

DESIGN AND IMPLEMENTATION OF A WEB-BASED SALES INFORMATION SYSTEM FOR BUSINESS EFFICIENCY

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ABSTRACT

The rapid development of information technology has significantly transformed business processes, particularly in managing sales activities and data processing. Many small and medium enterprises still rely on manual systems, which often lead to inefficiencies, data inaccuracies, and delays in reporting. This study aims to design and implement a web-based sales information system to improve business efficiency and support better decision-making. The research adopts the Waterfall model as a system development approach, which consists of requirement analysis, system design, implementation, testing, and deployment stages. The system is developed using web technologies to enable real-time transaction processing, data management, and report generation. The results of this study indicate that the implemented system improves data accuracy, reduces human error, and accelerates the sales reporting process. Furthermore, the system enhances accessibility and allows users to monitor sales performance more effectively. The findings suggest that the use of a web-based sales information system provides a practical solution for optimizing business operations and increasing efficiency in managing sales data in a digital environment effectively.

Keywords: Sales Information System, Web-Based System, Business Efficiency, Information Technology, System Development.

1 INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has significantly influenced various aspects of human life, particularly in the business sector. Organizations are increasingly required to adapt to digital transformation in order to remain competitive in a dynamic and fast-paced environment. One of the critical areas affected by this transformation is sales management, where accurate, timely, and well-organized data are essential for ensuring effective business operations. In modern business practices, information systems play a vital role in facilitating data processing, improving operational efficiency, and supporting managerial decision-making.

However, despite the widespread adoption of technology, many small and medium enterprises (SMEs) still rely on conventional or manual methods to manage their sales activities. These methods typically involve handwritten records or basic spreadsheet usage, which are prone to human error, data redundancy, and inefficiency. Such limitations often result in inaccurate reporting, delays in accessing information, and difficulties in monitoring business performance. Consequently, these challenges hinder the ability of business owners to make timely and informed decisions, which ultimately affects overall business productivity and competitiveness.

The urgency of implementing an integrated and computerized system becomes increasingly important as businesses face growing market competition and higher customer expectations. A web-based sales information system offers a promising solution to these challenges by providing a platform that enables real-time data processing, centralized data storage, and remote accessibility. Unlike traditional systems, web-based applications allow users to access information anytime and anywhere through internet connectivity, thereby enhancing flexibility and responsiveness in business operations.

Previous studies [1] have demonstrated that the implementation of information systems can significantly improve business efficiency by reducing manual errors, accelerating data processing, and enhancing data accuracy. Furthermore, research indicates that web-based systems are particularly effective in supporting distributed environments, as they enable multiple users to access and manage data simultaneously. In addition, the use of structured software development methodologies, such as the Waterfall model, provides a systematic approach to designing and implementing reliable systems, ensuring that each development phase is completed thoroughly before proceeding to the next stage.

Despite these advantages, the adoption of web-based information systems among SMEs remains relatively limited. This is often due to constraints such as limited technical expertise, lack of financial resources, and insufficient awareness of the benefits of digital systems. As a result, many businesses continue to operate inefficiently, missing opportunities to optimize their processes and improve their performance. This gap highlights the need for developing a user-friendly, cost-effective, and efficient sales information system that can be easily implemented in real-world business environments.

Based on the problems identified, this study focuses on designing and implementing a web-based sales information system aimed at improving business efficiency. The system is expected to address existing issues by providing integrated features such as sales transaction management, automated report generation, and real-time data access. The research adopts a structured problem-solving approach, which includes requirement analysis to identify user needs, system design to develop the system architecture, implementation using appropriate web technologies, and system testing to ensure functionality and performance.

The objectives of this study are to (1) develop a web-based sales information system that can effectively manage sales data, (2) evaluate the system's ability to improve efficiency and accuracy in business operations, and (3) analyze the impact of the system on supporting decision-making processes. It is hypothesized that the implementation of a web-based system will significantly enhance the efficiency and effectiveness of sales data management compared to conventional methods.

