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Analysis and Design of Customer Relationship Management System on the SMEs Using Iconix Process

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Abstract— **Background**: Integrating Customer Relationship Management (CRM) systems is crucial for small and medium enterprises (SMEs) to enhance customer relations and profitability. Many SMEs in Indonesia, including Go-Sumber Plastik, still need to fully utilize CRM systems, which are essential for managing customer data, improving satisfaction, and retaining customers. **Objective**: The purpose of this research is to analyze and design a web-based CRM system for Go-Sumber Plastik using the Iconix Process methodology to enhance user interaction and overall system effectiveness. **Methods**: The study employed the Iconix Process methodology, which includes a use case, robustness, sequence diagrams, a GUI prototype, and a test plan. The design was tested using Maze to measure user interaction efficiency and satisfaction. **Results**: The research revealed significant challenges in user understanding of the CRM system, particularly in managing activities and adding customer information. Tasks such as reporting and logging in had good user performance. The overall user interaction score was 81.1, indicating moderate effectiveness of the initial design. **Conclusion**: The results underscore the necessity for a more intuitive and streamlined CRM system interface for Go-Sumber Plastik. Implementing an effective CRM system can improve SMEs' competitiveness and profitability by systematically enhancing communication, managing customer data, and boosting business performance. Future research should focus on refining the user interface to reduce error rates and improve task completion efficiency. Enhanced visibility and user guidance are recommended to optimize system usability and customer satisfaction.

Keywords—Information System Design; Customer Relationship Management; Iconix Process

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I. INTRODUCTION

Small and medium enterprises (SMEs) have an essential role in the growth and development of a country. Therefore, it is vital for any country, especially developing countries, to support and enhance the development of SMEs. A well-maintained customer base can positively influence an SME's profitability. The main drivers for creating loyal customers for SMEs are good products and services, as well as competitive prices [1]. Like companies in general, SMEs also need to adapt to modern business methods that enable SMEs to sell more value to customers to build a strong value chain[2], [3]. An integrated information system is necessary for business processes within the Company to be relatively slow. One innovation that SMEs can utilize is an information system that implements a Customer Relationship Management (CRM) strategy to retain customers. CRM is one of the core businesses that aims to create and provide customer value by improving customer relationships, which can benefit the Company [4]. CRM positively impacts sales, marketing, and service performance indicators by focusing on customer-centric marketing strategies [5].

As a result, the business will try to stop competitors from acquiring its customers. That will affect the fierce competition that businesses would have for market share. On this basis, many companies implement CRM to maintain customer loyalty as one of the superior business elements so the company goals can be achieved. Referring to several previous studies, the presence of a CRM application can provide benefits for the company, help the company know what customers want, and monitor employee performance so that the company can improve its performance [6]. In this regard, research results [6], [7] show that the application of information technology has a positive impact on increasing SME income. Other research also shows that CRM software as a service can significantly improve customer satisfaction and retention for SMEs by providing valuable data on customer habits, key drivers, and business performance indicators [8], [9], [10].

However, most SMEs in Indonesia still need to utilize CRM properly [11], [12], [13]. One is UKM Go-Sumber Plastik, located in Gresik, East Java. Go-Sumber Plastik is an SME that sells a variety of the best plastic packaging at affordable prices. SME Go-Sumber Plastik is an SME that sells various kinds of food packaging and beverage packaging, both retail and wholesale. Different from what is generally expected, the Go-Sumber Plastik Shop not only sells food packaging products made from plastic but also food packaging made from paper. Go-Sumber Plastik is a modern plastic trading shop and partnership business. According to the results of the interview, the goal of the Go-Sumber Plastik store is to develop into a retail plastic distribution network owned by the community at large, to empower small businesses, meet customers' requirements and expectations, and be competitive worldwide.

