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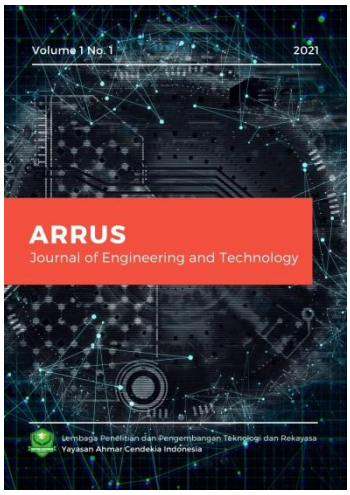

RESEARCH ARTICLE

Development of A Web-Based Online Sales Information System for a Micro-Retail Store: A Case Study at Toko Sembako Doa Ibu

Irgi Ariansyah, Sigit Auliana, & Basuki Rakhim Setya Permana

Department of Computer Science, Faculty of Computer Science, Bina Bangsa University, Serang City, Indonesia.

*Corresponding author: Irgi Ariansyah, Department of Computer Science, Faculty of Computer Science, Bina Bangsa University, Serang City, Indonesia

E-mail: irgiarisnsyah22@gmail.com

Abstract: Doa Ibu Grocery Store is a micro-enterprise that still performs its sales processes manually, including transaction recording, inventory management, and sales reporting. This condition leads to several issues, such as recording errors, limited customer reach, and inefficient operations. This research aims to design and implement a web-based online sales information system to automate transaction processes, expand service reach through online ordering, and provide structured sales reports. The system development method used is the waterfall model, consisting of analysis, design, implementation, testing, and evaluation stages. The system was developed using a PHP-based digital framework, MySQL database, and integrated with Midtrans as the payment gateway. Blackbox testing was applied to ensure that the system functions according to user requirements identified through elicitation stages. The results show that the system can automatically record transactions, manage product and customer data, generate sales reports, and support online orders and order status notifications. The system is considered feasible for implementation and provides a positive impact on the efficiency and modernization of Doa Ibu Grocery Store's operations.

Keywords: Information System, Online Sales, Grocery Store, Web-Based, Midtrans, PHP, MySQL

1. Introduction

In the era of rapid digital transformation, the role of information systems in supporting business operations has become increasingly significant, even for small and micro enterprises. The development and application of web-based technology have provided opportunities for businesses to improve their operational efficiency, reach a broader customer base, and automate routine processes. However, many traditional retail stores, particularly those operating in suburban or rural areas, still rely on manual methods to manage their day-to-day transactions. This situation leads to several issues such as inefficiency, data redundancy, inaccurate record-keeping, and limited scalability.

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Toko Sembako Doa Ibu, a micro-scale grocery store located in the local community, exemplifies such conditions. The store still utilizes conventional methods such as handwritten logs or spreadsheets to record sales, manage inventory, and generate reports. These manual processes not only consume time and effort but also increase the risk of human error and reduce the ability to make quick, data-driven decisions. Moreover, the absence of digital systems limits the store's potential to reach more customers beyond walk-in visitors, especially in an era where online shopping and cashless payments are becoming standard expectations.

In response to these challenges, the implementation of a web-based online sales information system becomes a strategic solution. This system is designed to digitize core business processes such as product management, customer data handling, transaction processing, and sales reporting. By adopting a structured digital platform, the grocery store is expected to improve operational efficiency, increase service transparency, and provide a better customer experience. Additionally, the integration of a payment gateway such as Midtrans enables the store to support digital payments, which are essential in enhancing customer convenience and business adaptability.

The use of open-source technologies like PHP and MySQL, along with responsive web design principles, allows the system to be developed cost-effectively while maintaining functionality and accessibility. Furthermore, adopting a modular architecture and multi-level user login ensures that the system can cater to different roles within the organization, including administrators, cashiers, and store owners.

Previous studies have demonstrated the impact of digital sales systems on improving small business performance, particularly in inventory accuracy, order processing speed, and customer satisfaction. Nonetheless, the practical implementation of such systems in micro-scale stores remains limited due to cost concerns, lack of digital literacy, or absence of localized solutions. Therefore, this research is not only a technical endeavor but also a contribution to empowering local businesses through affordable and accessible digital solutions.

