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Research Article [OPEN ACCESS]

Design and Implementation of a Customer Relationship Management System for Medium-Sized Digital Printing Enterprises

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ABSTRACT

This study investigates the design and implementation of a Customer Relationship Management (CRM) system specifically developed to address the operational challenges faced by medium-sized enterprises in the digital printing sector, with Rio Digital Printing as a case study. The research identifies key issues such as communication gaps and the lack of real-time order tracking, which negatively impact customer satisfaction. Employing a prototyping methodology, the system was iteratively refined with active user participation, ensuring alignment with stakeholder requirements. Key features include real-time order tracking, automated notifications, and a comprehensive interactive dashboard to support data-driven decision-making. The results demonstrate that the CRM system significantly enhances operational transparency, improves customer engagement, and fosters loyalty. This study contributes to the academic discourse by addressing the underexplored application of CRM systems in small and medium-sized enterprises, presenting a scalable framework for adaptation in similar industries. The findings also provide practical implications, advocating for digital transformation as a strategy to improve competitiveness in dynamic market environments.

Keyword: Customer relationship management, digital printing sector, prototyping methodology

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1. INTRODUCTION

Rio Digital Printing operates as a printing business in Palu City, offering various services to meet the community's needs, such as brochures, invitations, banners, and other promotional materials. Despite its strategic role in fulfilling local printing demands, the business lacks a Customer Relationship Management (CRM) system capable of directly integrating customers with the production process. This absence creates a communication gap between customers and the company, particularly in monitoring order statuses. Consequently, delays or production issues are often only communicated when orders are picked up, negatively impacting customer satisfaction (Bascur & Rusu, 2020; Bueno et al., 2019; Ismail et al., 2011; Johnston & Kong, 2011; Palmer, 2010; Sari & Kusumawati, 2022).

CRM represents a strategic management system focused on building and maintaining strong relationships between businesses and customers (Buttle & Maklan, 2019; Chan et al., 2018; Hargrave, 2024; Khan et al., 2022; Kumar & Reinartz, 2018; Mulyo & Situmorang, 2018). Its primary objectives include enhancing customer loyalty by improving service quality and facilitating more effective interactions

between customers and companies (Anwar et al., 2022; Yuniar & Handriani, 2020). For Rio Digital Printing, the implementation of a CRM system provides a viable solution to its challenges by offering features such as real-time order tracking and customer notifications. These features increase transparency in the production process, reducing customer frustration caused by uncertainty and fostering greater loyalty to the company's services.

The implementation of Customer Relationship Management (CRM) has been widely discussed in the context of large enterprises; however, its application in Small and Medium Enterprises (SMEs), particularly in the printing business sector, remains underexplored (Gaffar et al., 2021; Pohludka & Štverková, 2019). This research addresses the needs of local businesses by providing features tailored to customer requirements. Consequently, the study not only offers practical solutions for local printing businesses but also fills an academic gap related to CRM implementation in the small and medium-sized printing sector.

Developing an effective CRM system requires an approach that allows for active user participation. In this study, the prototyping method is utilized as a design technique to create an initial system model that users can promptly evaluate (Camburn et al., 2015, 2017; Gurianov et al., 2023; Lauff et al., 2018). The iterative process of this method ensures that each system feature aligns with customer requirements, enhancing usability and effectiveness.

The primary objective of this research is to design a CRM information system that addresses the operational needs of Rio Digital Printing while improving customer satisfaction and loyalty through greater service transparency. This system aims to resolve communication challenges between customers and the company, thereby strengthening long-term relationships. Additionally, the research offers practical contributions to the digital transformation of services in the printing sector and academic contributions by expanding the literature on CRM implementation in small and medium-sized businesses. By adopting a prototype-based approach, the study ensures that the system design reflects user needs. Using Rio Digital Printing as a case study, this research represents an initial step towards the digital transformation of local digital printing services in Palu City.

2. MATERIALS AND METHODS

2.1 Materials

This study utilizes real data provided by Rio Digital Printing, including customer information, order history, and order management requirements, to evaluate the accuracy and functionality of the developed system. The data required for system design was collected through intensive discussions with stakeholders, including Rio Digital Printing management, to understand the system's functional needs and user expectations. Data collection techniques included direct interviews and brainstorming sessions, which were subsequently analyzed to produce a structured specification description.

