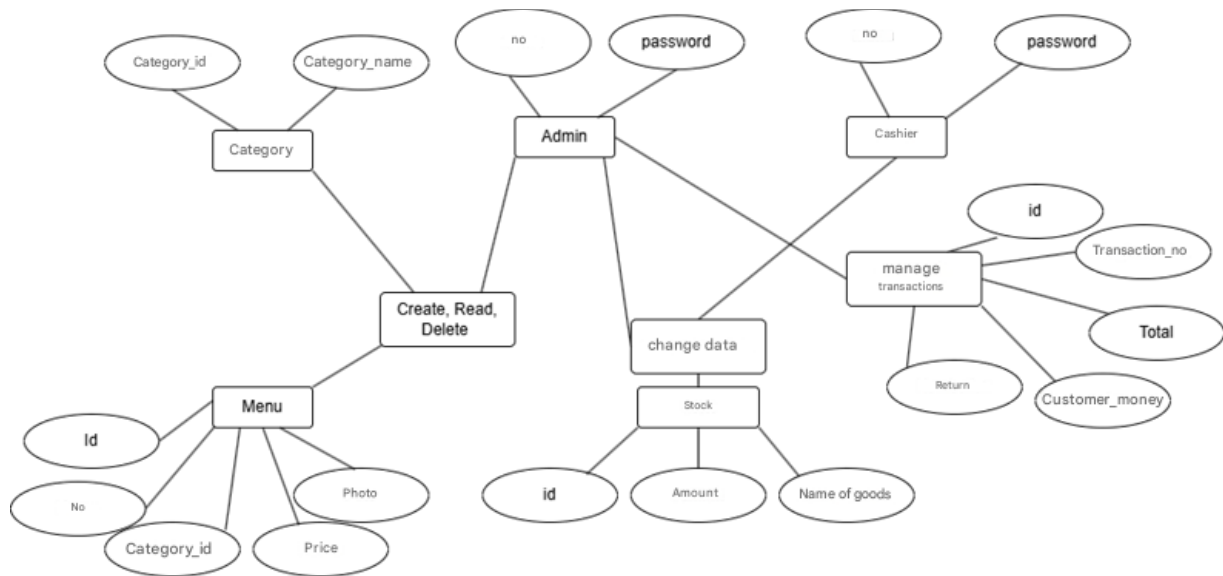


Figure 8. Entity Relationship Diagram

Programming

The programming stage is the process of implementing the program after the planning and design stages. This stage involves building the system according to the pre-designed specifications to create a program that suits the user's needs. At this stage, program code is written, tested, and modified if necessary to ensure that the system functions properly and meets the desired objectives. The result of this step is software that has been made in accordance with the previously designed plan (Mailasari & Sikumbang, 2019). The process of converting the planned design into written code uses the main programming language (PHP) Hypertext Processor Programming, and uses (CSS) Cascading Style Sheet and (HTML) Hypertext Markup Language as additional languages to regulate the appearance and structure of web pages, after the program code implementation stage, the next step is data processing. This information system uses MySQL to process the database because the data is Open Source and this system is easy to use because it uses an easy Structured Query Language (SQL), supports multiple clients simultaneously, can be accessed from various places via the internet, is easy to obtain, and has guaranteed security (Anggoro & Supriyanti, 2019). The database will be created to serve as a data storage area. The database will be created in accordance with the system design that has been compiled previously. The database structure will include tables such as user tables, customer tables, detail tables, and vehicle tables (Fitri & Fatmawati, 2019).

Testing

The next stage is testing, the program must be tested to ensure its internal logic is correct, all commands have been tested, and external functions produce the expected output with the appropriate input. Researchers conduct testing by running the program that has been created, verifying the logic and function of the program, and ensuring the output is in accordance with the needs of the user and the system (Irnawati, 2018). This system is tested using black box

testing, according to (Juventauricula et al., 2024) black-box testing is a software testing method that mainly focuses on testing functional specifications, this approach does not consider design details or internal program code. The second test uses system usability scale (SUS) testing to test the feasibility of the system, testing is done by collecting data through distributing questionnaires to respondents who have used the system or product. According to (Brooke, 2013) the purpose of SUS is to give us a measure of people's subjective perceptions of the usability of a system, and allows us to do so in a very short time during an evaluation session, in other words, SUS is a questionnaire tool that is useful in evaluating the usability aspects of a system from the subjective point of view of users.