The development and evaluation of this web-based sales system follow a structured methodology, including needs analysis through elicitation, system design based on user roles and business logic, implementation using current web frameworks, and validation through black-box testing. The outcomes of this study are expected to show that digital transformation, even at a small scale, can bring measurable improvements in accuracy, efficiency, and service quality for traditional retail businesses like Toko Sembako Doa Ibu.

2. Literature Review

2.1. Web-Based Information Systems in SMEs

The adoption of web-based information systems (WBIS) has become a fundamental strategy for improving business operations, especially in the small and medium enterprise (SME) sector. According to Laudon & Laudon (2020), web-based systems offer flexible access, centralized data management, and scalable functionality that aligns well with the limited resources of SMEs. They enable real-time data processing and remote access to business information, which are crucial for enhancing decision-making and competitiveness.

Multiple studies have shown that web-based sales applications can help SMEs improve inventory accuracy, streamline order fulfillment, and track customer interactions more effectively (Alsharif et al., 2021; Setiawan & Suyoto, 2019). These systems are also known for reducing manual workload and improving transparency in business operations.

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2.2. The Role of Digital Transformation in Micro-Enterprises

Digital transformation is no longer exclusive to large corporations; it has also penetrated micro-enterprises, including traditional retail shops and local stores. Micro-enterprises often face operational challenges such as inefficient transaction recording, stock mismanagement, and lack of customer insight due to manual business processes. Digital tools provide the means to overcome these obstacles.

Studies by Wijaya et al. (2020) and Ramadhan et al. (2021) emphasize that even simple web applications can significantly enhance the performance of traditional businesses by automating repetitive tasks and improving data accessibility. Furthermore, integration with digital payment platforms allows businesses to offer better customer service and maintain competitiveness in the evolving market.

2.3. E-Commerce and Consumer Behavior in the Grocery Sector

The online retail sector, particularly for groceries, has witnessed increased adoption post-pandemic due to shifts in consumer behavior. Consumers demand more convenience, instant access to product information, and flexible payment methods. Web-based systems meet these demands by providing an online catalog, secure transactions, and order tracking.

According to Turban et al. (2018), small grocery stores benefit from implementing e-commerce features such as product filtering, cart functionality, and order status notifications. These features not only improve customer experience but also contribute to customer retention. Research by Nurhadi et al. (2022) supports that online grocery platforms, when supported by robust inventory systems, minimize service delays and stock-outs.

2.4. Multi-Level Access Systems and Role-Based Interfaces

Modern information systems often implement role-based access control (RBAC) to maintain system security and usability. In the context of a small store, user roles typically include admin, cashier, and store owner, each requiring different permissions. RBAC enhances the usability of the system by limiting complexity and preventing unauthorized access (Sandhu et al., 1996).

Literature from Rahmawati et al. (2020) highlights that role-based login systems improve accountability and traceability in retail settings. Each user's activities are logged and monitored, thus enabling better control over financial and operational data.

2.5. Integration of Payment Gateway Services in Small-Scale Retail

The integration of third-party payment gateways, such as Midtrans, is becoming more common even in micro-enterprise environments. Payment gateways facilitate secure and efficient financial transactions, offering customers various payment options including bank transfers, QRIS, e-wallets, and virtual accounts.

Research by Dewi & Kusnandar (2021) shows that integrating payment gateways in web-based systems enhances user trust and promotes sales growth. Furthermore, by reducing the need for manual payment verification, store staff can allocate more time to customer service and product management.

2.6. Methodologies for System Development and Testing

The development of information systems typically follows a structured software development life cycle (SDLC), such as the Waterfall model, which includes requirements analysis, design, implementation, testing, and deployment. Pressman (2014) argues that the Waterfall model is

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suitable for projects with clearly defined requirements and linear development paths, such as small retail systems.

For testing purposes, black-box testing is widely used in functional testing, where the system is tested from an external perspective to ensure that input results in the expected output without examining the internal code. According to Sommerville (2016), black-box testing is ideal for validating user requirements and ensuring system reliability from the user's point of view.

3. Research Method and Materials

3.1. Type of Research

This study uses the Research and Development (R&D) method, which is a research approach aimed at developing and producing a product or system, as well as testing the effectiveness of the developed product. This method was chosen because it aligns with the objective of the research, which is to develop a web-based hotel room booking application using the Laravel framework.