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As previously explained, customer satisfaction can be used as an indicator to show the quality of a product or service that has been provided. If the response given by customers is good, then customers will loyally buy the product and can increase profits in the future [14], [15]. However, based on the interview results, there needs to be better communication and relationships between SME Go-Sumber Plastik and its customers. Apart from transacting and communicating directly, SME Go-Sumber Plastik carries out transactions and communicates with customers via chat applications. Staff had to send photos to customers several times because customer and order data was not well organized. Apart from that, from a consumer's perspective, they often complain because sellers frequently cannot answer messages quickly when they ask for product information. This weakness is caused by the absence of an implemented information system [16]. SMEs will get new consumers and increase sales by developing a CRM application design. SMEs can also process customer data, which can be used to retain existing customers due to data integration in CRM applications. Besides retaining old customers, SMEs will also get new potential customers [17].

However, this research aims to analyze and design a website-based CRM information system using the Iconix Process method. The Iconix Process is an effective software development methodology that employs the Unified Modeling Language (UML) to create clear and easy-to-implement system workflow descriptions [18]. It integrates a GUI with dynamic diagrams, including Use Cases, Robustness, and Sequence diagrams, ensuring a comprehensive and functional design [19]. The difference between this research and previous research is its unique application of the Iconix Process method, which includes specific steps like GUI Prototype, Use Case Model, Robustness Diagram, Sequence Diagram, and Test Plan, ensuring a clear and thorough design process. Unlike other studies, this research also incorporates Maze.co for UX testing, providing detailed insights into user interactions with the system prototype. While most studies focus on functionality and technical aspects, this research emphasizes user experience, making its approach more holistic. Targeting SMEs in Indonesia, the study addresses the unique challenges and requirements of businesses in developing countries. It highlights how an effective CRM can enhance the competitiveness and profitability of SMEs, offering tailored insights and solutions. The research also includes a detailed business process analysis to inform the CRM system design, often overlooked in other studies. Furthermore, iterative feedback from UX testing allows for continuous system improvement, ensuring user-friendliness and effectiveness. These combined elements make this research novel, offering practical solutions uniquely suited to the needs of SMEs in Indonesia and clearly distinguishing it from other state-of-the-art studies.

The testing process in this research uses the Maze method, a UX (User Experience) testing tool that helps understand how users interact with system prototype designs [20]. Maze enables

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task-based testing to measure efficiency, effectiveness, and user satisfaction. It is believed that the findings of this study will serve as a foundation for additional research on system development with suitable programming languages. With an effective CRM information system, SMEs can increase their competitiveness in the market and significantly increase their business profits [21].

II. RESEARCH METHOD

The research methodology is based on the Iconix Process, so data collection will be required first, followed by requirements analysis for system requirements analysis. Figure 1 shows the requirements analysis results will be implemented in a system design based on the Iconix Process sequence [22] especially the dynamic stage of the process and end with conclusions and suggestions to summarize the research results.

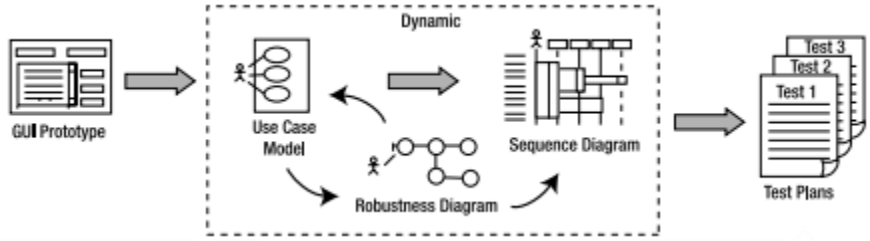

Fig 1. Research Method[22]

A. GUI Prototype

A GUI (Graphical User Interface) prototype is an initial model of a graphical user interface designed to test and validate an interface design before full implementation. GUI prototypes can be hand sketches, wireframes, mockups, or interactive prototypes created using digital design tools. This first stage provides a simple description of how the system should appear when finished [23].

