

Web-Based Sales System Development Using CodeIgniter Framework: A Case Study at Andesta Indah Store, Serang Regency

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Abstract

The rapid advancement of information and communication technology has significantly transformed business practices, particularly through the emergence of Electronic Commerce (E-Commerce). This study aims to design and develop a web-based sales application for Toko Andesta Indah, a micro, small, and medium-sized enterprise (MSME) located in Serang Regency, to address inefficiencies in manual sales processes and expand digital market reach. The system was developed using the Waterfall model and implemented with the CodeIgniter framework due to its lightweight structure and support for MVC architecture.

The application features include user registration and login, product catalog display, order processing, payment proof upload, and administrative control of product and transaction management. Functional testing using Black Box methods confirmed that the system operates according to user requirements and supports secure, accurate, and efficient transactions.

The results demonstrate that the developed system effectively simplifies transaction processes, enhances customer access to products, and provides administrative efficiency in managing sales data. This web-based application serves as a strategic step toward digital transformation for MSMEs and contributes to improving competitiveness in the e-commerce landscape.

Keywords: E-Commerce, Web-Based Sales System, CodeIgniter, MSMEs, Waterfall Method, Black Box Testing.

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1. Introduction

The advancement of information and communication technology has transformed the way people conduct business activities. One of the most notable changes is the emergence of Electronic Commerce (E-Commerce), which enables buying and selling processes to be carried out online. E-Commerce not only expands market reach but also increases the efficiency of transactions between sellers and buyers (Hasanat et al., 2020). In this context, E-Commerce-based websites serve as strategic tools for building a competitive digital ecosystem, particularly for Micro, Small, and Medium Enterprises (MSMEs) seeking to transition toward digitalization.

Indonesia, as the country with the fourth-largest number of internet users in the world, holds significant potential in E-Commerce development. According to data from the Indonesian Internet Service Providers Association (APJII), more than 70% of Indonesians have used the internet to search for products and make transactions (Utami et al., 2022). However, the adoption of technology by MSMEs still faces many challenges. One of the main issues is the lack of knowledge and technical skills in designing and managing reliable, secure, and user-friendly E-Commerce systems (Sari et al., 2023).

Toko Andesta Indah, as one of the MSMEs in Serang Regency, still relies on manual sales methods and social media platforms such as WhatsApp and Instagram. Data recording is still done conventionally, and customers do not have access to a real-time product catalog. This situation results in limited information, difficulties in reaching consumers outside the local area, and inefficiencies in the transaction process. Thus, designing a web-based E-Commerce application has become an urgent need for this store to compete in today's digital era.

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CodeIgniter is one of the most popular PHP frameworks for web application development due to its open-source nature, lightweight structure, and comprehensive documentation. Previous research states that CodeIgniter is highly efficient for building MSME-scale E-Commerce systems as it simplifies the integration between front-end and back-end components (Haryono et al., 2021). Furthermore, for a systematic system design, the Waterfall development model is considered suitable as it adopts a linear and structured approach that facilitates documentation and evaluation at each stage (Ardiansyah & Prasetyo, 2021).

The implementation of an E-Commerce system is not only related to functionality but must also consider user security and convenience. A good system should be able to verify user identities, maintain the confidentiality of transaction data, and provide features such as automated checkout and payment proof uploads. Research by Rizal et al. (2020) emphasizes the importance of a security-by-design approach in E-Commerce systems, especially in validating payments and maintaining customer data integrity.

By developing a web-based sales application, Toko Andesta Indah can expand its market reach, improve customer satisfaction through self-service and responsive features, and streamline internal business processes. The use of an integrated system also assists the store owner in managing inventory, monitoring transactions, and generating sales reports more accurately. In other words, the digitalization of the sales system is a concrete step toward creating an adaptive and sustainable business transformation.