Implementation

The final stage of the waterfall model is implementation, where the system is implemented according to specifications after testing is complete. Programmers will correct deficiencies based on test results. Users are given a brief guide, and periodic maintenance is carried out to maintain system performance (Widiastuti & Fatmawati, 2019).

Results and Discussion

This research produces a point of sale (POS) system for meatball stalls, which is designed to facilitate the management of sales, transactions, and preparation of daily reports. The system provides two types of user access, namely admin and cashier, with different rights and responsibilities according to their functions in the application.

Results

The point of sale system we designed presents an intuitive interface that is tailored to the user's role. The main page of the system offers two main entrances: admin and cashier, each specifically designed to efficiently support their daily tasks

Home Page

Figure 9 displays the system home page that shows all the main menus available. In the upper right corner of this page, there is a login button that allows users to enter the system according to their access, either as an admin or cashier.

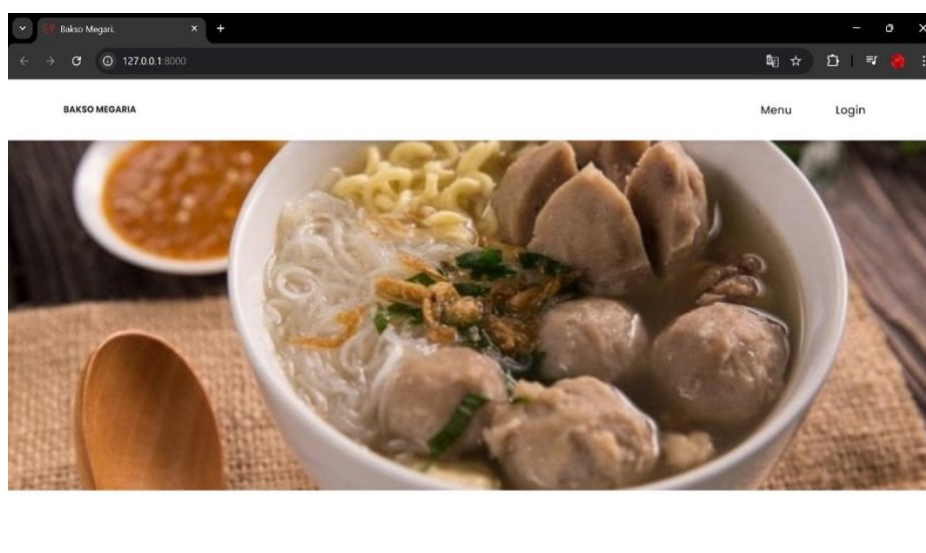


Figure 9. Home page

Figure 9 below shows the login form used to access the system. Users only need to enter their email and password.

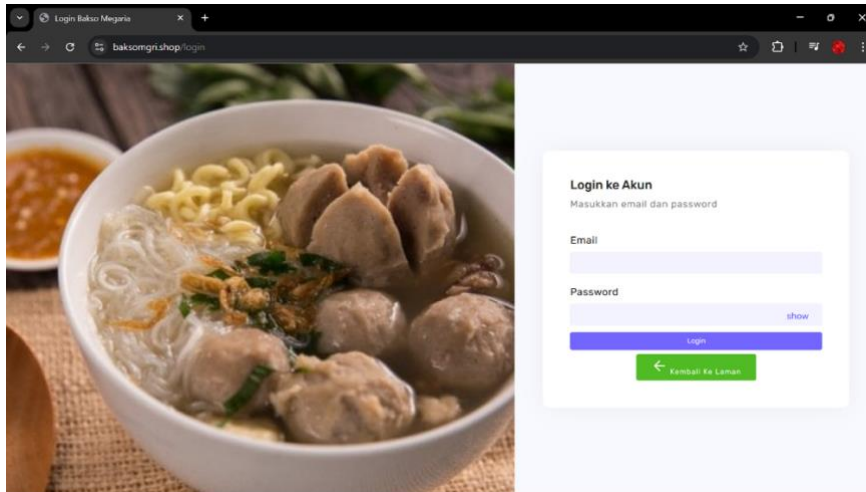


Figure 10. Login page

Admin Page

Figure 3.3 shows the dedicated page for the admin, which provides important features such as editing and adding menus. Initially, there is a dashboard that presents information related to daily, monthly, and yearly sales, along with sales graphs that help in visually monitoring business performance.