B. Use Case Model

A use case diagram in the Iconix Process describes interactions between external actors (users or other systems) and the system being developed [23]. This diagram helps visualize the system's functionality from the user's perspective, by highlighting how actors interact with the various functions or services provided by the system [24]. The main components of a Use Case Diagram include actors (external entities that interact with the system), use cases (specific functions or services provided by the system to actors), and relationships (association, include, extend, generalization) between actors and use cases [25]. The main benefits of Use Case Diagrams include clear communication between the development team, stakeholders, and users, documentation of system functional requirements, a basis for further development of other diagrams, and validation and verification of user requirements [24].

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C. Robustness Diagram

One tool in the Iconix Process that helps software developers bridge the gap between analysis and design is the robustness diagram [22]. Robustness Diagrams include three main types of elements: boundaries (interfaces that interact with users or external systems), controls (components that manage application logic), and entities (objects that store information) [26]. By visualizing these interactions, Robustness Diagrams help ensure that all system elements have been thoroughly considered and that the workflow conforms to functional requirements. Robustness Diagrams facilitate the identification of design problems at an early stage, thereby reducing the risk of errors at later stages of development.

D. Sequence Diagram

Sequence Diagram is a type of diagram in the Iconix Process used to chronologically model interactions between objects in a system. This diagram displays a sequence of messages or calls between objects, showing how processes execute over time. A lifeline represents each object, and messages sent between objects are indicated by arrows [22]. Sequence Diagrams are handy for understanding and designing process flows in a system, identifying object responsibilities, and ensuring that interactions between system components occur in accordance with specified needs. These diagrams help visualize complex usage scenarios, supporting better analysis and more efficient testing [27].

D. Test Plan

At the test plan stage, Maze is used as a UX (User Experience) testing method to measure and analyze user interactions with design prototypes. Maze enables task-based testing, where users are asked to complete a series of specific tasks in a prototype while the platform records data such as completion time, navigation path, and success rate [20]. With Maze, researchers can quickly conduct remote testing and get insightful input from actual users, enhancing designs before they are used [28].

III. RESULT AND DISCUSSION

The results of the research are made following the steps of the ICONIX Process [22]. The Business Process diagram in Figure 2 illustrates the interaction between an Employee, a System, and a Customer. The process begins with the employee initiating and creating a campaign. The system then displays the campaign and sends the offer to the customer, who views the campaign and decides whether to accept or decline the offer. If the customer declines, the system notifies the employee. If the customer accepts, the process moves forward with the system creating a quotation. If there is a need for negotiation, the employee engages in bargaining, and the system sends a negotiation offer to the customer. The customer then decides whether to accept or decline

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the negotiation offer. If the customer declines, the process ends. If the customer accepts, the system proceeds to create a quotation. After the quotation is created and accepted, the system generates a sales order from the quotation. The final step involves the system making a report and completing the process. This diagram clearly outlines the activities and interactions among the employee, system, and customer in managing campaign creation, offer negotiation, and order processing.

