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DEVELOPMENT OF A WEB-BASED ELECTRONIC CUSTOMER RELATIONSHIP MANAGEMENT SYSTEM FOR IMPROVING CUSTOMER SERVICE IN RETAIL BUSINESSES

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Abstract

The development of information technology encourages businesses to adopt digital systems to improve customer service and operational efficiency. Small retail businesses often face challenges in managing customer data and transactions due to manual processes, which can lead to inefficiencies and data inconsistencies. This study aims to design and implement a web-based Electronic Customer Relationship Management (E-CRM) system to support customer data management and enhance service quality. The research method used is the Software Development Life Cycle (SDLC) with the Waterfall model, which includes requirement analysis, system design, implementation, testing, and evaluation. Data were collected through observation, interviews, and documentation. The system was tested using Black Box Testing to ensure that all functionalities operate as expected. The results show that the developed system is able to integrate customer data, transaction records, order monitoring, and customer feedback into a unified platform, thereby improving service efficiency and reducing data recording errors. The implementation of the system also enables faster transaction processing and more structured customer data management. This study contributes to the field of information systems by providing an integrated E-CRM model tailored for small retail businesses, emphasizing the use of customer interaction features and data-driven service strategies. The findings also imply that the adoption of E-CRM can enhance service effectiveness and support better decision-making in small-scale business environments.

Keywords*:* E-CRM; Information System; Web-Based System; Customer Service.

I. INTRODUCTION

The very rapid development of information technology has changed many fields, including trade and customer service [1]. Currently, many companies are starting to switch from manual systems to digital systems to be more efficient and to make customers more satisfied [2]. One example of the application of this technology is E-CRM, which is a system used to manage the relationship between the store and customers electronically and in an integrated manner [3].

Bunda Plastic Store is a business engaged in selling various plastic needs and packaging equipment. This store serves many customers with various needs, especially food entrepreneurs and the surrounding community. However, the ordering process and customer service at this store are still done manually. Customers have to come directly to the store to buy goods, while transaction and customer data recording still uses notebooks. This manual method often causes various problems, such as the risk of losing transaction data, errors in recording, as well as longer service times due to the lack of a digital system. Toko Plastik Bunda has been operating since 2023. According to the information on the store banner, Toko Plastik Bunda sells various types of plastic packaging, oz cups, mica, straws, tissues, rice paper, as well as ingredients for making cakes and other supporting equipment. These products are used for various household needs as well as culinary businesses.

Bunda Plastic Store not only sells various plastic necessities, but also provides a range of supporting equipment such as plastic packaging, oz cups, mica, straws, tissues, rice paper, cake-making ingredients, and various other tools needed for everyday life and culinary businesses. All the products offered aim to meet the increasingly diverse needs of customers, especially food business operators and local residents. However, with the development of technology and increasing competition in the business field, Bunda Plastic Store has begun to face several challenges in managing orders and customer service. Until now, purchases are still made manually, meaning customers have to come directly to the store to buy. This

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method is considered less effective in attracting new customers and retaining old ones because the service is not yet supported by a digital system.

Order management and customer service at Toko Plastik Bunda, which are still carried out manually, often cause problems, such as delayed service processes, errors in recording transaction data, and lack of supervision over customer satisfaction. Therefore, a web-based E-CRM system needs to be implemented as a solution to digitalize these processes [4]. With this system, the ordering process, customer service, and customer data management are expected to run more efficiently, orderly, and quickly [5]. The implementation of E-CRM is also expected to be able to increase customer satisfaction and maintain the loyalty of Toko Plastik Bunda's customers [6].

In addition, customers feel more valued because the system makes the ordering and communication process easier. The service becomes faster and aligns with what customers expect. [7]. By using this digital system, stores can reduce errors when recording data, speed up the payment process, and securely store all information in a single connected system [8].

Customer Relationship Management (CRM) is an important strategy for stores to increase profits by improving customer satisfaction [9] [10]. If customers feel satisfied, this will have a positive impact on the store, such as building a good relationship between the store and customers or creating customer loyalty [11]. This can also reduce the likelihood of customers switching to other stores or products [12].

Electronic Customer Relationship Management (E-CRM) is a strategic method that uses information technology to manage relationships with customers better and more efficiently [13]. This system helps stores utilize customer data, strengthen communication, and increase customer loyalty [14]. At the time of its implementation, E-CRM was supported by the PHP programming language [15].

By using a web-based E-CRM system, it is expected that Toko Plastik Bunda can improve work efficiency, speed up services, and strengthen relationships with customers.

Several previous studies have implemented Customer Relationship Management (CRM) or Electronic Customer Relationship Management (E-CRM) systems to improve customer service and sales processes in various business sectors. For example, previous research applied E-CRM systems in retail stores, fashion businesses, and small-scale enterprises to support online sales transactions and improve customer loyalty. However, most of these studies mainly focus on general sales management systems and do not specifically address the integration of online ordering, customer reviews, and transaction monitoring in small retail businesses that sell packaging and plastic products.