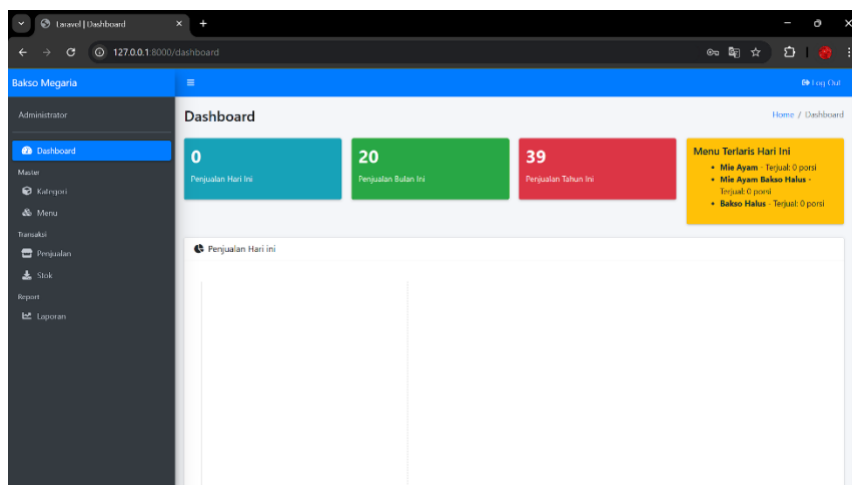


Figure 11. Dashboard page

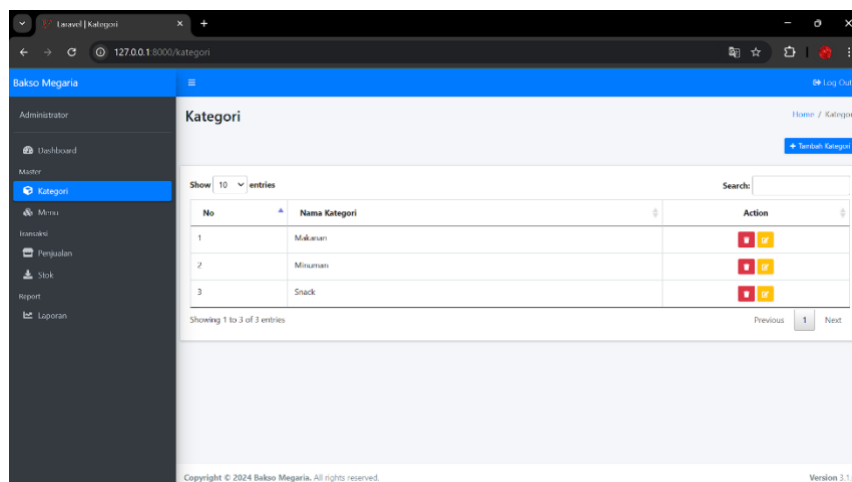


Figure 12. Category Page

Figure 11 shows a page specifically designed for food category management, where admins can easily add, edit, or delete categories as needed. This feature makes it easier to keep menus organized and relevant to product offerings, thus maximizing efficiency in food category management.

Figure 12 shows the menu page that allows the admin to perform full management of the food list. On this page, the admin can add new items, edit existing meal details, or delete them as needed. This feature provides flexibility in updating food options, ensuring that the menu list is always in line with current offerings and business needs.