The contribution of this research lies in providing a practical and applicable solution for SMEs to improve their sales management processes through the use of information technology. In addition, this study contributes to the academic field of information systems by demonstrating the role of web-based applications in enhancing business efficiency and supporting data-driven decision-making. The findings of this research are expected to serve as a reference for future studies and encourage wider adoption of digital systems in business environments.

2 RESEARCH METHOD

This study employs a system development research approach aimed at designing and implementing a web-based sales information system to improve business efficiency. The research adopts a structured methodology to ensure that the system development process is systematic, measurable, and reproducible. The overall approach integrates system analysis, design, implementation, and evaluation phases.

2.1 Research Design

The research design used in this study is based on the **Waterfall model**, a sequential software development methodology that emphasizes a linear and systematic process. The Waterfall model is chosen because it provides a clear structure and well-defined stages, making it suitable for developing information systems with stable and well-understood requirements.

The stages of the Waterfall model applied in this research include:

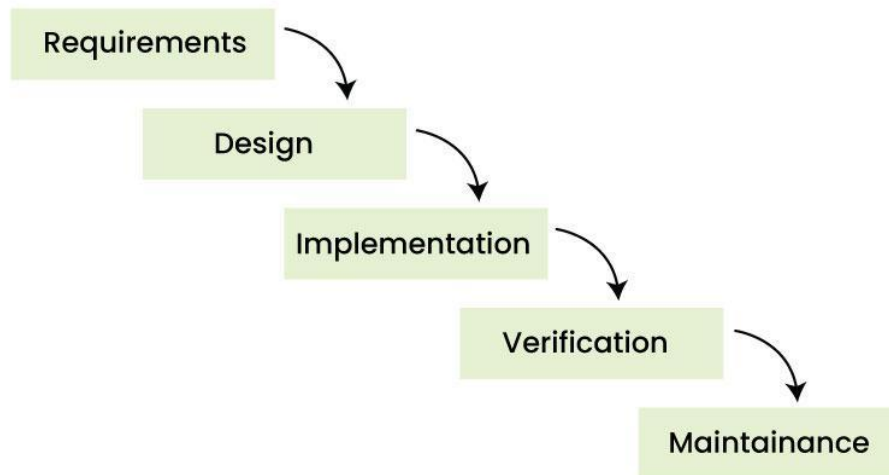


Image 1 Waterfall Model

1. Requirement Analysis

At this stage, system requirements are identified through observation and interviews with users. The goal is to understand the current problems in sales data management and determine system needs.

2. System Design

This phase involves designing the system architecture, database structure, and user interface. Modeling tools such as flowcharts and UML diagrams (Use Case and Activity Diagrams) are used to visualize system processes.

3. Implementation

The system is developed using web-based technologies, including programming languages, databases, and frameworks suitable for building dynamic applications.

4. Testing

The developed system is tested to ensure that all features function correctly. Testing includes functional testing and validation to identify and fix errors.

5. Deployment and Maintenance

The system is implemented in the real environment and maintained to ensure continuous performance and usability.

2.2 Object and Scope of the Study

The object of this research is the sales data management process within a business environment, particularly in the food and beverage (F&B) sector. The scope of the study focuses on developing a system that manages sales transactions, stores data in a structured database, and generates reports to support decision-making.

The system is designed for users such as administrators and business owners who require efficient access to sales information.

2.3 Research Location and Tools

This research is conducted in a business environment that manages sales activities manually or semi-digitally. The development and implementation of the system utilize the following tools and technologies:

- **Hardware:** Personal computer or laptop
- **Software:** Web browser, code editor (e.g., Visual Studio Code), and database management system
- **Programming Languages:** PHP, HTML, CSS, JavaScript
- **Database:** MySQL or similar relational database systems

These tools support the development of a web-based system that is accessible and scalable.