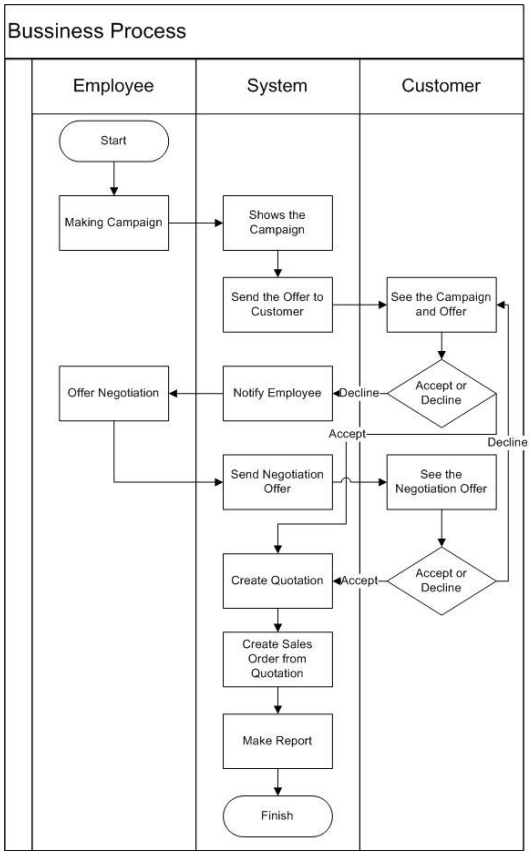

Fig 2. Business Processes CRM

A. GUI Prototype

Figure 3 represents a comprehensive dashboard from a web-based Customer Relationship Management (CRM) system, featuring multiple sections for user interaction and information display. This feature was created based on requirements from SME Go Sumber Plastik and several references [7], [16]. The top navigation bar includes the CRM logo, a search bar, and icons for settings, notifications, and user profiles. The dashboard is divided into "Connect with Your Customers," displaying a bar chart for salesperson activity across various companies, and "Manage and Close Deal," featuring a team pipeline bar chart that distinguishes between existing and new business. Another section, "Build Your Pipeline," shows a bar chart of leads by source over different months. Task and event management tools are provided in sections like "Today's Task" and "Today's Events," with links to view calendars. Additionally, sections like "My

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Opportunities" list current sales opportunities, while "My Leads" and "Recently-Viewed Leads" provide detailed information on leads and recent interactions. The layout is designed to help users efficiently manage customer interactions, sales pipelines, and daily tasks, enhancing overall CRM functionality.

Fig 3. Homepage of CRM System

B. Use Case Model

CRM has three stages: acquisition, enhancement, and retention. These three steps examine the present system, which is then applied to the CRM application that will be created [29]. According to that, the functional requirements defined for the Go-Sumber Plastik website include features such as activity deadlines display, navigation menu, real-time business performance reviews, real-time customer interaction, data storage for customers and employees, data protection and backup, earnings data storage, local data storage, and user management. Non-functional requirements include hardware specifications (Intel Core i3 CPU, 4GB RAM, 320GB SSD/HDD, Windows/Linux/Mac OS), software compatibility with various web browsers and operating systems, user capabilities (effective laptop/computer operation and English proficiency), an intuitive and easy-to-understand interface, reliable local data saving, ease of learning, web-based accessibility, 24/7 availability with internet access, security limited to admins and authorized users, and portability for access from anywhere with an internet connection.

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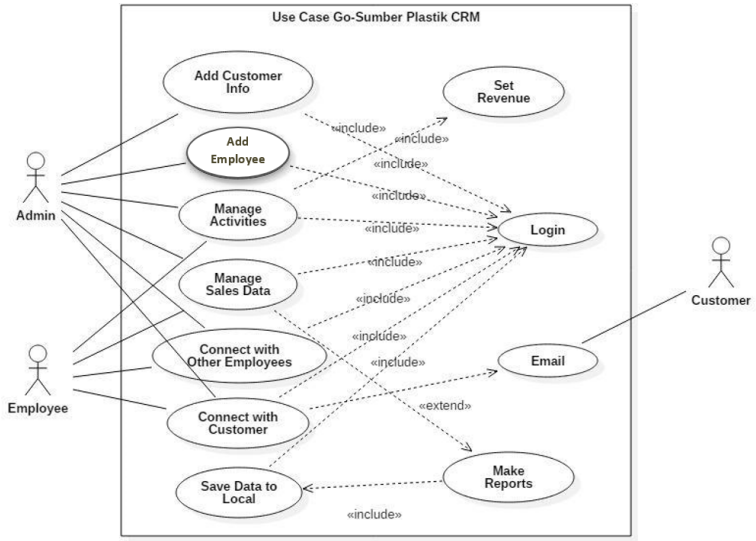

Fig 4. Use Case Diagram

Figure 4 is a generated use case diagram for the Go-Sumber Plastik CRM system. The actors in it are the admin, employees, and customers. The admin has various tasks in the system, such as adding customer info, adding users, managing activities, managing sales data, connecting with other users, and connecting with customers. Employees have the same tasks as admins, except for adding customer info and adding users. Then, Actor Customers can connect with the admin in real time, which is useful for customers who want to ask questions about products or complain about products. In addition, the system can Set Revenue and Make Reports so that the manager can monitor and supervise all business activities in the company.