3.2. System Development Method

This research employs a descriptive qualitative and developmental approach aimed at designing and implementing a web-based information system tailored for the sales operations of a micro-enterprise, namely Toko Sembako Doa Ibu. The methodology adopted in this study follows the Waterfall model, which is suitable for projects with well-defined, sequential phases. This model provides a structured and linear approach to system development, allowing each phase to be completed before progressing to the next.

The research is conducted in several stages:

(1). Needs Analysis (Elicitation)

Data was collected through interviews with the store owner and observations of daily operations. The goal was to identify existing problems in the sales process and determine specific system requirements, such as automated transaction recording, inventory updates, role-based login, and online order handling.

(2). System Design

In this phase, the system architecture was modeled using use-case diagrams, flowcharts, and database design (ERD and table structures). The interface design was developed to be responsive and user-friendly, catering to three different user roles: admin, cashier, and owner.

(3). Implementation

The system was developed using PHP as the programming language, MySQL as the database management system, and a digital framework (e.g., CodeIgniter or Laravel). Midtrans was integrated as a payment gateway to enable online transactions.

(4). Testing

The Blackbox testing method was used to evaluate system functionality. Each feature was tested based on user inputs and expected outputs without reviewing the internal code structure. Test cases were derived from the final list of requirements established during the elicitation phase.

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(5). Evaluation

After implementation, the system was evaluated by the end-users through observation and feedback collection. Effectiveness, usability, and benefit to store operations were key aspects considered during evaluation.

3.3. Research Location and Time

The research was conducted at Toko Sembako Doa Ibu, a traditional retail store located in Banten Province, Indonesia. The duration of the study spanned approximately three months, from May to July 2025, covering the full development lifecycle from requirement gathering to final deployment.

3.4. Tools and Materials

Table 1. Tools and Materials

No.	Category	Name / Description	Function / Purpose
1	Hardware	Laptop (Intel Core i3, 4GB RAM)	Device for system development and testing
2	Hardware	Smartphone (Android-based)	Used for testing responsive layout and mobile access
3	Hardware	Internet Connection (≥10 Mbps)	Access to online resources, hosting, and API integration
4	Software	Visual Studio Code	Source code editor for writing PHP, HTML, CSS, and JS
5	Software	XAMPP (Apache, MySQL, PHP)	Local server environment for development and testing
6	Software	Google Chrome / Mozilla Firefox	Web browser for testing user interface and compatibility
7	Software	Postman	Testing API endpoints (e.g., Midtrans integration)
8	Software	MySQL	Database management system for structured data storage
9	Software	Figma / Canva	UI/UX design, wireframing, and prototyping interface
10	Framework	PHP (CodeIgniter / Laravel)	Backend programming and web application development
11	API Service	Midtrans Payment Gateway	Online payment processing via e-wallets, QRIS, bank transfer
12	Hosting	Shared Web Hosting + Domain	Deployment of the final web application

4. Results and Discussion

4.1. Proposed System Design

The online sales information system is designed to address the digitalization needs of transaction processing at Toko Sembako Doa Ibu, which previously conducted its sales manually without any application support. With this web-based system, the sales transaction process is expected to become faster, more efficient, and more accurate. The system includes features such as online product ordering, product and stock data management, automatic payment confirmation through integration with the Midtrans payment gateway, and systematic transaction reporting for the store owner.

The digital framework used in the development of this system supports a modular and scalable architecture, allowing easier feature management and enhanced system security. The integration of Midtrans as a payment gateway enables customers to make digital payments through various methods such as bank transfers, e-wallets, QRIS, and credit cards. The system is also equipped

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with automated notifications for both customers and administrators regarding the transaction status.

4.1.1. Proposed System Procedure

The proposed system procedure describes the flow of processes in this web-based online sales system, starting from when the customer accesses the application until the transaction is completed. The following are the stages of the proposed system procedure:

(1). User Registration and Login

Users can register to create an account in the system. Once registered successfully, users can log in using their email and password.

(2). Browsing and Selecting Products

After logging in, users can browse the catalog of grocery products displayed online. Each product includes price details, descriptions, and stock availability.

(3). Adding Products to Cart

Users can select products and add them to the shopping cart. The system stores the purchase data temporarily before proceeding to checkout.