2. Literature Review

2.1. E-Commerce

Electronic Commerce (E-Commerce) is a form of digital transformation in business that enables buying and selling processes to be conducted electronically via the internet. According to Laudon and Traver (2020), E-Commerce encompasses all commercial activities conducted electronically, including the exchange of goods, services, and information between companies and consumers through the internet as the primary medium of communication and transactions. The implementation of E-Commerce has been proven to improve business process efficiency, expand market reach, and reduce operational costs.

Fauzan and Rohmah (2021) argue that web-based E-Commerce systems greatly support Micro, Small, and Medium Enterprises (MSMEs), especially in overcoming geographical limitations and promotional costs. With E-Commerce systems, ordering, payment, and delivery processes can be automated, supporting smooth operations and more accurate recordkeeping. Furthermore, E-Commerce plays a role in the digital transformation map that encourages businesses to continuously adapt to technological developments (Kusumawardani & Agustina, 2023).

2.2. CodeIgniter Framework

A framework is a set of libraries and programming structures that simplify and speed up software development. One of the widely used PHP frameworks in web application development is CodeIgniter. This framework is open-source, lightweight, and flexible, making it ideal for small to medium-scale projects. According to Wahyudi and Mubarak (2022), the main advantage of CodeIgniter lies in its Model-View-Controller (MVC) architecture, which separates application logic, user interface, and data management. This structure allows developers to work modularly and efficiently.

CodeIgniter also provides basic security features such as input sanitization, Cross-Site Request Forgery (CSRF) protection, and adequate session management. These aspects are essential in building secure and reliable online sales systems. Its complete documentation and active global community support also make CodeIgniter a practical choice for developing MSME-scale E-Commerce systems (Amin & Supriyanto, 2021).

2.3. Web-Based Sales System

A web-based sales system is an application that allows sales transactions to be conducted online in an integrated manner. This system includes features for recording transactions, managing inventory, handling customers, and generating real-time sales reports. Setiawan and Ramadhan (2020) stated that implementing web-based sales systems is highly effective in minimizing manual errors, increasing service speed, and facilitating business monitoring and evaluation processes.

For MSMEs, such a system is strategic because it improves operational flexibility and efficiency. Arifin and Pratiwi (2021) showed that using online sales systems helps increase business productivity, speed up transaction flows, and expand market access. Web-based systems also provide access flexibility for both consumers and business owners anytime and anywhere, thus improving service quality and user experience.

2.4. Waterfall Methodology

The Waterfall methodology is a classic approach in software development that is sequential and systematic. Each stage begins with requirements analysis, followed by system design, implementation, testing, and maintenance. Sutrisno and Firmansyah (2022) explain that the Waterfall model is suitable for projects with well-defined scopes and minimal changes during the development process.

In developing information systems for MSMEs, this method offers a clear workflow and systematic documentation, making it easier to track, validate, and evaluate each phase. The Waterfall model is also considered to reduce errors and conflicts in system development due to its structured and disciplined stages (Yulianto & Wibowo, 2021). This is especially beneficial for building web-based E-Commerce systems, particularly for beginner developers and small-scale businesses.

2.5. Previous Relevant Studies

To strengthen the theoretical and methodological foundation of this research, several relevant previous studies have been reviewed. These studies show that the development of web-based sales systems using the CodeIgniter framework has been widely implemented and yielded positive results in terms of operational efficiency, ease of use, and effectiveness in managing transaction data.

A study conducted by Hamid and Hidayat (2021) developed an online sales application for an electronics store using the waterfall method and the CodeIgniter framework. The results indicated that the system was capable of managing sales transactions, product data, and sales reports automatically. CodeIgniter proved to be an effective tool due to its lightweight structure and ease of development. This study is relevant in terms of the selected technology and development method, although it differs in the research object.

Kurniawan and Salsabila (2022) designed a web-based sales system for a grocery store using the prototype method. The application successfully enabled customers to access products and place orders remotely. The fundamental difference from the current study lies in the development approach. While the present research uses a structured waterfall model, Kurniawan and Salsabila's study emphasized iterative design through prototyping.