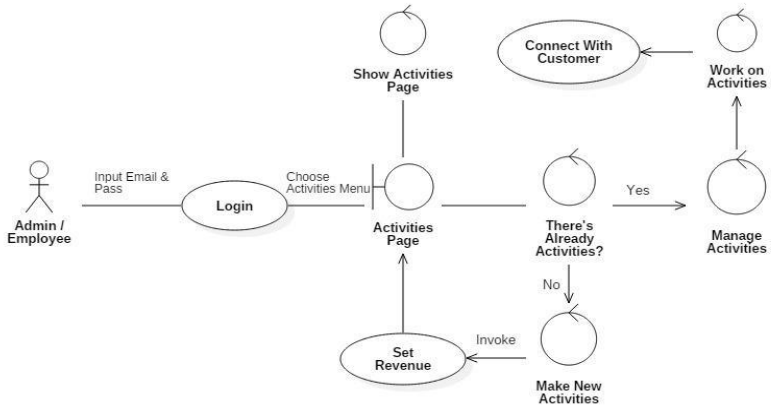

Fig 5. Robustness Diagram Manage Activities

C. Robustness Diagram

Robustness diagrams are developments of use case diagrams [20]. The robustness of this diagram is in the form of a more detailed description of the use case diagram previously designed. Figure 5 shows the robustness diagram for Manage activities. Manage activities is a use case

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where the admin or employee manages the activities on the system. Initially, the admin/employee must log in by entering their correct email and password. Then, select the activities menu, which will display the activity page. If the activity page is empty, it will be rerouted to the activity page. If there are already activities, the admin or employees can manage them. Then, if the admin/employee wants to do activities, they will enter the Connect with Customers use case. The other robustness shown in Figure 6 is related to the use case diagram Connect with Customer. To connect with customers, administrators/employees must log in by entering their email and password. After that, select the customer menu, and the program will display a customer page containing customer data such as name, address, and contact information. If there is no customer data on the customer page, the page will display the add customer option.

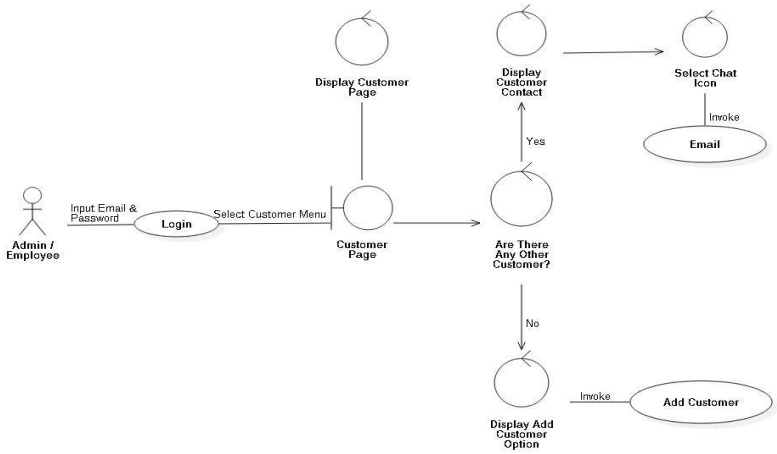

Fig 6. Robustness Diagram Connect with Customer

D. Sequence Diagram

Sequence diagrams are made according to the use case diagrams and robustness diagrams that have been made previously. This Sequence Diagrams describe a scenario or series of steps carried out in response to an event (manage activities) to produce a specific output (activities info). In addition, Sequence diagrams represent interactions between objects in and around the system (including users, displays, etc.) in the form of messages that are described against time [19]. Figure 7 shows sequence diagram to manage activities and Figure 8 shows sequence diagram to connect with customer.