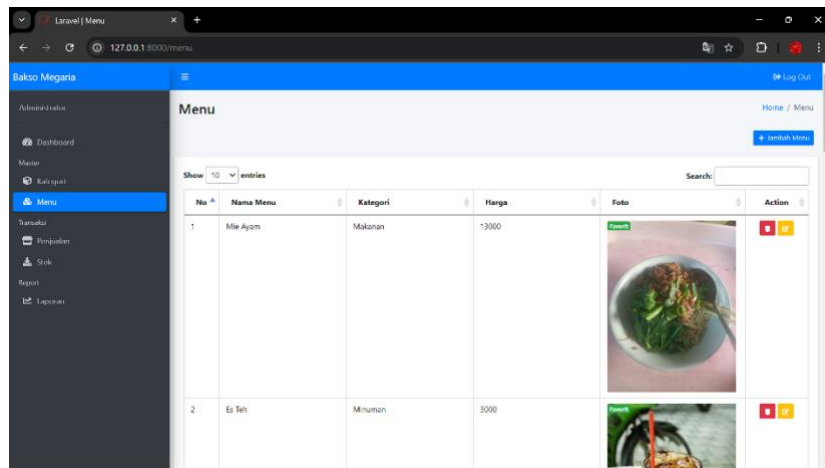


Figure 13. Menu Page

Figure 13 displays the sales page used to process transactions with customers, through this view it can easily record orders, calculate total payments, and complete transactions quickly and accurately. In addition to calculating, it is also possible to edit or delete transactions if errors occur, thus ensuring the accuracy of sales data. In addition, this feature also makes it possible to print receipts as proof of payment, providing convenience and comfort for customers in transactions.

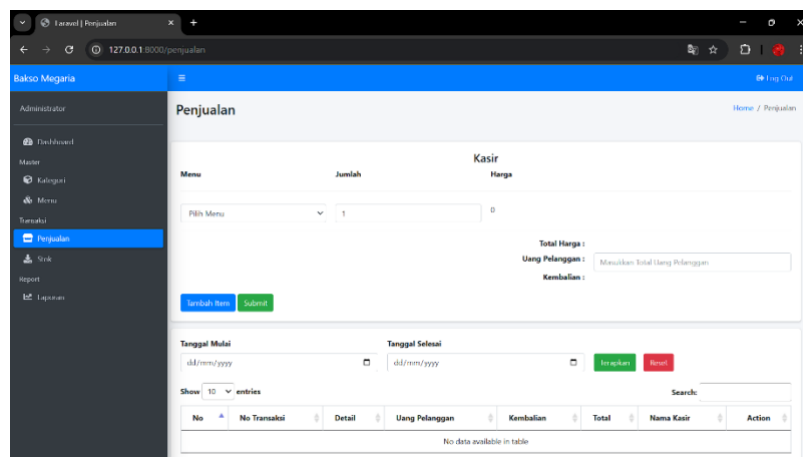


Figure 14. Transaction Process

Figure 14 shows the stock page that serves to monitor the real-time availability of items. Through this page, the admin can update the stock information, ascertain whether the item is still available or needs to be replenished. This feature helps in maintaining smooth operations by ensuring accurate and controllable stock availability.

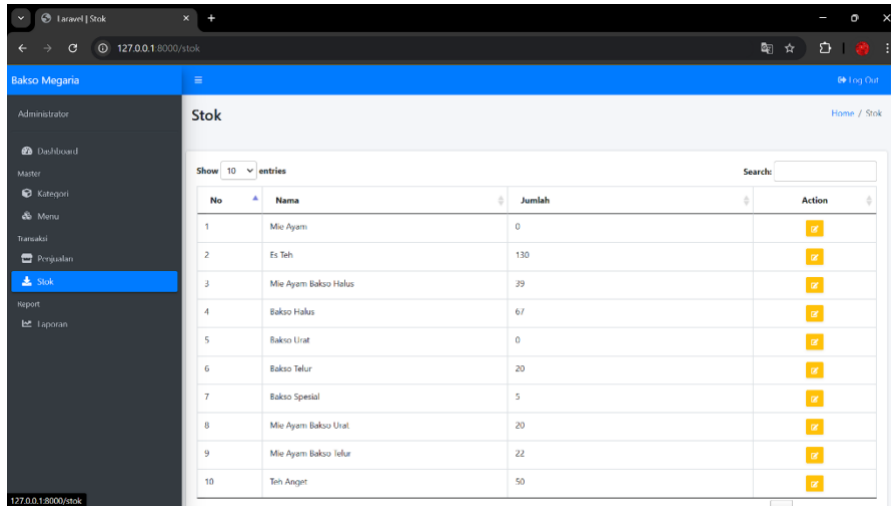


Figure 15. Stock Page

Figure 15 shows the report page designed to help admins effectively monitor daily sales reports. On this page, admins can view detailed sales data, providing insights into business performance on a daily basis. This report feature allows admins to analyze sales, monitor trends, and make decisions based on accurate data.