An initial system model was developed using an iterative approach, actively involving users to provide feedback at each stage of development. Each iteration incorporated user input to refine the design, such as modifications to menu structures, color schemes, and button layouts based on feedback from the initial prototype. Additionally, the study builds on theoretical and technical foundations from relevant literature, such as studies by Walenta et al. (2023) and Hardiana & Pramono (2022), which discuss CRM features and user interface elements. This integration of feedback and literature ensures the system design aligns with both practical requirements and established research.

2.2 Methods

In conducting research, a structured methodology is essential to ensure systematic progression from problem identification to solution implementation. This study employs a research method that encompasses three primary stages: communication, plan and design, and iterative prototype. These stages provide a comprehensive framework to identify stakeholder needs, design a solution, and refine the prototype through iterative processes. The research method, as illustrated in Figure 1, ensures alignment between objectives and outcomes while facilitating continuous improvements at each stage.

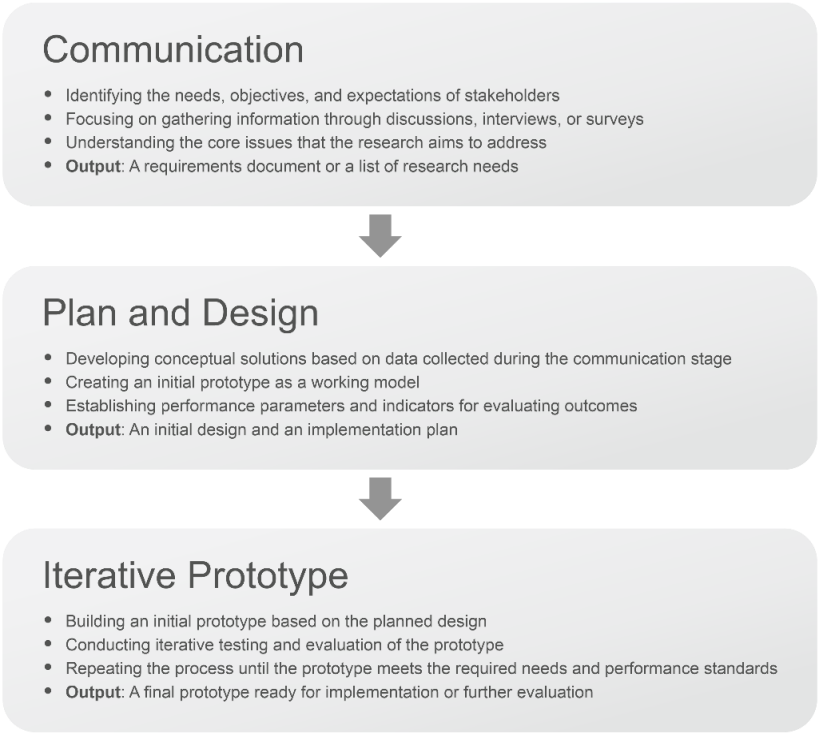

Figure 1. Research method

The communication stage represents the initial step in the research process, aimed at identifying the needs, goals, and expectations of all relevant stakeholders. This phase involves active interaction between researchers and involved parties, including industry partners, end-users, and academics, to uncover the core problems requiring resolution. Through these interactions, crucial information is gathered to understand the constraints, context, and scope of the project clearly. The output of this stage is typically a requirements document that serves as the foundation for subsequent stages of the research.

The plan and design stage builds upon the insights gained during the communication phase to develop a conceptual solution. Researchers formulate a comprehensive strategy that includes technical and methodological planning while selecting relevant tools and approaches to support the research. During this phase, an initial prototype is often designed, with considerations for feasibility, efficiency, and sustainability. Additionally, performance parameters and indicators are established to evaluate the success of the developed prototype. This strategic planning ensures that the research aligns with its objectives and facilitates the iterative development process.

The iterative prototype stage focuses on implementing and refining the prototype through successive iterations. The initial prototype, designed in the previous stage, is tested, evaluated, and modified based on feedback from testing and stakeholder input. The iterative approach allows researchers to continuously improve the design, identify issues at an early stage, and ensure the final output meets the predefined requirements. This cycle of iteration continues until the prototype achieves the expected performance standards, resulting in a solution that effectively addresses the identified needs.

