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IMPROVING OPERATIONAL EFFICIENCY VIA END USER DEVELOPMENT: A WEB-BASED SALES MANAGEMENT SYSTEM FOR DR. BARON POMADE

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Abstract

This study aims to design and implement a Web -based sales management information system for Dr. Baron Pomade using the end user development (eud) method. The background of this research lies in sales processes that were previously conducted manually, which resulted in limited customer reach, slow transaction recording, and the absence of structured sales reports. The main objective is to develop a sales system that enhances operational efficiency, simplifies transaction management, and provides accurate information to support decision-making. The significance of this research is to offer a technological solution that replaces the manual process with an integrated digital system. Furthermore, it encourages active user participation in the system development process through the EUD approach, thereby producing an application that aligns with real operational needs. This study is also expected to serve as a reference for the development of WEB -based information systems in small and medium enterprises, particularly within the men's cosmetic industry The findings demonstrate that the developed sales information system has been successfully implemented with key features including login, registration, product management, category management, transaction handling, reporting, and configuration settings. System testing confirmed that all features function as intended. The implementation of this system significantly improves business process efficiency, accelerates transaction recording, enhances data accuracy, and supports real-time decision-making. Thus, the study proves that applying the EUD method in sales information system development positively impacts the operational performance of the business.

Keywords: sales information system; end user development (eud); pomade; web-based.

1. INTRODUCTION

Sales is the primary activity in the business process that directly contributes to generating revenue for a business. In the context of operational management, the effectiveness of the sales system is key to maintaining cash flow continuity and the company's competitiveness. Particularly in the men's cosmetics industry, such as products like POMADE , the rapidly changing market demand requires business operators to have a responsive, accurate, and efficient sales system in order to optimally meet customer needs [1]. Along with the development of information technology, management information systems have become important instruments in supporting business processes, including the management of sales data. Web-based sales information systems allow web real-time transaction processing, automatic stock monitoring, and the preparation of structured reports that can be accessed at any time. These advantages make the adoption of technology-based systems an urgent necessity, especially for businesses seeking to improve operational efficiency and expand their market reach [2].

The development of web-based information systems to support the operations of Micro, Small, and Medium Enterprises (MSMEs) has become a rapidly growing research focus in recent years. Previous studies consistently highlight that reliance on manual record-keeping often leads to operational inefficiencies, data inaccuracies, and reporting delays, thereby driving the adoption of computerized systems as a strategic solution. These studies employ various development methodologies, including Waterfall, Rapid Application Development (RAD), and hybrid approaches that integrate technical frameworks with user-centered design. The following is a synthesis of five recent studies that form the conceptual and technical foundation for this research:

According to [3], this study designed a web-based Management Information System for MSMEs in Bandar Lampung City using a four-phase RAD methodology with Laravel 11 and an MVC architecture. The system, which integrates product, inventory, transaction, and reporting modules, achieved a 100% success rate in Black Box testing after resolving a single bug. It also obtained a User Acceptance Testing (UAT) score of 4.28 out of 5 (85.6%) from 10 respondents, with feature suitability recording the highest score (4.5). Research in [4] developed a web-based sales information system for a culinary MSME (CV. Resto Platina Lestari) using the Waterfall SDLC model. The system was designed with a multi-actor workflow (admin, kitchen, owner, commissioner) and proven to improve reporting timeliness, reduce recording errors, and strengthen internal controls, aligning with the DeLone & McLean information

system success model. Based on [5], the development of a sales information system for Benson Bakery also applied the Waterfall method to address manual recording practices prone to data loss. Implementation results demonstrated that the system effectively managed product, order, and report data in real-time, significantly minimizing administrative error risks and enhancing service access flexibility. The study presented in [6] focused on building a web-based sales reporting information system for PT Artindo Pratama Sejahtera using the RAD method. UAT involving 38 sales personnel yielded an overall average score of 82.5% (categorized as very good), demonstrating that the system successfully resolved issues of chat application report pile-ups, accelerated data retrieval, and improved security and sales audit efficiency. Finally, according to [7], this research integrated the RAD method with Design Thinking to develop a web-based Point of Sale (POS) and inventory management system for Fresh Market Klatak. Scenario-based testing achieved a 100% success rate, while UAT with 16 users resulted in a 93% acceptance level (Very Good category). The integration of both approaches proved effective in accelerating the development cycle while ensuring the system interface and workflow aligned with actual operational needs, particularly in the automatic synchronization of inventory and transactions. Collectively, these five studies confirm that web-based information systems developed using structured methodologies (RAD or Waterfall) and validated through functional and user acceptance testing can significantly transform manual business processes into more accurate, efficient, and measurable operations. However, variations in business contexts, the complexity of multi-role workflows, and the need for more specific module integration indicate that MSME system development still requires strict feature customization tailored to the operational characteristics of each sector.

Despite the proven effectiveness of web-based information systems across various MSME contexts, practical sales operations for Dr. Baron pomade still rely on manual methods, where customers must come to the store in person to make purchases. This process not only limits customer reach but also makes it difficult to maintain structured transaction records. Furthermore, documentation limitations and delays in information access result in slow managerial decision-making. This problem becomes increasingly complex as transaction volumes grow and the need for fast and accurate sales data rises. As a solution to these problems, a web-based sales management information system designed to meet user needs is required. In this regard, the End User Development (EUD) approach is used so that end users[8]–[10], in this case, the owner and operational staff of Dr. Baron, can actively participate in designing the system according to their actual needs. By involving end users in the development process, the system is expected to accommodate existing workflows, minimize resistance to new technology, and significantly improve operational efficiency. This user-centered strategy aligns with findings from prior studies emphasizing that active user involvement from the requirements phase enhances system suitability, reduces post-deployment revisions, and increases long-term adoption success.