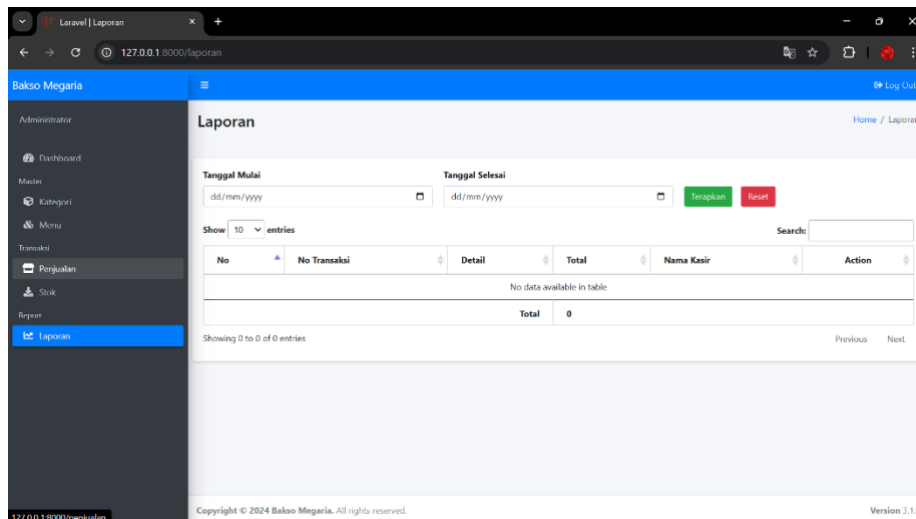


Figure 16. Sales Report Page

Cashier Page

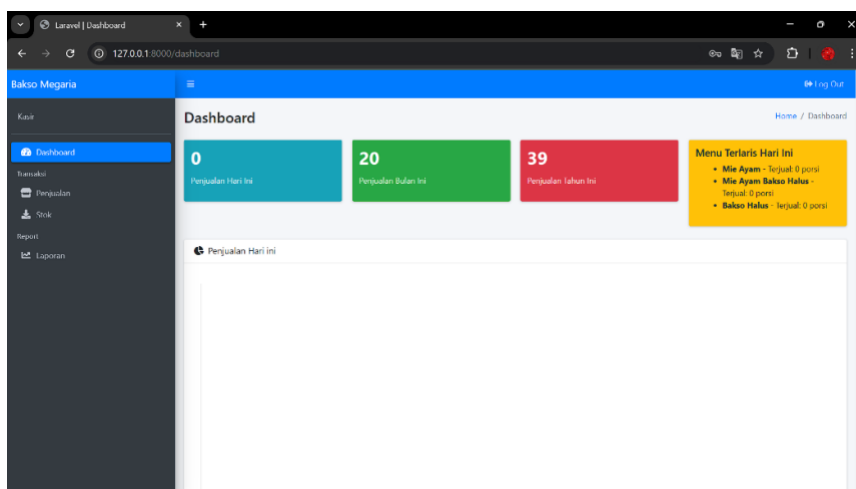


Figure 17. Cashier Page

Figure 17 The cashier page includes several main features, namely dashboard, sales, and reports. The dashboard and report features provide the same access as on the admin page, so that cashiers can view daily sales and performance information easily. Meanwhile, the sales feature is specifically designed to support cashiers in conducting direct transactions with customers, ensuring the sales process runs smoothly and efficiently.

Figure 17 displays the sales page used by cashiers to process transactions with customers, through this view, cashiers can easily record orders, calculate total payments, and complete transactions quickly and accurately. The cashier also has the ability to edit or delete transactions if errors occur, thus ensuring the accuracy of sales data. In addition, this feature also allows cashiers to print receipts as proof of payment, providing convenience and comfort for customers in transactions.