In addition, several previous studies only emphasize the development of web-based sales systems without providing features that support continuous interaction between businesses and customers, such as feedback management, order monitoring, and customer communication. Therefore, the implementation of E-CRM systems in small retail stores that sell packaging products remains relatively limited in the existing literature.

Based on these conditions, this research proposes the implementation of a web-based Electronic Customer Relationship Management (E-CRM) system at Toko Plastik Bunda that integrates customer registration, online ordering, order monitoring, payment confirmation, and customer review features within a single system. The contribution of this research lies in the development of an E-CRM implementation model that supports customer interaction and service efficiency in small-scale plastic retail businesses. Through this approach, the system is expected to improve customer service performance and strengthen customer relationships in small retail enterprises.

Several previous studies have implemented Customer Relationship Management (CRM) and Electronic Customer Relationship Management (E-CRM) systems to improve customer service, sales performance, and customer loyalty across various business sectors, including retail, fashion, and small enterprises. These studies generally demonstrate that CRM systems can enhance transaction management and support customer data storage effectively. However, most of these studies primarily focus on operational aspects such as sales transactions and basic customer data management, without fully leveraging customer data for strategic decision-making processes.

Furthermore, some studies have developed web-based sales systems with CRM features, but they often lack integration of interactive components such as customer feedback, order tracking, and real-time communication, which are essential for building long-term customer relationships. In addition, previous research rarely emphasizes the implementation of E-CRM in small-scale retail businesses that have specific characteristics, such as diverse product types and dynamic customer demands, particularly in the packaging and plastic product sector.

Based on this analysis, it can be identified that there is a research gap in the development of E-CRM systems that not only support transaction processing but also integrate customer interaction features and data-driven service strategies within a single platform. Therefore, this study proposes the implementation of a web-based E-CRM system that integrates customer registration, online ordering, order monitoring, payment confirmation, and customer review features. The main contribution of this research lies in providing a more comprehensive E-CRM implementation model that supports both operational efficiency and customer relationship management in small retail businesses.

II. RESEARCH METHODOLOGY

This research applies a system development approach using the Software Development Life Cycle (SDLC) with the Waterfall model to design and implement a web-based Electronic Customer Relationship Management (E-CRM)

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system at Toko Plastik Bunda. The Waterfall model was chosen because it provides a structured and sequential development process, making it suitable for developing information systems with clearly defined requirements. This structured methodology ensures that the system development process is conducted systematically and produces a reliable and functional E-CRM system that meets user requirements.

A. Literature Review

At this stage, the researcher studies various theories, journals, and previous research related to Customer Relationship Management (CRM), Electronic Customer Relationship Management (E-CRM), and web-based information systems. This step aims to build a theoretical foundation and identify research gaps related to the implementation of E-CRM systems in small retail businesses.

B. Data Collection

Data collection was conducted using several techniques, namely observation, interviews, and documentation. Observation was carried out by directly observing the ordering and customer service processes at Toko Plastik Bunda. Interviews were conducted with the store owner to obtain information about the problems faced in managing customer data and transactions. Documentation was used to collect records related to products, transactions, and existing service processes.

C. System Requirement Analysis

At this stage, the collected data were analyzed to identify system requirements and the main problems faced by the store. The analysis focuses on identifying functional requirements such as customer registration, online ordering, payment confirmation, and customer reviews, as well as non-functional requirements such as system usability and data security.

D. System Design

The system design stage aims to design the structure and workflow of the E-CRM system before implementation. In this study, the system design is modeled using Unified Modeling Language (UML), including use case diagrams to describe system functionality and interactions between users and the system [16].

E. System Implementation

After the design stage, the system was implemented using PHP as the programming language and MySQL as the database management system. The developed system includes several modules such as customer registration, product ordering, order management, payment confirmation, and customer review features.

F. System Testing

System testing was carried out using the Black Box Testing method to evaluate whether each function of the system operates according to user requirements. The testing focuses on validating system inputs, processes, and outputs to ensure that all features work properly [17].

G. System Evaluation

The final stage is system evaluation to assess the effectiveness of the developed E-CRM system in improving customer service and ordering processes at Toko Plastik Bunda. The evaluation focuses on system functionality, ease of use, and the system's ability to support faster and more efficient customer service processes.

III.RESULTS AND DISCUSSION

A. System Design

System design uses a use case diagram to determine the system's functionality. The E-SCM system use case diagram is in the following Figure 1.