Another study by Dwi and Amelia (2020) implemented the CodeIgniter framework in an E-Commerce system for MSMEs in the fashion sector. Their focus was on creating a user-friendly system capable of efficiently managing inventory and transactions. This study contributes significantly to the development of user interfaces and the integration of checkout features in small-scale E-Commerce systems.

Additionally, Nugroho and Wijayanti (2019) developed an online sales information system for a bookstore using CodeIgniter. They applied the waterfall method and built a system that accommodated ordering, payments, and comprehensive sales reporting. Although the research object differs, the technical approach and framework used share similarities with the present study and validate its approach.

In terms of system security, Astuti and Permana (2021) conducted an analysis of the security features in E-Commerce applications based on CodeIgniter. Their findings indicate that the framework comes equipped with essential security features such as Cross Site Scripting (XSS) filtering, input validation, and CSRF (Cross Site Request Forgery) protection. This study supports the decision to use CodeIgniter in the current research, as it offers a reasonable level of security for online transaction applications while maintaining a lightweight footprint.

Based on the review of the five studies above, it can be concluded that developing a web-based sales system using the CodeIgniter framework is both relevant and effective, particularly within the context of MSMEs. Each study contributes uniquely in terms of methodology, technology, security, and system design. Therefore, this research continues and expands upon these works with a specific focus on grocery stores, the waterfall method, and the development of systems aimed at enhancing operational efficiency and user experience.

3. Methods

3.1. Type and Research Approach

This research is classified as software engineering research using a quantitative descriptive approach. This approach is employed to design and develop a web-based sales application tailored to user needs. The research was conducted through systematic stages, starting from the analysis of the current system, the design of the new system, implementation, and application testing (Sommerville, 2016).

3.2. System Development Method

The system development method used in this study is the Waterfall model. This method is a classical approach in software engineering that is sequential and systematic, where each stage must be completed before proceeding to the next (Pressman, 2019). The Waterfall model consists of five main stages:

3.2.1. Requirement Analysis

This stage aims to understand the user's needs for the system to be developed. The analysis process includes observation, interviews, and documentation of the manual system currently running at Toko Andesta Indah. Functional and non-functional requirements are identified in detail as the foundation for system development.

The requirement analysis was conducted to identify essential features that must be included in the web-based sales system to meet the operational needs of Toko Andesta Indah and provide convenience for users (both administrators and customers). This process involved observation of the currently running manual system, interviews with the store owner, and collection of existing transaction documentation.

Based on the analysis, the system requirements are categorized into two main types: functional requirements and non-functional requirements. Functional requirements describe the services and processes the system must support, while non-functional requirements cover system qualities and technical constraints, such as performance, security, and usability.

Table 1. Functional Requirements

No	Functional Requirement	Description
1	User Login	The system must provide a login feature for administrators and customers, including username and password verification.
2	Product Management	Admins can add, edit, and delete product data displayed to customers.
3	View Product Catalog	Customers can view a list of products with details such as images, prices, and descriptions.
4	Product Ordering	Customers can place orders online by filling out an order form.
5	Upload Payment Proof	Customers can upload payment proof after bank transfers.
6	Payment Verification	Admins can verify payment proof and change the order status to "processed" or "completed".
7	Transaction Reports	Admins can view and print sales reports based on date, product, or customer.
8	System Logout	Users can log out from the system to maintain account security.

Table 2. Non-Functional Requirements

No	Non-Functional Requirement	Description
1	Data Security	The system must ensure the confidentiality and integrity of user data through login protection and CSRF token implementation.
2	System Availability	The system should be accessible 24 hours a day to support online transactions anytime.
3	Accessibility	The system interface must be user-friendly and accessible via both desktop and mobile devices.
4	Time Efficiency	The system should respond quickly in displaying pages and processing transactions.

5	System Scalability	The system must be scalable for future development, such as adding courier or automatic discount features.
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3.2.2. System Design

At this stage, the system architecture is designed using Unified Modeling Language (UML) diagrams such as use case diagrams, activity diagrams, sequence diagrams, class diagrams, and Entity Relationship Diagrams (ERD). The design also includes user interface (UI) layouts and database schema planning.