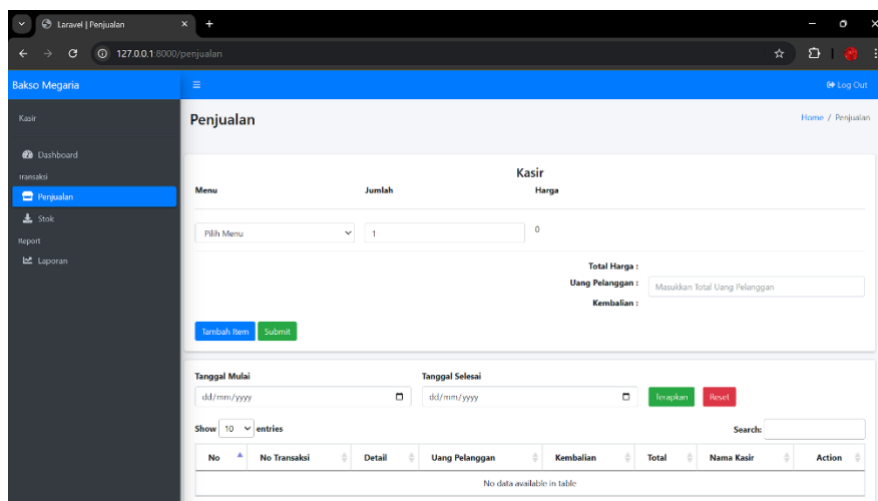


Figure 18. Cashier Sales Page

Figure 18 shows the stock page that serves to monitor the availability of items in real-time. Through this page, it can update stock information, confirm whether items are still available or need to be replenished. This feature helps in maintaining smooth operations by ensuring accurate and controllable stock availability.

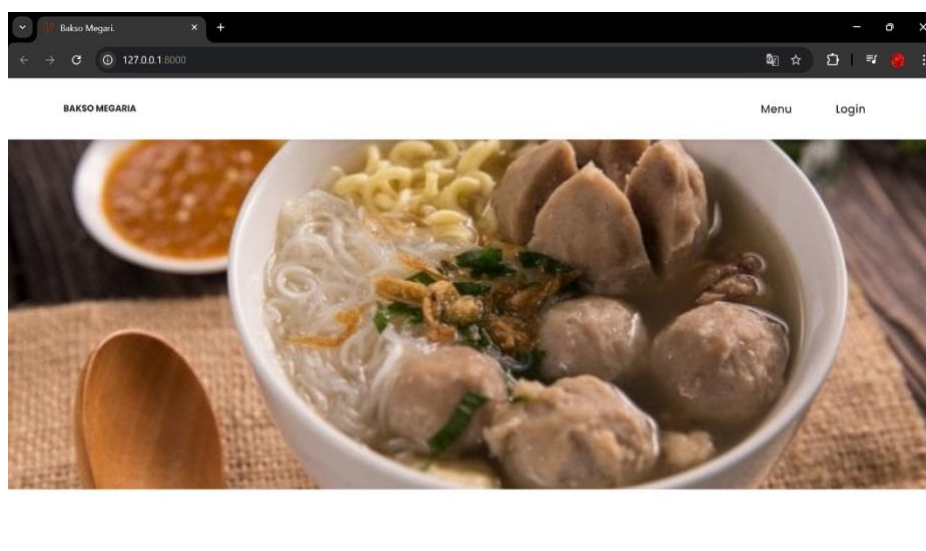


Figure 19. Stock View

Figure 20 shows a report page that has similarities to the page available to the admin. This page allows cashiers to access and view sales reports in a similar way, making it easier to

monitor sales performance and analyze data. This consistent view helps users understand information more clearly and make decisions based on accurate reports.