(4). Checkout and Shipping Address Input

After selecting products, users proceed to checkout by entering shipping address information and choosing a payment method.

(5). Payment Processing via Midtrans

The system redirects users to the payment page provided by Midtrans. Users can choose from the available payment methods and complete the transaction.

(6). Automatic Payment Confirmation

Once the payment is successful, Midtrans sends a notification to the system to update the order status to "Paid." Notifications are also sent to both the customer and the admin through the system.

(7). Packaging and Delivery Process

The admin receives the order notification and begins processing the packaging and shipment of the products to the customer's address.

4.1.2. Use Case Diagram

A Use Case Diagram is a method used in software analysis and design to document the interactions between a system and its users. It serves to visualize the functionalities provided by the system and illustrates how each user interacts with the system based on their assigned roles. In the context of the web-based online sales information system for Toko Sembako Doa Ibu, the use case diagram helps describe how customers and administrators (admin) engage with the system.

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Figure 1. Use Case Diagram

This diagram consists of two primary actors:

Customer (User):

The customer can register an account and then log in to access the online shopping system. After successful login, the customer can browse available products, place orders, and proceed with digital payment using the integrated Midtrans payment gateway. The system also allows customers to view the status of their orders and receive notifications accordingly.

Administrator (Admin):

The admin plays a central role in managing the system. Admin functions include managing product data (add, update, delete), handling payment processes (viewing, verifying, or updating payment status), and managing user accounts. This includes actions such as approving new user registrations or blocking accounts in case of misuse. Admins also oversee the order fulfillment process and maintain overall system operations.

4.1.3. Activity Diagram

The Activity Diagram presents a visual representation of a control flow within a system, similar to flowcharts or data flow diagrams (DFD). It is frequently used in modeling business processes and explaining the detailed steps involved in a use case. Activity diagrams help describe dynamic aspects of the system and serve to analyze the procedural logic that governs the flow of control.

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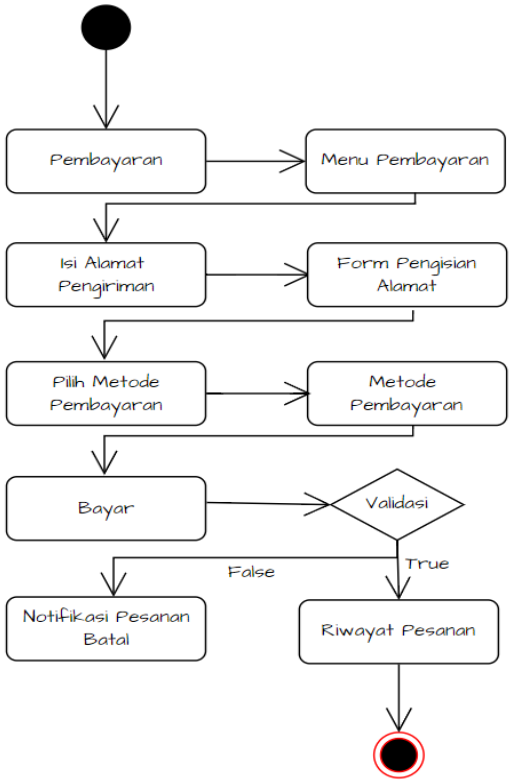

Figure 2. Activity Diagram

In the proposed system for Toko Sembako Doa Ibu, the payment activity diagram depicts the process a customer undergoes when placing an order and completing a payment. The flow begins with the customer selecting a product and adding it to the shopping cart. Once the cart is finalized, the customer proceeds to checkout and is prompted to enter personal information such as name, contact, and delivery address.

Following this, the customer selects a preferred payment method provided by the system through Midtrans, such as QRIS, e-wallet, bank transfer, or credit card. Once the payment is submitted, the system waits for confirmation from Midtrans. If the transaction is validated, the system updates the order status to "Paid" and redirects the user to the order summary menu. Simultaneously, the system sends automatic notifications to the admin and the customer regarding the successful payment and order processing.

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4.1.4. Sequence Diagram

The Sequence Diagram illustrates the functional flow and the sequence of interactions between objects or components in a system over time. It is particularly useful for detailing how processes within a use case occur in a step-by-step manner, involving multiple system entities.