3. RESULTS AND DISCUSSION

3.1 User Requirements Analysis

This study begins by identifying user requirements through interviews with relevant stakeholders. An internal user, including a Customer Service representative, an administrator, and a manager, was consulted to address internal system needs. An external user, such as a customer, was engaged to enhance user experience and foster customer loyalty. The following sections detail the user requirements identified during the interviews:

1. Customer

   Based on the interviews, the customer expressed a need for a feature that enables them to track the status of their order in real time. Currently, order processing takes several days, during which the customer often lacks clear updates on the progress of their order. This lack of transparency leads to dissatisfaction, as the customer feels inadequately informed. To address this issue, the system should include features such as an order number, an order description, an order date, quantity, the name of the responsible Customer Service representative, the total order cost, the current order status, and an estimated completion date. These features are intended to enhance transparency and improve the overall customer experience.

2. Customer Service

   As the primary point of contact, a Customer Service representative requires a system that supports the effective management and monitoring of customer interactions. The representative needs access to comprehensive customer information to deliver responsive service. Additionally, the system should include features for recording customer complaints and inquiries to ensure all issues are properly documented. Real-time updates on order statuses and reminders to provide timely updates to the customer are also essential. These features are expected to improve operational efficiency and strengthen communication between the representative and the customer.

3. Administrator

   An administrator plays a critical role in data management and overall system configuration. According to the interviews, the administrator requires a system that simplifies the management of user data, including both customer and internal team information. Furthermore, features for managing access permissions are crucial to ensure data security, particularly given the sensitive nature of the information being handled.

4. Manager

   A manager requires a system that provides data-driven insights to support decision-making. Based on the identified requirements, the manager needs visual reports summarizing order statuses and customer order details. Furthermore, an interactive dashboard should also be developed to present a comprehensive overview of order statuses. This functionality enables the manager to monitor the performance of both the Customer Service representative and the production team effectively.

3.2 Functional Scope and Roles

Figure 2 provides a visual representation of the functional scope of the system, offering a framework to understand the roles and interactions of stakeholders within the system. By illustrating the primary interactions and behaviors of the key stakeholders involved, the diagram facilitates a comprehensive understanding of how each user's responsibilities align within the overall system.

The system, as outlined in the diagram, highlights how various roles interact with specific functions to streamline business operations. Four primary actors are identified: the Manager, Customer Service Officer, Administrator, and Customer. Each actor is associated with distinct use cases that reflect their respective responsibilities. The Manager focuses on activities such as searching for orders, reviewing customer order statuses, and analyzing customer order reports, ensuring oversight of all customer-related transactions. In parallel, the Customer Service Officer manages support functions, including handling order statuses, monitoring customer orders, and addressing complaints, thereby ensuring timely and efficient service delivery to customers.

In addition to the above, the Administrator and Customer hold critical yet more specialized roles. The Administrator is responsible for managing user data, ensuring secure system access, and searching for orders to support both internal processes and external requests. Meanwhile, the Customer, as the end-user to be served, has the ability to search and review their order statuses, granting them transparency and autonomy in their order journey.