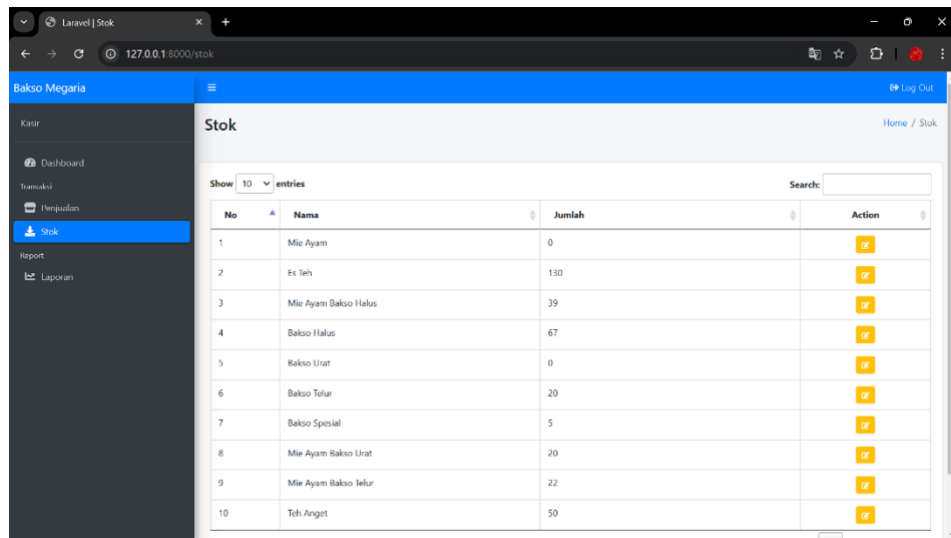


Figure 20. Report Page

Blackbox Testing

The developed Information System will be tested using the blackbox method, which focuses on the specifications and functional features contained in the Bakso Megaria POS system. This test is carried out through ten statements that describe the condition of the system when it is run and the expectations or desired response from the system after operation. These parameters will show the extent to which the features that have been implemented function in accordance with the expectations that have been set. This test method is detailed in Table 1.

Table 1. Search string and search formula

No.	Conditions	Hope	Results
1	Username: True Password: Correct	Login successfully and enter the dashboard page	Valid
2	Username: False Password: False	Unsuccessful login	Valid
3	Add, edit and delete categories	Categories are saved to the database and a success notification is displayed, categories in the database are modified, and categories are deleted successfully.	Valid
4	Add, edit, and delete menus.	Menus are saved to the database, menus in the database are modified, and menus are deleted successfully.	Valid
5	Search for sales reports	Display sales report data according to the sales date	Valid
6	Calculate order totals, delete order data, and print order receipts	Display the total order accordingly, delete the incoming order data, and print the payment receipt.	Valid
7	Logout admin/cashier	Successfully exit and return to the login page	Valid

The results of black box testing on the system show that all functionality features have run well as expected. Each test scenario of the seven applied conditions produces a valid output, which confirms that the system successfully meets all the needs and expectations that have been set.

SUS Testing (System Usability Scale)

After blackbox testing, the system will be tested again using the System Usability Scale (SUS) method to evaluate whether the interface has met the expected standards. This method uses the following formula: a) For odd numbered questions, the score is calculated by the formula "answer score - 1"; b) For even numbered questions, the score is calculated by the formula "5 - answer score"; c) The final result is obtained from the total number of odd and even scores, which is then multiplied by 2.5. d) The average score is calculated by dividing the sum of SUS scores by the total number of respondents.

This standard-compliant SUS formula will be applied through a series of questions to respondents, as detailed in Table 2, which contains ten fundamental questions related to user satisfaction with the system. Based on the guidelines (Sharfina & Santoso, 2016) the statements in this instrument retain the same meaning as the original version of SUS and do not undergo semantic changes in translation. This test aims to assess whether the system designed is in accordance with the expected usability criteria.

Table 2. Search string and search formula

No.	Statement
1	I'm thinking of using this system again.
2	I find this system complicated to use.
3	I found the system easy to use.
4	I need help from other people or technicians in using this system.
5	I feel that the features of this system are working properly.
6	I feel that there are many inconsistencies (mismatches in this system)
7	I feel that others will understand how to use this system quickly.
8	I find this system confusing.
9	I feel there are no obstacles in using this system.
10	I need to familiarize myself before using this system.

Based on the available formulas, statement a represents odd values, while equation b is even values. Equation c describes the final result of the test, while statement d is the average result of the system usability scale (SUS) test. In accordance with the capabilities of the respondents, the data was processed based on Table 3.