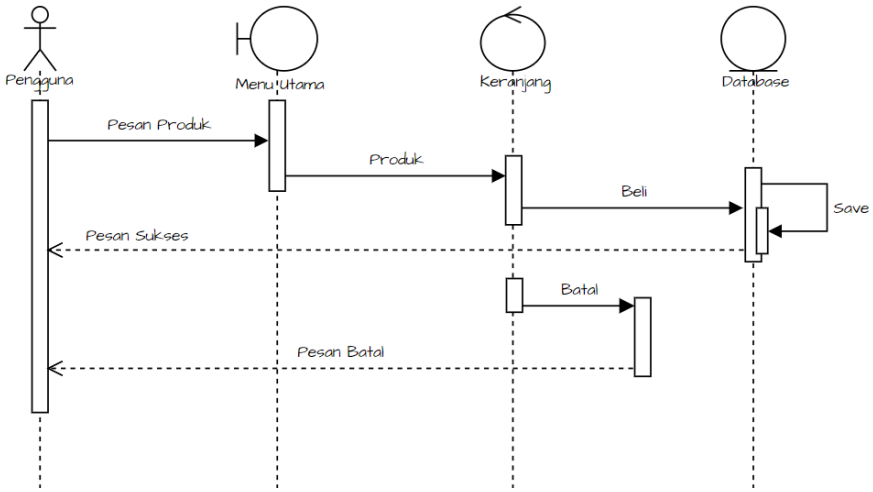

Figure 3. Sequence Diagram

In the context of the online sales system at Toko Sembako Doa Ibu, one of the primary sequence diagrams depicts the product ordering process. It begins with the user browsing the product catalog on the main menu. Upon selecting a product, the system adds it to the cart. If the user decides to proceed with the purchase, they click the "Buy" button, triggering a process that stores the order data into the database.

The next step is reflected in the payment sequence diagram, where the customer initiates the payment. The system sends a request to the Midtrans API, which processes the transaction based on the selected payment method. Midtrans then returns a success or failure status. If successful, the system confirms the order, updates the transaction log, and notifies both the admin and the customer. If the transaction fails, the system prompts the user to retry the payment.