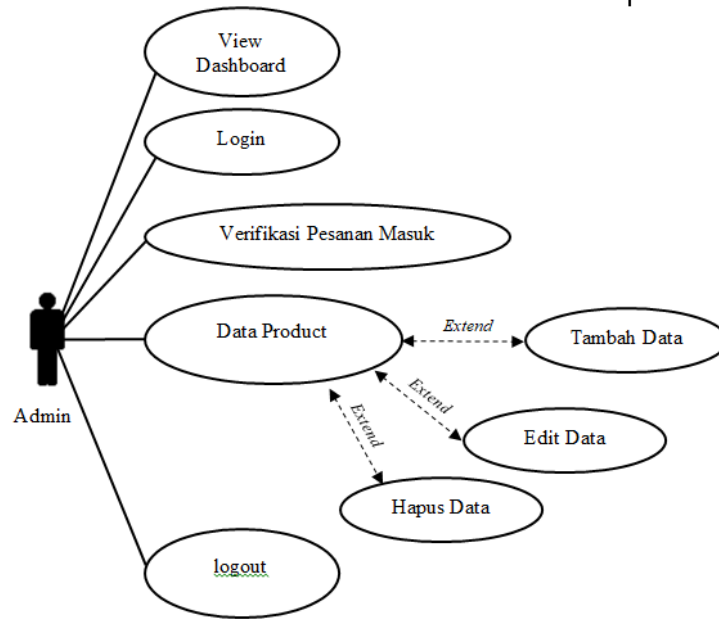


Figure 1. Use Case Diagram Admin

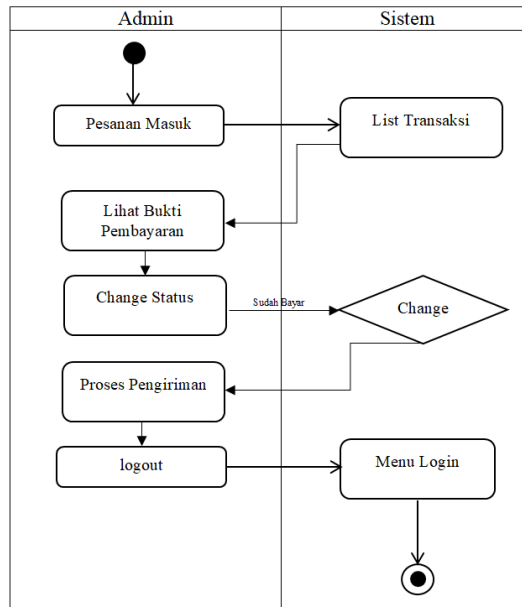


Figure 2. Activity Diagram Admin

Figure 1 illustrates the Use Case Diagram for the Admin user in the web-based sales system. The admin has access to several primary system functionalities including logging in, viewing the dashboard, verifying incoming orders,

managing product data, and logging out. The “Data Product” use case is further extended into three additional use cases: “Add Data,” “Edit Data,” and “Delete Data,” indicating that product management includes the ability to create, modify, and remove product entries. Each of these extended use cases is triggered as part of the broader product management function. This diagram emphasizes the core responsibilities of the admin in maintaining the operational integrity of the system, particularly in managing product data and validating customer orders.

Figure 2 presents the Activity Diagram for the Admin in the web-based sales system. The diagram illustrates the sequence of actions performed by the admin starting from accessing incoming orders (Pesanan Masuk), where the system displays the list of transactions. The admin then views the uploaded proof of payment to verify the status. A decision point follows—if the status is marked as “Sudah Bayar” (Paid), the system allows the admin to proceed with changing the order status and continue to the shipping process (Proses Pengiriman). After completing the shipping activity, the admin logs out, and the system returns to the login menu. This diagram effectively maps the flow of administrative operations related to order verification and processing, ensuring that payment validation is completed before dispatching products to customers.