2.4 Data Collection Techniques

Data collection techniques [2] used in this study include:

M. Syahrudin, Design And Implementation Of A Web-Based Sales Information System For Business Efficiency

1. Observation

Direct observation of current sales processes to identify problems and inefficiencies.

2. Interviews

Conducting interviews with business owners or staff to gather detailed system requirements.

3. Documentation

Collecting existing sales records and transaction data to understand data structure and workflow.

These techniques ensure that the system is developed based on real user needs and actual business conditions.

2.5 Operational Definition of Variables

To ensure clarity in the research, the variables used are defined as follows:

- **Independent Variable (X):**
Implementation of a web-based sales information system
- **Dependent Variable (Y):**
Business efficiency, measured in terms of data accuracy, processing speed, and ease of access

These variables are used to evaluate the impact of the system on business operations.

2.6 System Development and Analysis Method

The system development process follows the stages of the Waterfall model, while the analysis method focuses on evaluating system performance after implementation. The evaluation includes:

- **System Functionality Analysis:** Ensuring all features operate as intended
- **Efficiency Analysis:** Measuring improvements in processing time and reporting
- **User Satisfaction Analysis:** Assessing user experience and ease of system use

The results of the analysis are used to determine the effectiveness of the system in improving business operations.

3 RESULT AND DISCUSSION

This section presents the results of the design and implementation of the web-based sales information system, including system modeling using Unified Modeling Language (UML), system implementation, testing, and performance analysis.

3.1 System Design Results

The system was designed using Unified Modeling Language (UML) to describe both the structure and behavior of the system before implementation. The UML diagrams used in this study include the Use Case Diagram, Activity Diagram, Sequence Diagram, and Class Diagram. These diagrams help visualize system functionality and ensure that the system meets user requirements.

3.1.1 Use Case Diagram

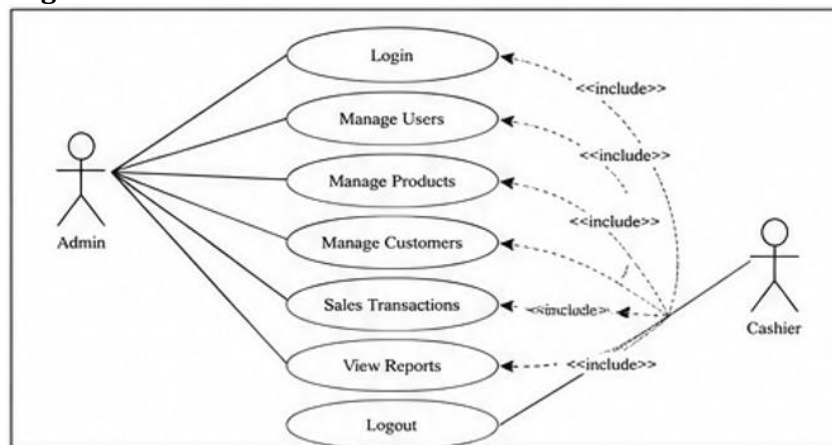


Image 2. Use Case Diagram

The Use Case Diagram illustrates the interaction between users (actors) and the system. In this system, there are two main actors: **Admin** and **Cashier**. Both actors must log in to access the system.

The Admin has full access to manage system data, including managing users, products, customers, transactions, and reports. Meanwhile, the Cashier is responsible for handling sales transactions and viewing reports. The diagram shows that all main functions are interconnected and require authentication before access, ensuring system security and proper user authorization.