E. Test Plan

Maze.co provides a score system that is paired with task scenario testing results to create a scale of 0 to 100. Seven distinct tasks were used in the usability tests that researchers produced [20], [28]. Table 1 lists initial design tasks related to a software system or application. Each task is identified by a unique Task Code (T1 through T7) and accompanied by a brief Task Scenario description. The tasks outlined include essential functions such as logging in (T1), managing activities (T2), connecting with customers (T3), managing sales data (T4), generating reports (T5),

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adding customer information (T6), and logging out (T7). These scenarios represent fundamental functionalities the software needs to support, providing a structured overview of the initial design requirements for the Go-Sumber Plastik CRM system.

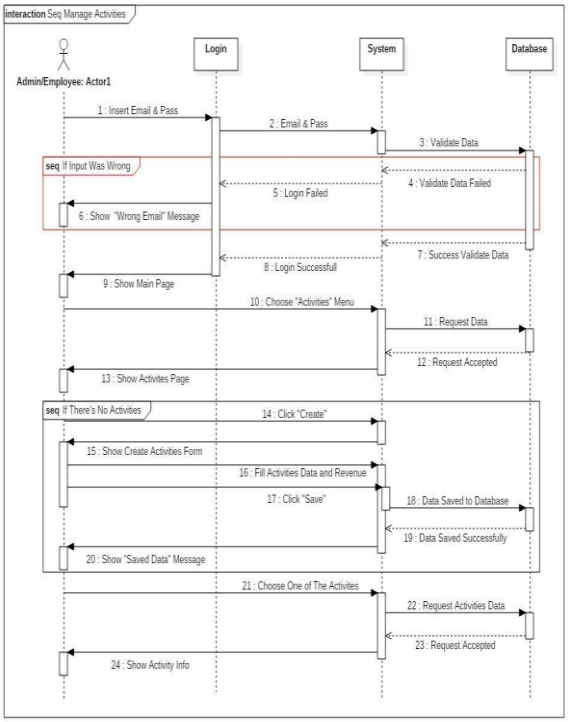

Fig 7. Sequence Diagram Manage Activities

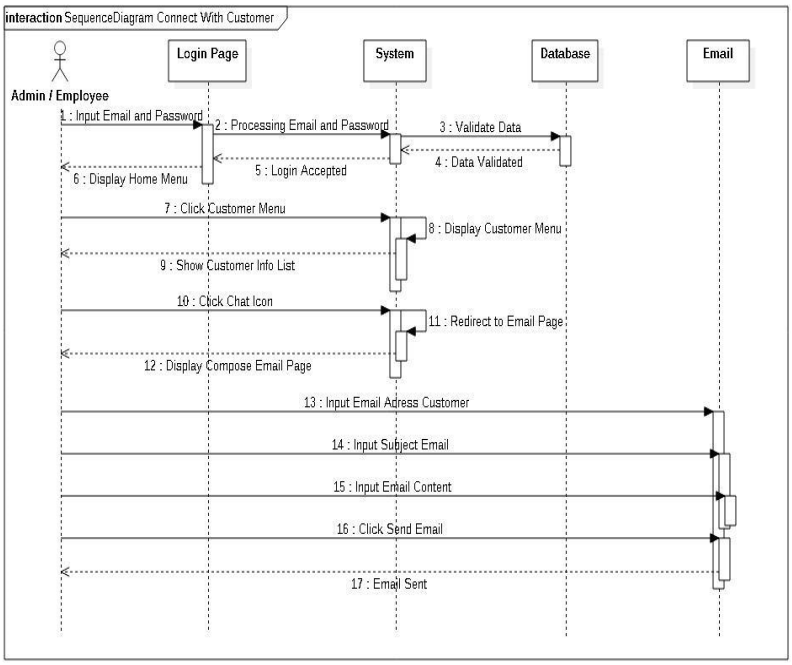

Fig 8. Sequence Diagram Connect with Customer

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Table 1. Initial Design Task Scenario