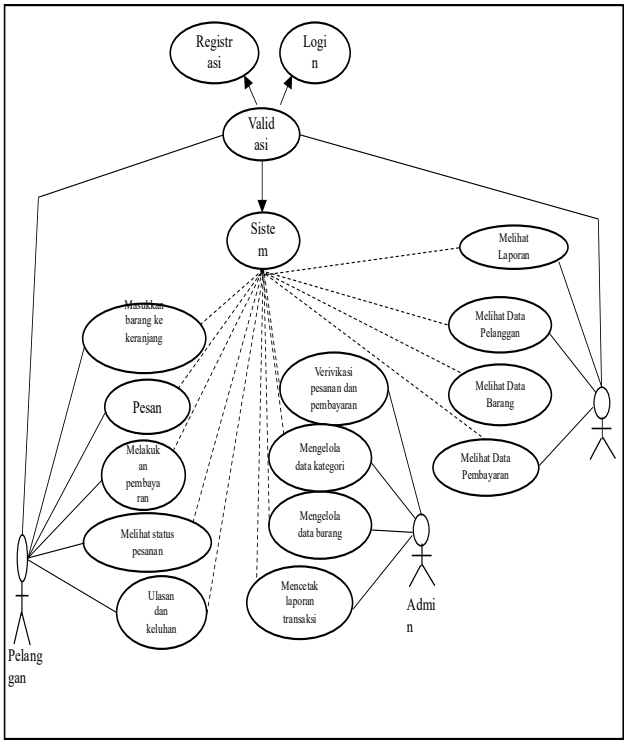


Figure 1. Use Case Diagram

B. System Implementation

Home Page

This is the main page of the E-CRM application. From this page, other menus can be accessed.

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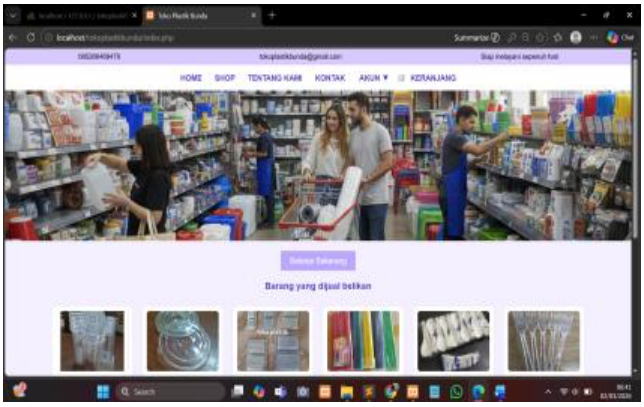


Figure 2. Main Page

Cart Page

This is a page that displays the items that have been added to the cart by the customer and the item price details.

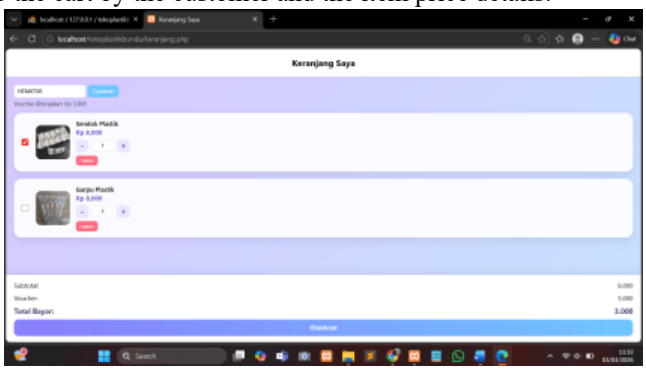


Figure 3. Cart Page

Order Page

It is the customer order page where customers can view order data, the status of their orders, and can give reviews if the order status allows rating.

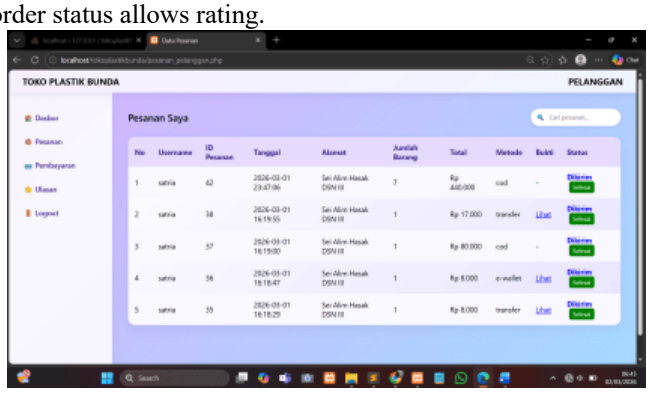


Figure 4. Order Page

Payment Page

It is a customer payment page where customers can view payment data and whether the payment status is approved or rejected.