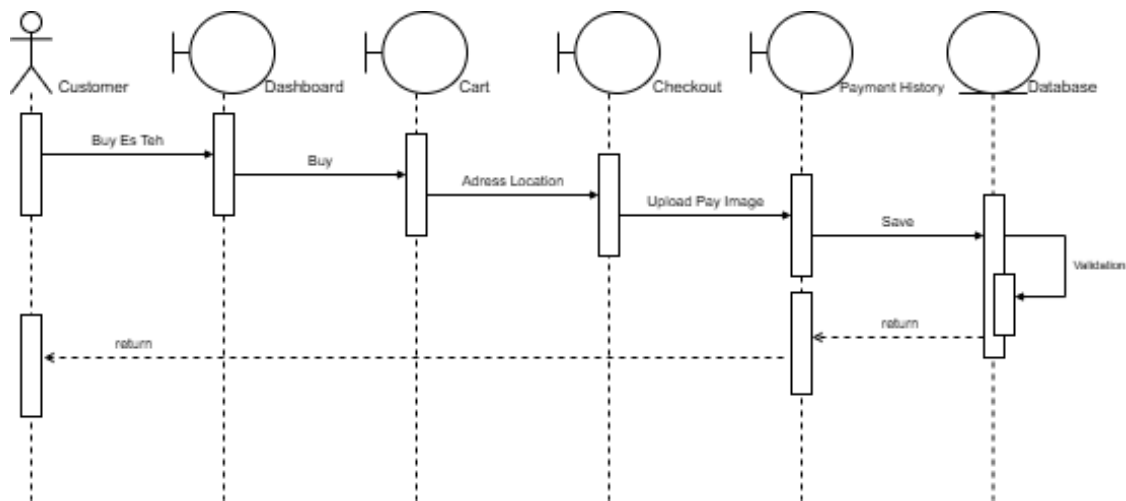


Figure 3. Sequence Diagram Admin

Figure 3 illustrates the Sequence Diagram for the Admin-side Transaction Flow in the web-based sales system. The diagram demonstrates the interaction between the customer, various system modules (Dashboard, Cart, Checkout, Payment History), and the database. The process begins when the customer selects a product (in this case, “Buy Es Teh”) from the dashboard. The request is passed to the cart where the customer provides the delivery address. Subsequently, during the checkout phase, the customer uploads a payment image as proof of transaction. The system then interacts with the Payment History module, which in turn communicates with the database to save the transaction and validate the data. Once validation is complete, the control flow returns successively back to the customer, confirming that the order has been recorded. This sequence diagram captures the critical steps in the purchasing workflow and ensures that payment and order data are consistently stored and validated.

3.2.3. Implementation (Coding)

This phase involves translating the system design into source code using the PHP programming language with the CodeIgniter framework. MySQL is used as the database system, and development is carried out using XAMPP as the local server environment.

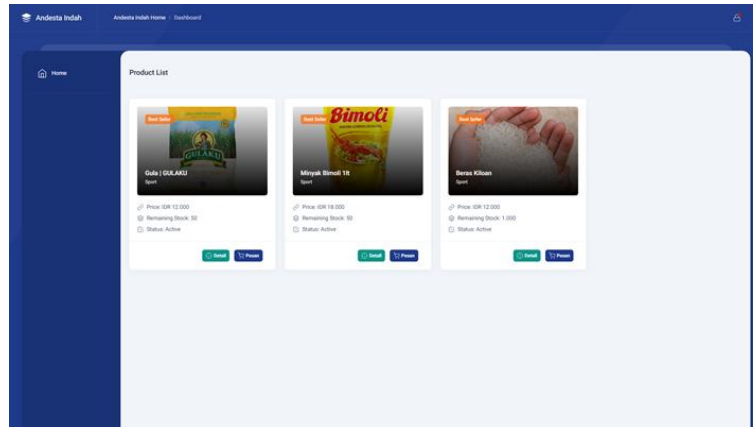


Figure 4. Main Menu

The image above represents the main page of the Andesta Indah website, where every visitor can browse available products along with their detailed information. To place an order, customers who do not yet have an account will be redirected to the registration page, while those who already have an account can proceed directly to the login page. This ensures that only registered users can access the ordering system, while unregistered users are encouraged to create an account for a more personalized shopping experience.