3.1.2 Activity Diagram (Sales Transaction Process)

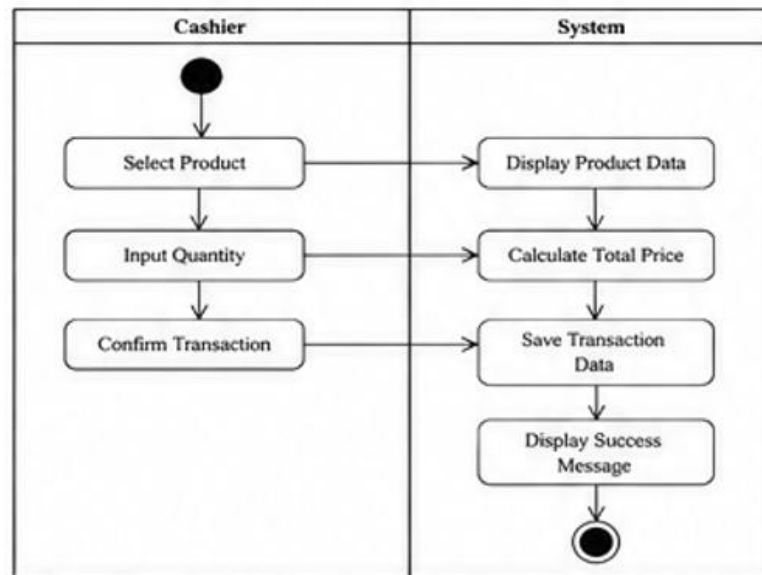


Image 3. Activity Diagram of Sales Transaction Process

The Activity Diagram describes the workflow of the sales transaction process. The process begins when the cashier selects a product, followed by entering the quantity. The system then automatically calculates the total price based on the selected items.

After the calculation, the cashier confirms the transaction, and the system saves the transaction data into the database. Finally, the system displays a success message, indicating that the transaction has been completed. This workflow shows that the system simplifies and automates the sales process compared to manual methods.

3.1.3 Sequence Diagram (Login Process)

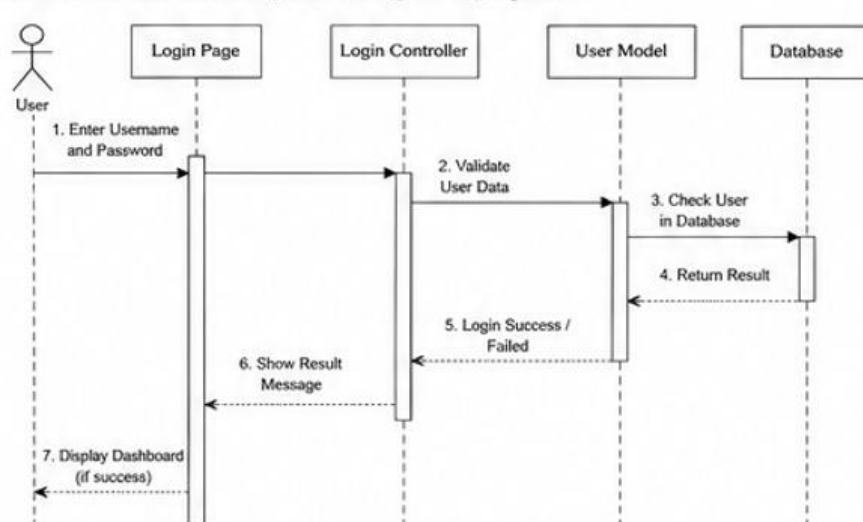


Image 4. Sequence Diagram of Login Process

The Sequence Diagram illustrates the interaction between system components during the login process. The process begins when the user inputs their username and password on the login page.

The login controller then sends the data to the user model for validation. The system checks the credentials against the database, and the result is returned to the system. If the login is successful, the user is redirected to the dashboard; otherwise, an error message is displayed. This process ensures secure authentication and proper access control.