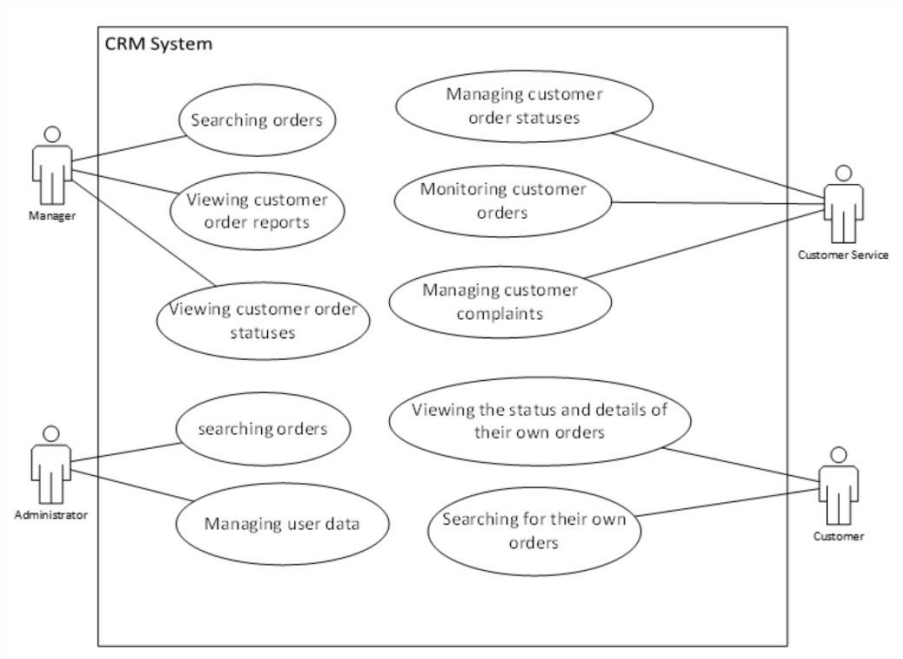

Figure 2. Usecase diagram

3.3 Interface Implementation

The implementation of the interface for the CRM system is designed to ensure an intuitive and functional user experience. The main dashboard (Figure 3) provides a summary of key information, including the total number of orders, the overall status of orders (Waiting, In Progress, Completed), and a list of recent orders with details such as customer name, date, order type, and completion status. A search feature allows users to quickly access specific orders, while the "Add New Order" button facilitates the addition of new orders. All interface elements are designed with a minimalist approach and contrasting colors to enhance readability, making the interface efficient for order management.

On the order details page (Figure 4), the implementation further demonstrates how specific order information—such as customer name, item quantity, price, and order status—is presented. The system generates a tracking link that can be shared with customers, enabling them to monitor their order status. Additionally, the customer order list page (Figure 5) showcases a simple yet informative interface, displaying the status of each customer order (Waiting, In Progress, Completed) along with the scheduled pick-up date. This coherent design ensures that users can efficiently manage and track orders while providing customers with transparent and accessible order status updates.