Task Code	Task Scenario
T1	Login
T2	Manage activities
T3	Connect with customer
T4	Manage sales data
T5	Make report
T6	Add customer info
T7	Logout

Each task is given a score depending on three assessment factors as follows [28], [30]: 1) The 'Intended Path and Give-up Rate' assessment reveals areas where users struggle. It involves the respondent completing a task through an unexpected path and an assessment where the respondent cannot complete a given task. 2) The 'Misclick' assessment is significant, as it directly impacts user experience. It involves the respondent clicking on the wrong button or action. 3) Average Duration is an assessment of the average duration a user is on the screen in seconds; the longer it gets, the worse.

Table 2. Results of the Initial Design Scenario Task Using the Maze.co Website

Task Code	Intended Path	Give-up Rate	Misclick	Avg. Duration	Score
T1	0%	0%	7.1%	9.7s	96
T2	30%	25%	29.3%	22s	71
T3	2%	15%	11%	10.6s	72
T4	21%	16%	21%	13.1s	78
T5	4%	6%	6%	6.6s	96
T6	5%	18%	5%	26.1s	63
T7	2%	0%	7%	2.4s	92

Table 2 above is the result of testing using Maze.co in operating the CRM system website. From the results of measuring the intended path and give-up rate in Table 2, users still need help understanding the commands on the manage activities page, as evidenced by users who still need to complete the tasks given. Then, from the time measurement results in Table 2, the add customer info page has the longest time compared to several other features. The next study should improve that feature to make it more concise and precise for users. Furthermore, misclicks still have a significant error rate, especially on the manage activities page. Therefore, the level of visibility can be increased again so that the website runs better [31], [32]. As for the results of Table 2, the overall score of the respondent's task scenario is 81.1.

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IV. CONCLUSION

The research conducted on analyzing and designing a Customer Relationship Management (CRM) system for the SME Go-Sumber Plastik has yielded several key conclusions. The study addressed the need for a systematic approach to managing customer relationships to improve business operations and customer satisfaction. By employing the Iconix Process methodology and Maze UX testing, the research has led to significant findings and recommendations.

The primary conclusion is that implementing a CRM system for Go-Sumber Plastik can significantly enhance the management of customer interactions, leading to improved customer satisfaction and business performance. The CRM system's design, including features like real-time business performance reviews, customer interaction data storage, and user management, aligns well with the company's needs and addresses the inefficiencies identified in the current manual processes. Iconix Process, which incorporates Use Case, Robustness, and Sequence Diagrams, has provided a clear and functional blueprint for the system's development.

Despite the promising results, the research has identified limitations that should be addressed in future studies, emphasizing the importance of continuous improvement. The initial testing using Maze indicated that users struggled with certain features, such as managing activities and adding customer information. High misclick rates and longer task completion times suggest that the user interface needs further refinement to improve usability and efficiency. Additionally, the study was limited to the design phase, and future research should focus on the system's implementation and long-term impact on business performance.

This research contributes to system engineering by underscoring the importance of integrating modern information systems in SMEs to enhance operational efficiency and customer satisfaction. The findings support the broader application of CRM systems in similar business contexts, providing a reference for other SMEs aiming to leverage technology for competitive advantage.
Future research should focus on iterative testing and refinement of the CRM system, involving a larger and more diverse user base to gather comprehensive feedback. Furthermore, investigating the integration of advanced technologies like machine learning and predictive analytics could improve the system's functionality and offer a more in-depth understanding of customer behavior and industry trends. These improvements will confirm the advantages noted in this research and open the door for more advanced and expandable CRM programs designed with SMEs' requirements in perspective.

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