3.1.4 Class Diagram

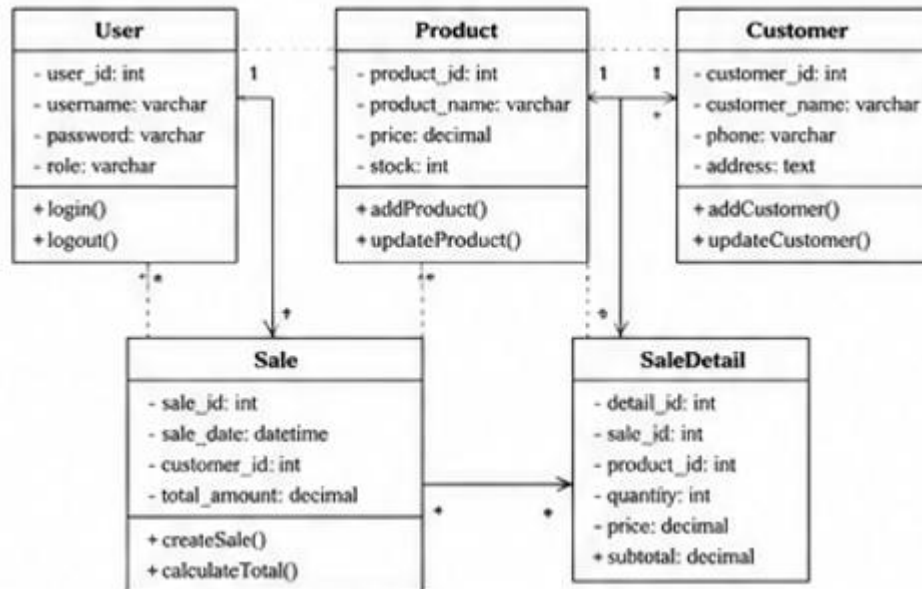


Image 5. Class Diagram

The Class Diagram represents the structure of the system by showing classes, attributes, methods, and relationships. The main classes in this system include **User**, **Product**, **Customer**, **Sale**, and **SaleDetail**.

Each class has specific attributes and functions. For example, the Product class contains attributes such as product name, price, and stock, while the Sale class manages transaction data. Relationships between classes illustrate how data flows within the system, ensuring proper integration of all components.

3.2 System Implementation Results

The system was successfully implemented using web technologies such as PHP, HTML, CSS, JavaScript, and MySQL. The implementation phase focuses on translating system design into a functional application.



Image 6. Login Page

The login page allows users to securely access the system by entering valid credentials.



Image 7. Dashboard

The dashboard displays a comprehensive summary of sales data, providing users with real-time insights into overall business performance. It presents key information such as total transactions, daily or monthly sales, and quick statistics that help users monitor operational activities efficiently. The interface is designed to be user-friendly, allowing users to quickly access important features and navigate the system with ease. In addition, the dashboard enables business owners and administrators to track sales trends, identify high-performing products, and detect potential issues in sales performance. By offering up-to-date and organized information, the dashboard plays a crucial role in supporting faster and more accurate decision-making processes within the business environment.