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4.1.5. Design

(a). Home Page

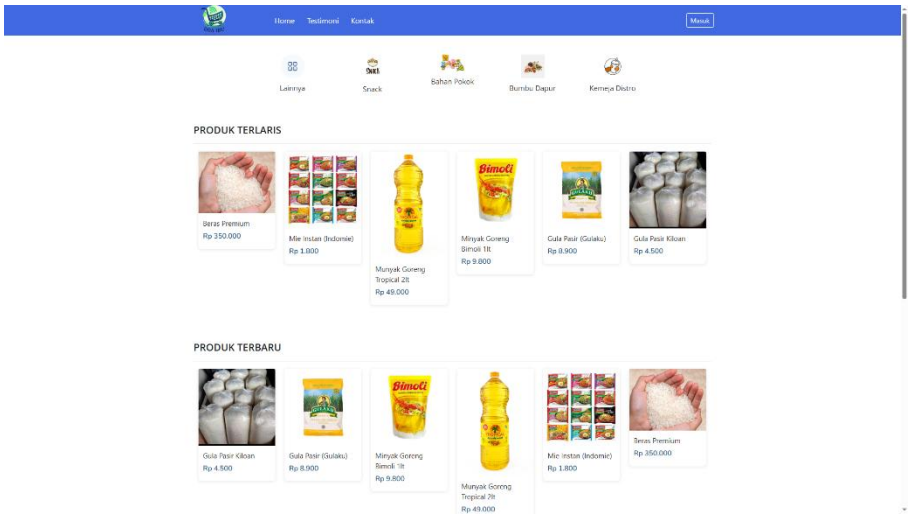

Figure 4. Home Page

(b). Registration Page

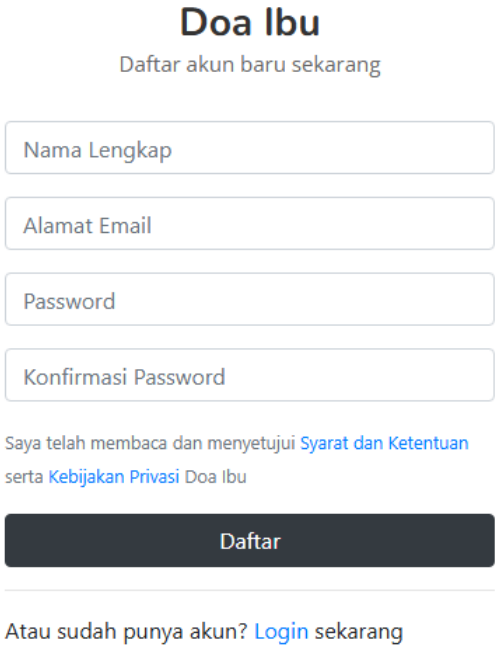

Figure 5. Registration Page

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(c). Login Page

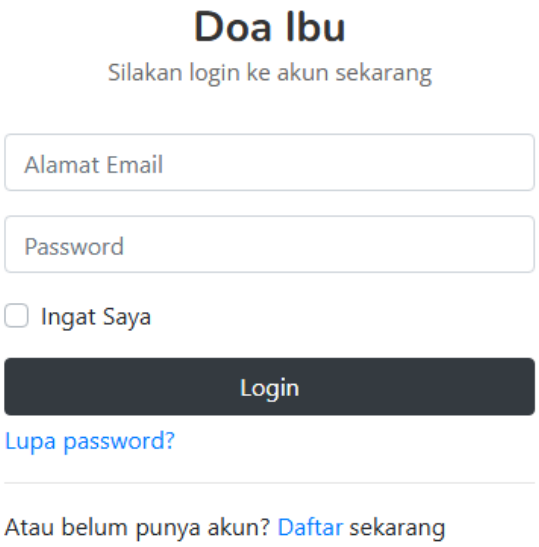

Figure 6. Login Page

(d). Consumer Dashboard

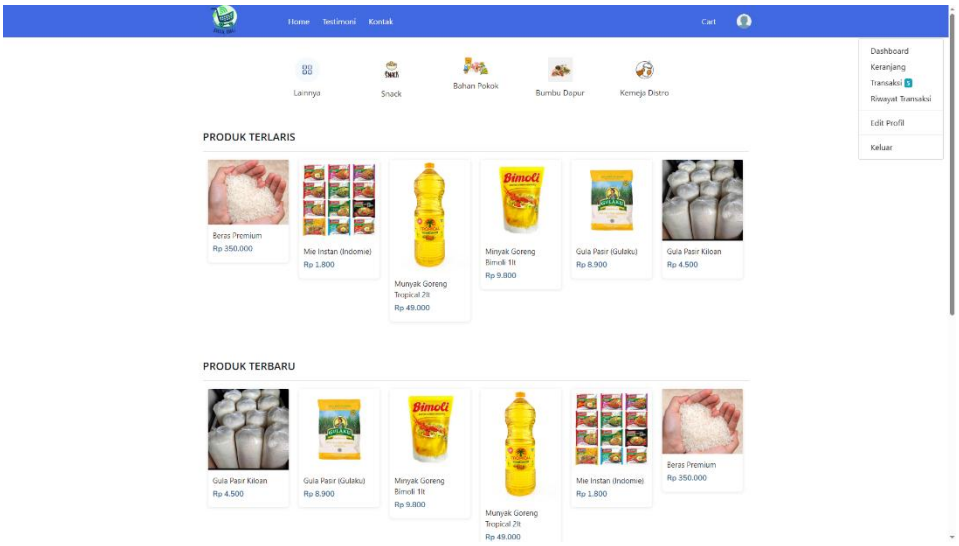

Figure 7. Consumer Dashboard

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(e). Cart Page

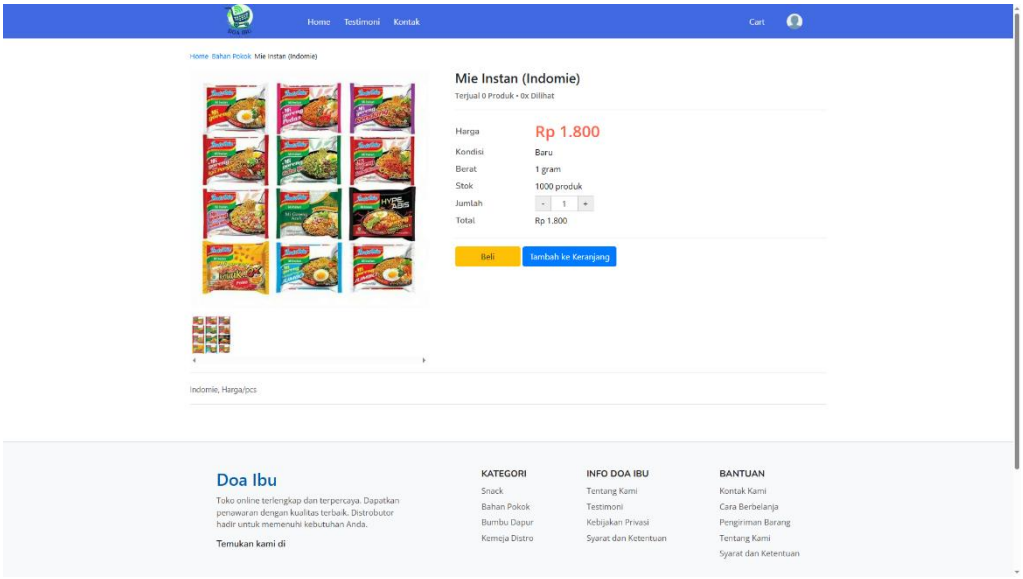

Figure 8. Cart Page

4.2. Testing

System testing was conducted to ensure that all functions within the system operate according to the requirements identified during the elicitation process. The testing method used in this system is Blackbox Testing, which focuses on evaluating the system's input and output without requiring knowledge of the internal code structure. The main objective of this method is to validate the system's functionality based on user specifications and expectations.

The testing process was carried out by comparing the final elicited requirements with the actual output generated by the implemented system. This approach ensures that each functional component of the system has been developed in accordance with user needs. The following section presents the results of functional testing for the core features based on the requirements identified in elicitation stages 3 and 4.

Table 2. Black Box Testing Result

No	Tested Feature	Test Scenario	Expected Result	Actual Result	Status
1	Multi-level Login	Admin, cashier, and owner log in with their respective accounts	Successful login based on user role	Successful	Match
2	Product Input and Update	Admin adds and edits products (name, price, stock, image)	Data is saved and updated	Successful	Match
3	Sales Transaction & Receipt	Cashier completes a sale and prints the receipt	Receipt is printed and transaction is recorded	Successful	Match
4	Sales Reports	System displays daily, weekly, and monthly reports	Reports appear based on selected filter	Successful	Match
5	Customer Data Management	Admin views and updates customer information	Customer data appears and can be edited	Successful	Match