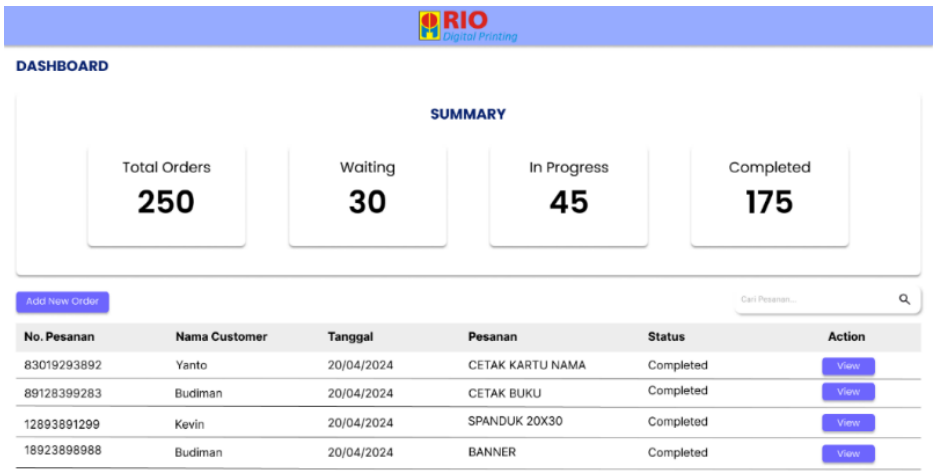

Figure 3. Internal user dashboard

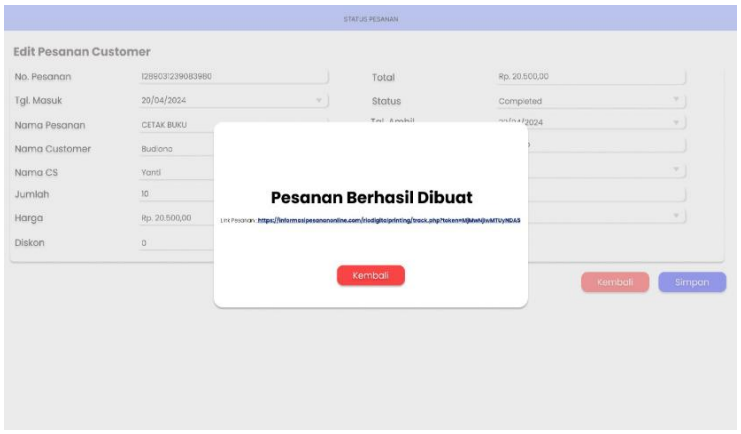

Figure 4. Customer order notification

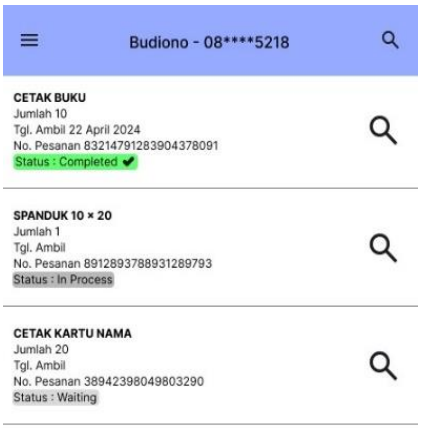

Figure 5. Customer order list

3.4 System Testing

Table 1 summarizes system improvements through iterative user evaluations. Enhancements included tooltips, order summaries, search features, and clearer status displays, while minimal changes were needed for well-functioning features. This process highlights the role of user input in optimizing system performance.

Table 1. User feedback and iterative refinement

Page	Iteration	Feeback	Improvements
Dashboard	1	The dashboard is user-friendly, key information is clearly visible, and navigation is easily accessible.	Added tooltips for key features to enhance accessibility
	2	Users need a summary of total orders showing Total Orders, Waiting, In Progress, and Completed	Implemented a summary section displaying Total Orders by status
	3	Users requested a quick access search bar	Implemented a quick access search bar at the top of customer orders
Order Detail Customer	1	The information layout is clear and easy to understand	No changes required
Add Order	1	The form layout is well-organized, and the input process is straightforward for users	No changes required
Edit Order	1	The editing process is simple and efficient, with all necessary fields easily accessible	No changes required; positive feedback received
Login	1	The login page is clean and functional, with minimal design focusing on usability	Added a "Forgot Password" link based on feedback
Customer Order List	1	The list provides a clear overview of orders, with statuses displayed prominently for easy tracking	Implemented order status display aligned with customer orders
	2	Users requested a search button for easier navigation	Added a search button allowing input by customer name, order date, or pickup date

3.5 Discussion

This study builds upon existing research on CRM systems, specifically focusing on medium-sized printing businesses—an area that remains underexplored in CRM implementation. Previous studies, such as those conducted by Yuniar & Handriani (2020), have predominantly examined CRM systems in large enterprises, where complex sales and marketing integrations are essential. By addressing the specific needs of medium-sized businesses, such as real-time order tracking and status transparency, this study aims to enhance customer experience in businesses like Rio Digital Printing. This focus highlights a significant gap in the literature, which this research seeks to fill by designing a CRM solution tailored to the unique workflows and customer engagement processes in the printing service industry.

The implementation of a CRM system enhances real-time order tracking, improves transparency, and addresses communication gaps in medium-sized businesses. The study expands theoretical understanding of CRM in specific industries like digital printing and offers a practical model for integrating order management with customer service. These findings highlight the potential of CRM systems to enhance service quality, boost customer satisfaction, and guide SMEs in adopting competitive digital strategies.

4. CONCLUSION

The findings from the implementation phase and subsequent feedback indicate that the CRM system successfully addressed the primary needs of the company and its users. The system was designed to tackle operational challenges by streamlining the ordering process, enabling real-time status tracking, and enhancing customer engagement. These results demonstrate that the system effectively facilitated communication between Customer Service staff and customers, thereby achieving its intended objectives. The development of this CRM system has practical implications for similar businesses within the printing and customer service industries. The study highlights the benefits of adopting a CRM system for workflow management, particularly in improving customer satisfaction through enhanced transparency. Furthermore, the system's architecture can serve as a model for small to medium-sized enterprises (SMEs) aiming to optimize their service operations and strengthen customer relationships.

Nevertheless, this research is limited in scope, as the developed CRM system is tailored to small- and medium-sized enterprises. Consequently, the features provided may not be suitable for large-scale companies with complex business processes. Future research should explore the scalability of CRM systems to accommodate the needs of larger organizations with more intricate operational requirements.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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