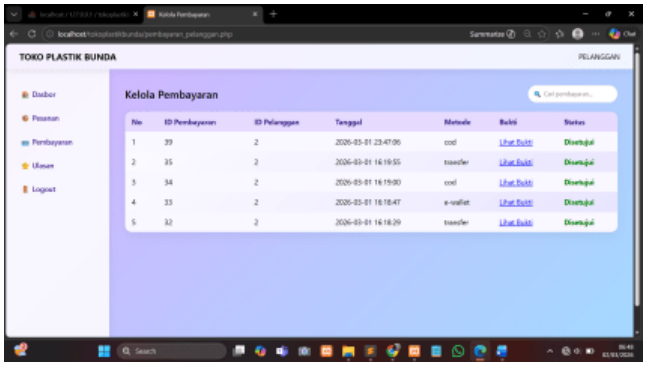


Figure 5. Payment Page

Reviews Page

This is a customer review page, which displays customer review data.

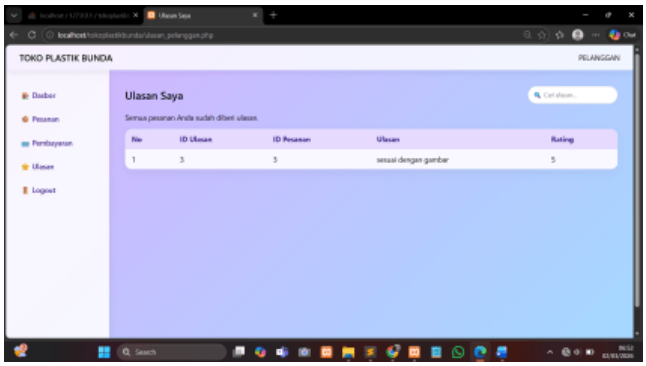


Figure 6. Review Page

C. System Testing

System testing was carried out using the Blackbox Testing method to ensure that all functions in the e-CRM automation system run in accordance with user requirements. The following are the results of the Blackbox Testing.

Table 1. Blackbox Testing

Testing	Testing Details	Status
Login	Verify admin and customer login data by entering the username and password to activate all buttons on the system's main page.	Successful
Testing product data, categories, orders, transactions, and live chat.	Processing data of products, categories, orders, transactions, and live chats by the admin.	Successful

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Testing displays data about products, categories, services, orders, and transactions.	Displaying the results of input data for products, categories, orders, transactions, and reports as shown by admins and customers.	Successful

D. System Performance and User Evaluation

In addition to functional testing using the Black Box Testing method, further analysis was conducted to evaluate the effectiveness of the developed E-CRM system in improving customer service processes. Before the implementation of the system, the ordering process was carried out manually, where customers had to visit the store directly, and transaction records were written in notebooks. This condition resulted in longer service times, frequent recording errors, and difficulties in tracking customer data

After the implementation of the web-based E-CRM system, several improvements were observed. The average service time for order processing decreased from approximately 10–15 minutes to 3–5 minutes, as customers can place orders online without visiting the store. In addition, data recording errors were reduced due to the use of an integrated database system.
To further evaluate system usability, a simple user satisfaction assessment was conducted involving X users (customers and admin). The evaluation results indicate that approximately X% of users stated that the system is easy to use, while X% of users reported that the system helps improve service efficiency. These findings suggest that the developed system provides a positive impact on both system usability and service performance.

Furthermore, compared to the previous manual system, the E-CRM system improves customer interaction through features such as order tracking, payment confirmation, and customer reviews. These features enable faster response to customer needs and enhance overall service quality.
Thus, the implementation of the E-CRM system not only improves operational efficiency but also contributes to better customer satisfaction and service effectiveness in small retail businesses.

IV. CONCLUSION

This study has successfully developed and implemented a web-based Electronic Customer Relationship Management (E-CRM) system to support customer data management and improve service efficiency in small retail businesses. The system integrates key features such as customer registration, online ordering, order monitoring, and customer feedback into a unified platform, enabling more structured and efficient business processes compared to manual methods.

From a practical perspective, the implementation of the system contributes to improving service efficiency, reducing data recording errors, and enhancing the ability of businesses to manage customer information effectively. The system also supports better customer interaction through faster response and more organized transaction management.

From an academic perspective, this research contributes to the field of information systems by demonstrating the implementation of an integrated E-CRM model tailored for small-scale retail businesses with specific operational characteristics. Unlike previous studies that mainly focus on transaction processing, this study emphasizes the integration of customer interaction features and data-driven service strategies within a single system. This contribution highlights the role of E-CRM not only as an operational tool but also as a strategic system to improve customer relationship management and business performance.

However, this study is limited to system implementation and basic evaluation without incorporating advanced analytical features such as customer behavior analysis or predictive modeling. Therefore, future research is recommended to integrate data analytics, machine learning techniques, or decision support methods to further enhance the functionality and strategic value of the E-CRM system.

V. SUGGESTION

For further research, it is possible to develop an E-CRM system that is integrated with financial systems or mobile-based applications (Android) so that the system becomes more complete, can be managed flexibly, and is easier to access by users.

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