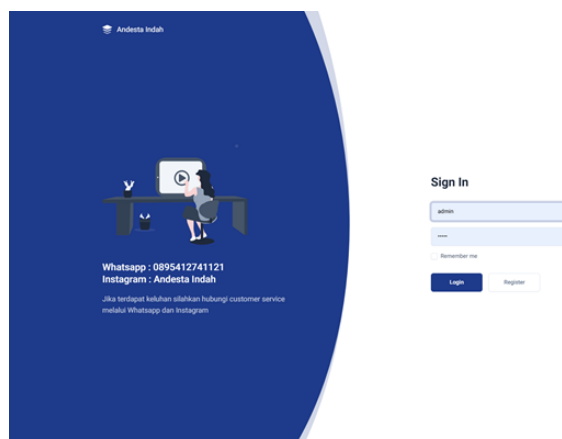


Figure 5. Login Page

The image above explains that after completing the registration process, the customer is required to log in first. To access the andesta indah platform, the customer must enter the registered username and password. This login step ensures secure access to the customer dashboard and enables them to proceed with browsing, ordering, and managing their transactions within the system.

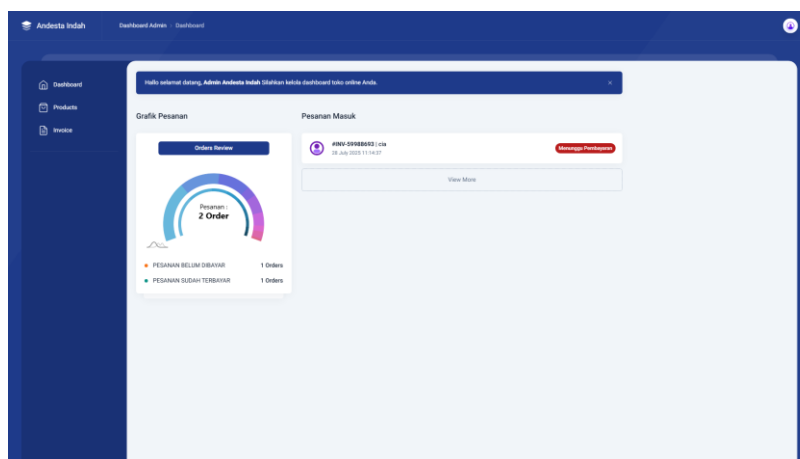


Figure 5. Admin Dashboard Page

The image above shows the admin main dashboard of the Andesta Indah web application. To access this page, the admin must first log in using the same login interface as the customer. The system distinguishes between admin and customer accounts based on user levels. In this case, Andesta Indah has designated only one admin user, as stated during the interview process. On the admin dashboard, the administrator can view products and invoices. Additionally, graphical representations of order statistics and incoming orders are displayed for quick monitoring. To access detailed information about incoming orders, the admin must click the “View More” button, as shown in the interface.

3.2.4. System Testing

Testing is conducted using the Black Box Testing method to evaluate the system’s functionality from the user’s perspective. This ensures that all designed features operate correctly and meet user requirements without logical errors (Marchewka, 2015).

