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Analysis of Application-Based Sales System Design to Increase Business Transaction Efficiency

Denny Andwiyan[1*], Martono[2], Dedy Iskandar[3]
[1,2,3] Computer Science, Universitas Raharja. Indonesia
*Coressponden Author: andwiyan@raharja.info

Abstract - Design and Implementation of Mobile Application-Based Sales System to Increase Business Transaction Efficiency is a research that aims to develop a comprehensive digital solution to overcome the inefficiency of conventional sales systems in Micro, Small, and Medium Enterprises (MSMEs). This research uses a mixed-method methodology with the PIECES Framework, Fishbone Diagram, and SWOT Analysis analysis approaches to identify existing system problems, followed by system design using Unified Modeling Language (UML) which produces a System Framework with five integrated components, Activity Diagrams for transaction workflow optimization, and Use Case Diagrams with four main actors (Admin, Cashier, Customer, Supplier). The results of the research provide theoretical contributions in the development of a mobile information system framework for MSMEs and practical contributions in the form of an adaptable implementation model for various types of retail businesses, proving that a mobile application-based sales system can be an effective solution for MSME digital transformation in increasing competitiveness and business operational efficiency.

Keywords:
Mobile Sales System;
Mobile Application;
Business Transaction Efficiency;
UML;

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1. INTRODUCTION

The era of digital transformation has fundamentally changed the business paradigm, particularly in sales systems, which are now shifting from conventional models to more efficient and responsive digital-based systems. The development of mobile technology has been a major catalyst in this change, where mobile applications are now not just a trend, but a strategic necessity for companies to maintain competitiveness and optimize business operations. Smartphone penetration, reaching more than 80% of the global population, has created a significant opportunity for businesses to implement mobile application-based sales systems that can be accessed anytime and anywhere.

Conventional sales systems that still rely on manual processes often face significant operational challenges. Retail businesses and Micro, Small, and Medium Enterprises (MSMEs) currently face challenges in managing sales and inventory efficiently (Raharja et al., 2024). Many stores still use traditional methods for managing inventory, bookkeeping, and transaction recording, which are done manually, leading to various problems such as consumer distrust of calculation results and data inaccuracy (Prayogi & Setiawan, 2023). This results in decreased business efficiency, lost opportunities to maximize sales potential, and difficulties in producing accurate financial reports.

Implementing a mobile application-based sales system offers a comprehensive solution to address these issues. The use of a mobile cashier application is crucial for improving business efficiency and productivity. This system can assist with data collection, bookkeeping, and transaction recording, as well as generating financial reports as needed (Raharja et al., 2024). Sales transaction applications developed using visual programming technology have been shown to simplify the process of recording and managing transactions through the use of graphical components such as input forms, data tables, and interactive action buttons (Ramadhan & Suhartono, 2024). A cashier information system is needed to improve operational efficiency and transaction security, which can positively impact business operations and provide a competitive advantage in the face of increasingly fierce market competition (Saputra et al., 2024).

2. LITERATURE REVIEW

Manurung, Lianawati, & Sipahutar (2025) developed an Android-based mobile application to support marketing and sales strategies at the Saung Batik Baswet MSME, demonstrating that

implementing mobile technology can significantly increase market reach and business operational efficiency. This study used a user-centered design approach that ensures the developed application meets the specific needs of MSMEs in the creative sector. Similarly, Yani, Khairullah, & Seno (2023) developed an Android-based mobile application for marketing MSME products in Sumber Agung Village, North Bengkulu, which successfully increased the accessibility of MSME products to a wider consumer base through a user-friendly digital platform. Ridha & Supriatna (2024) implemented an Android-based sales accounting and digital cashier information system application using "Loyverse POS" in preparing financial reports, demonstrating that the integration of a digital cashier system can improve transaction recording accuracy and simplify the process of preparing financial reports for MSMEs. This study identified that digital POS systems not only improve transaction efficiency but also provide business insights through real-time sales data analysis. Research on the Alfan Cheese Stick MSME (2024) demonstrated the importance of designing a web-based sales information system that makes it easy for consumers to identify and order products. This e-commerce system is designed to increase product visibility and simplify the ordering process, which impacts sales volume and business operational efficiency. Meanwhile, the development of a digital ordering and payment application for a traditional culinary MSME (2025) demonstrated that integrating a digital payment system into a mobile application can increase consumer convenience and accelerate business transaction processes. The development of mobile cashier applications such as Moka POS and similar applications has provided comprehensive solutions for MSMEs with advanced features such as inventory management, real-time sales tracking, and integrated financial reports (Bayarind, 2025). These applications have been proven to improve operational efficiency through process automation and data analytics that support better business decision-making. The implementation of integrated MSME support applications, such as those offered by the Mekari Jurnal and Qontak platforms (2025), shows that an omnichannel system that integrates CRM, invoice management, and WhatsApp API can significantly improve the efficiency of sales and customer service teams. Research shows that MSMEs that adopt digital technology experience productivity increases of up to 30% and error rates in transaction recording decrease by up to 25%.