Table 3. Search string and search formula

No.	Score										Total	Value
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		(Number x 2.5)
1	4	3	3	4	4	3	4	2	3	4	34	85
2	3	3	3	4	4	2	3	3	3	5	33	83
3	4	2	4	2	4	2	4	2	4	4	32	80
4	5	2	4	2	2	2	4	2	4	2	29	73
5	5	3	4	3	4	2	3	3	4	3	34	85
6	5	2	4	2	2	3	4	2	4	4	32	80
7	4	4	4	4	2	2	2	3	5	1	31	78
8	3	3	3	3	2	2	2	4	4	0	26	65
9	4	1	2	1	4	3	2	4	4	1	26	65

10	3	3	4	1	2	1	2	4	3	3	26	65
11	3	2	4	2	3	3	3	3	3	3	29	73
12	1	3		1	2	4	1	3	3	0	18	45
13	3	2	2	3	3	2	2	3	3	1	24	60
14	4	4	3	4	3	3	3	4	4	3	35	88
15	3	4	4	3	2	3	4	1	3	3	30	75
16	4	2	3	1	4	4	3	3	1	2	27	68
17	4	3	4	2	4	3	4	3	4	3	34	85
18	4	3	3	3	3	2	1	3	3	3	28	70
19	4	4	4	3	3	2	3	2	4	3	32	80
20	4	4	4	4	4	3	3	4	4	1	35	88
21	3	2	3	2	3	3	3	2	3	3	27	68
22	3	2	3	3	3	3	2	3	2	3	27	68
23	3	1	2	3	1	2	3	2	3	1	21	53
24	3	1	3	1	3	3	3	3	3	1	24	60
25	3	0	3	1	3	3	3	3	3	3	25	63
26	3	0	3	1	4	3	3	4	3	0	24	60
27	4	0	4	0	4	4	4	4	4	0	28	70
28	1	2	3	1	1	2	3	3	3	2	21	53
29	3	0	3	1	4	3	3	4	3	0	24	60
30	2	4	3	4	2	3	3	4	3	3	31	78
Average Score (Final Result)											70	

The test results involved 30 respondents consisting of 27 people from the general public, 2 employees, and 1 owner. The data obtained was then processed to determine the evaluation results.

After division, a final average score of 70 was obtained. This score is then checked using the SUS Score assessment standard to assess the information system being tested. The assessment is carried out based on predetermined criteria and is listed in Table 4.

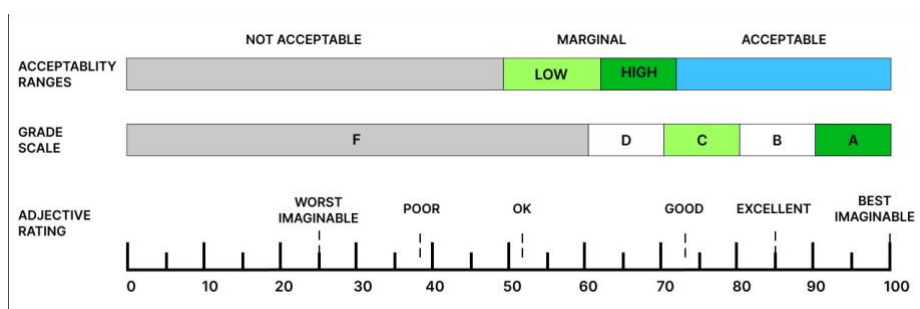


Figure 21. Search string and search formula (Karaman J. & Cobantoro, 2021)

Based on the test results based on predetermined benchmarks and validated data, a score of 70 was obtained. The score falls into the Good category and indicates that the system meets the assessment standards as listed in Table 4. The point of sale information system of Warung Bakso Megaria is considered feasible and gets a positive response from users and shop owners.

Conclusion

This research shows positive results in supporting transaction management at Warung Bakso Megaria. The system was designed using the waterfall method according to established standards, and tested through blackbox testing and System Usability Scale (SUS). The results of blackbox testing prove the system functions as expected, while SUS produces a score of 70, indicating the system meets user criteria. This research is expected to speed up the

transaction process, help the admin in managing sales, and facilitate customers when making purchases.

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