Table 3. Black Box Testing

No	Feature Tested	Test Scenario	Input	Expected Result	Actual Result	Status
1	User Login	User enters valid username and password	Correct credentials	Redirect to dashboard	Success	Pass
2	User Login Failure	User enters invalid username or password	Incorrect credentials	Display error message: “Login failed”	Success	Pass
3	Product Catalog View	Customer opens the product catalog	Click “Products” menu	List of products displayed with image, name, and price	Success	Pass
4	Product Details	Customer selects a product to view its details	Click product name or image	Product description and price shown	Success	Pass
5	Product Ordering	Customer completes an order process	Fill order form	Order data saved and confirmation displayed	Success	Pass
6	Upload Payment Proof	Customer uploads payment proof	Image file	Proof uploaded and notification sent to admin	Success	Pass
7	Payment Verification	Admin checks payment proof	Click “Verify Payment”	Order status updated to “Processing”	Success	Pass

No	Feature Tested	Test Scenario	Input	Expected Result	Actual Result	Status
8	Product Management - Add	Admin adds a new product	Product form filled	Product saved and listed in catalog	Success	Pass
9	Product Management - Edit	Admin edits an existing product	Modify product data	Product information updated	Success	Pass
10	Product Management - Delete	Admin deletes a product from the list	Click “Delete”	Product removed from catalog	Success	Pass
11	Transaction Report	Admin opens transaction report	Click “Reports” menu	Table of reports displayed by date and product	Success	Pass
12	Logout	User logs out from the system	Click “Logout”	Redirected to login screen	Success	Pass

4. Result and Discussion

The development of the web-based sales system for Toko Andesta Indah was carried out using the Waterfall development method and implemented through the CodeIgniter PHP framework. This system was designed to address several issues found in the manual sales process, such as limited customer reach, inefficient transaction handling, and the absence of real-time product availability updates.

4.1. System Implementation Results

The final system includes several key modules: user registration and login, product catalog display, order processing, payment proof upload, and admin-side transaction management. Customers are able to browse products and place orders after successful login. Admins have access to features such as adding and editing products, verifying payments, and generating sales reports.

Each feature has been tested using Black Box Testing, which verified that the system behaves correctly under valid inputs and handles invalid scenarios appropriately. For example, login validation accurately distinguishes between valid and invalid credentials, and the upload module successfully restricts file types to prevent security vulnerabilities. These tests confirmed that the system meets the functional requirements and offers a smooth user experience.

4.2. Discussion

The results of system implementation and testing reveal that the adoption of a web-based sales system significantly improves business processes, particularly for small enterprises like Toko Andesta Indah. By integrating essential sales functions into a centralized platform, the system reduces the dependency on manual recordkeeping and increases transaction transparency and accuracy.

Previous studies support these findings. Hasan et al. (2020) emphasize that digital sales systems enhance operational effectiveness by reducing the time spent on administrative tasks and minimizing errors in order management. Furthermore, Ab Rahman et al. (2021) argue that systems based on web technologies improve accessibility for both consumers and administrators, making the overall business process more scalable and adaptable to market changes.

CodeIgniter was chosen for its lightweight framework and MVC architecture, which is ideal for developing scalable and well-structured web applications (Jahan et al., 2022). Its compatibility with MySQL and built-in security features such as CSRF and XSS protection further ensure that user data and transaction processes are safeguarded.

Moreover, based on the work of Malik & Aamir (2019), the implementation of real-time transaction monitoring and payment verification helps build consumer trust and enhances the credibility of online stores. These factors contribute directly to customer satisfaction, which is a key element for business sustainability in digital markets.

5. Conclusion

The development of a web-based sales application for Toko Andesta Indah using the CodeIgniter framework and the Waterfall method has successfully addressed the limitations of its previous manual system. Through the integration of key features such as product catalog management, user registration and login, order placement, and payment verification, the system has streamlined business operations, improved transaction accuracy, and enhanced customer experience.

Testing through Black Box techniques confirmed that all functionalities meet the expected requirements and perform reliably under real-world usage scenarios. The use of CodeIgniter facilitated fast and secure development, while its MVC architecture ensured code maintainability and modularity. In addition, the adoption of digital tools has enabled better inventory tracking, more efficient report generation, and broader market reach.

In conclusion, the application contributes positively to the digital transformation of MSMEs by providing a practical, user-friendly, and secure platform for managing sales activities online. It is recommended that future developments integrate mobile responsiveness and advanced analytics to further increase system usability and strategic value.

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