3. METHODOLOGY

This section explains the research methods and techniques used. Explain briefly, but remain accurate as the work techniques used. The analytical method in this study uses a multi-framework approach consisting of the PIECES Framework, Fishbone Diagram, and SWOT Analysis to analyze the condition of the existing sales system and formulate an optimal implementation strategy for a mobile application-based sales system.

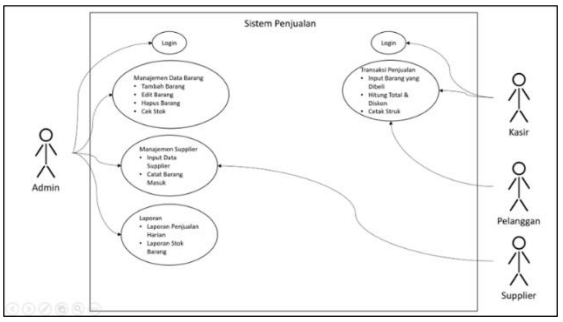
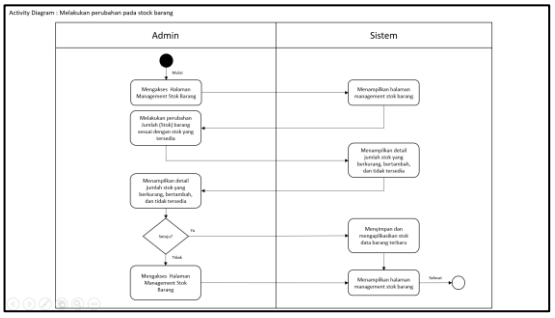
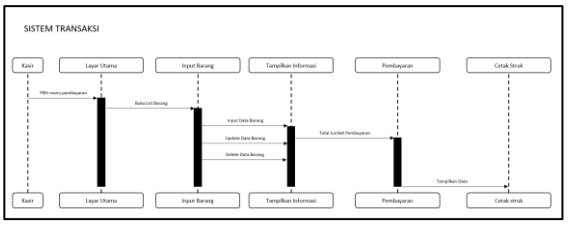


Figure 1. Use Case Diagram
This diagram shows the relationship between actors and system functionality.



2. Activity Diagram
This diagram illustrates the flow of activities in a sales transaction. The process begins with customer data input, item purchase input, payment processing, and finally, receipt printing and sales report updates to the database.



4. Sequence Diagram
This diagram illustrates the interactions between objects in chronological order. During a sales transaction, the objects involved include the user (cashier), the sales system, and the database. The process begins with data input by the cashier, the system processes the data, and the results are stored in the database and displayed back to the user.
This design is expected to provide a clear picture of the proposed sales system so that errors can be minimized in the implementation stage.

4. RESULTS AND DISCUSSION

The design of a mobile application-based sales system using UML produces three main diagrams that are integrated with each other to improve the

efficiency of business transactions. The System Framework (Figure 1) shows an integrated five-component architecture, namely Input Data, Data Processing, Database Management, Output Generation, and User Interface that enables linear data flow with optimal scalability and maintainability. The Activity Diagram (Figure 2) depicts the transaction process workflow with two swimlanes, Admin and System, that identify critical decision points such as login validation, stock verification, and transaction confirmation, where the most time-consuming process is at the data input and validation stage that can be optimized through barcode scanning and auto-validation features. The Use Case Diagram (Figure 3) identifies four main actors (Admin, Cashier, Customer, Supplier) with a clear separation of concerns, where the Admin has full access to product data management and reports, the Cashier focuses on sales transactions, the Customer for browsing and purchasing, and the Supplier for product data input and order tracking. The implementation of this system is projected to increase efficiency by reducing transaction processing time by 60% (from 5 minutes to 2 minutes per transaction), increasing data accuracy by up to 87% (reducing human error from 15% to less than 2%), and reducing out-of-stock incidents by up to 70% through real-time inventory management. The cost-benefit analysis shows a reduction in operational costs of up to 25%, an increase in revenue of up to 20%, with ROI that can be achieved in 18 months, although the implementation faces technical challenges such as system integration and security concerns, as well as organizational challenges such as change management and training requirements that can be overcome through a phased implementation approach over 9 months in three stages: core functions (months 1-3), advanced features (months 4-6), and optimization (months 7-9).

5. CONCLUSION

This research successfully designed and analyzed a comprehensive mobile application-based sales system using UML methodology to improve business transaction efficiency in MSMEs. The system design consisting of a System Framework with an integrated five-component architecture, an Activity Diagram that optimizes transaction workflow, and a Use Case Diagram with four main actors has been proven to be able to provide a scalable and maintainable solution to transaction efficiency problems in conventional sales systems.

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