6	Online Ordering	Customer places an order via website	Order is saved and received by admin system	Successful	Match

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No	Tested Feature	Test Scenario	Expected Result	Actual Result	Status
7	Order Status Notification	Customer receives notification after order is processed	Order status appears in the customer's account	Successful	Match
8	Product Deletion	Admin deletes inactive product	Product no longer appears in the catalog	Successful	Match
9	User Account Deletion	Admin deletes a user account	Deleted user can no longer log in	Successful	Match

5. Conclusion

The development of a web-based online sales information system for Toko Sembako Doa Ibu has proven to be a strategic step in addressing the operational limitations commonly found in traditional, manually managed retail businesses. By transitioning to a digital platform, the store gains access to more efficient transaction processing, accurate inventory management, and structured reporting—all of which contribute to improved service quality and business control.

This system integrates various essential features such as multi-level user access (admin, cashier, and owner), product and customer data management, real-time ordering, and automatic payment confirmation through the Midtrans payment gateway. The use of a modular digital framework has facilitated the scalability and maintainability of the system, while responsive web design ensures that it remains accessible across various devices.

Through a structured development methodology and rigorous black-box testing, the system was validated against user requirements gathered through a multi-stage elicitation process. The test results confirmed that each feature operates as expected, fulfilling the functional needs of the store while remaining intuitive and user-friendly.

In conclusion, the implementation of this web-based sales system demonstrates that digital transformation is not only feasible for micro-enterprises but also brings tangible benefits to business sustainability and competitiveness. Future enhancements may include the integration of QRIS payments, a dedicated mobile application, and further automation in delivery tracking and customer relationship management.

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