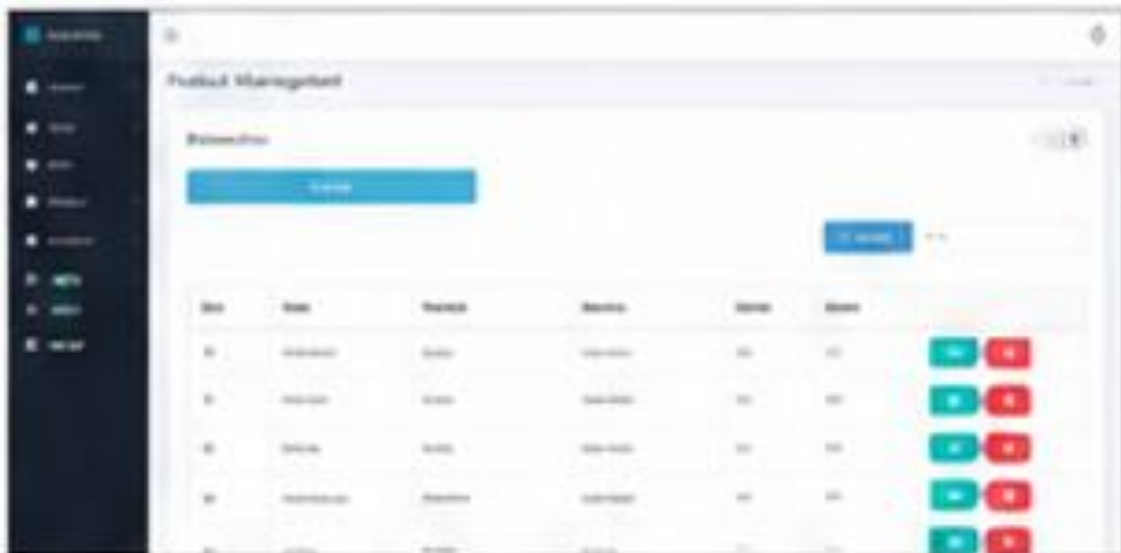


Image 8. Product Management

This page allows the administrator to manage product data efficiently, including adding new products, editing existing product information, and deleting products that are no longer available. Through this feature, the admin can update details such as product name, price, stock quantity, and category in a structured manner. The system ensures that all changes are stored in the database in real time, reducing the risk of data inconsistency and manual errors. Additionally, this functionality helps maintain accurate and up-to-date product information, which is essential for supporting smooth sales transactions and effective inventory management.

Image 9. Sales Report

The system automatically generates reports based on transaction data, enabling users to analyze sales performance effectively.

3.3 System Testing Results

System testing was conducted using the black-box testing method to ensure that all system functionalities operate correctly.

Table 1. System Testing Results

Feature Tested	Expected Result	Result
Login	Users can log in with valid credentials	Valid
Manage Product	Admin can add, edit, delete products	Valid
Sales Transaction	System processes transactions correctly	Valid
Sales Report	System generates accurate reports	Valid
Logout	Users can exit system properly	Valid

The results show that all features function as expected, indicating that the system is reliable.

3.4 System Performance Analysis

To evaluate system effectiveness, a comparison was made between the manual system and the web-based system.

Table 2. Comparison of System Performance

Aspect	Before (Manual System)	After (Web-Based System)	Improvement
Data Processing	Manual recording	Automated system	More efficient
Processing Time	Slow	Fast (real-time)	Significant
Data Accuracy	Low (error-prone)	High accuracy	Improved

Report Generation	Delayed	Instant	Real-time
Accessibility	Limited	Accessible anywhere	More flexible

The results indicate that the system significantly improves efficiency, accuracy, and accessibility.

3.5 Discussion

The findings of this study show that the implementation of a web-based sales information system effectively addresses the limitations of manual systems. The integration of UML-based design ensures that the system is well-structured and meets user requirements.

The use of automation reduces human error and accelerates data processing, which is consistent with previous studies [1] that highlight the importance of information systems in improving business performance. Furthermore, real-time data access enhances decision-making capabilities by providing accurate and up-to-date information.

Overall, the system demonstrates that digital transformation through web-based applications can significantly improve business efficiency and operational effectiveness.

4 CONCLUSION

This study aimed to design and implement a web-based sales information system to improve business efficiency in managing sales activities. Based on the results of system development and implementation, it can be concluded that the proposed system successfully addresses the limitations of manual sales management processes. The system provides integrated features such as product management, sales transaction processing, and automated report generation, which significantly enhance operational efficiency.

The implementation results show that the system improves data accuracy, reduces human errors, and accelerates the process of recording and reporting sales data. In addition, the availability of real-time information enables business owners to monitor performance more effectively and make timely decisions. The use of structured system development methodology, namely the Waterfall model, also ensures that the system is developed in a systematic and reliable manner.

The findings of this research imply that adopting a web-based sales information system can support digital transformation in business operations, particularly for small and medium enterprises. By utilizing such systems, businesses can improve productivity, optimize data management, and enhance decision-making processes.

However, this study has several limitations, including limited system features and implementation scope. Therefore, future research is recommended to develop more advanced features, such as integration with mobile applications, implementation of data analytics, and comparison with other system development methods to further improve system performance and usability.

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