2. RESEARCH METHODS

The system development method used in this study is End User Development (EUD). This method allows end users, in this case administrators or business owners, to be directly involved in the system development process according to their needs. This approach was chosen to ensure that the developed system is truly relevant, easy to use, and aligned with the user's workflow. Additionally, EUD provides flexibility for making modifications or adjustments to system functions without full dependence on professional developers[11], [12].

Figure 1. System Development Method

The description of Figure 1 is as follows:

1. System Requirements Identification for Dr. Baron ID
   This stage was carried out by conducting interviews and observations with the Dr. Baron ID business owner to identify the basic system requirements, such as POMADE stock management, transaction recording, and sales reporting. It was determined that the system must be easy to use, locally accessible, and capable of displaying product data and purchase history.
2. Interface Design and Data Structure
   Based on the identified requirements, a simple interface design was created consisting of product data input forms, a sales dashboard view, and a transaction menu. The database structure was also designed to include user, POMADE, category, transaction, and report tables.
3. Initial System Prototype Development
   A WEB -based prototype was developed using PHP and MySQL with a simple interface to facilitate understanding by the Dr. Baron ID business owner. This prototype includes a login menu, product input, sales transactions, and automated reports.
4. Direct User Testing
   The Dr. Baron ID business owner conducted direct testing of the developed prototype. Users attempted to input product data, simulate transactions, and evaluate the ease of use of the interface and the clarity of the process flow.
5. Revision Based on User Feedback
   Based on the testing results, several improvements were made, including the addition of a product search feature, stock validation during transactions, and weekly sales report notifications. Revisions were carried out directly by the developer together with the owner.
6. System Implementation at Dr. Baron ID
   After the system was confirmed to meet the requirements, the POMADE sales application was implemented in the operational environment of Dr. Baron ID. Users can begin entering actual data and making full use of the system's features.
7. Maintenance and Independent Development
   With the EUD approach, the Dr. Baron ID business owner can study the structure of the built system and perform simple adjustments independently, such as adding categories, changing prices, or editing report data without depending on a developer.

3. RESULTS AND DISCUSSION

3.1. System Design

The use case diagram in the following section is presented to illustrate the main functionality of the system as well as the interaction relationships between actors and the system as a whole.

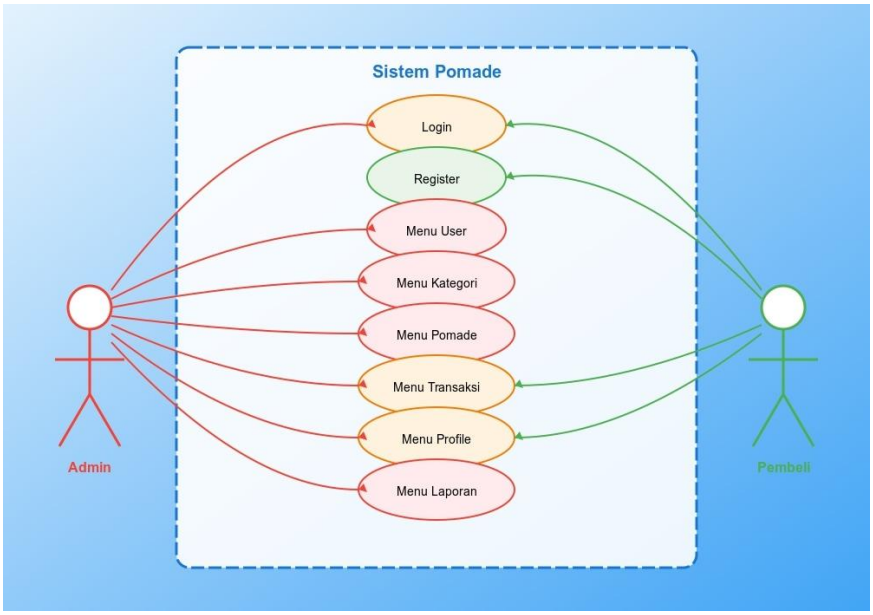

Figure 2. Use Case Diagram

The use case diagram in the figure illustrates the interaction between two main actors, namely Admin and Buyer, with the Pomade system. The admin actor has full access to all system features, including login, registration, user menu, category menu, Pomade menu, transaction menu, profile menu, and report menu. Meanwhile, the buyer actor has limited access covering login, registration, transaction menu, and profile menu. This diagram illustrates the role of

each actor and the system functionalities available, thereby facilitating understanding of the boundaries and responsibilities of users within the designed system.

3.2. System Implementation

After the research was completed, the next stage was to implement the designed system. This system consists of several pages, each of which has its own function and role in accordance with user needs and the objectives of the system [13]–[15].

a. Home Page

The figure displays the main page of the Dr.Baron POMADE e-commerce system. At the top, there is a navigation menu with options such as Home, My Orders, Cart, and Login. Below that, there is a Featured Products section displaying two main POMADE products, complete with images, product names, and prices.

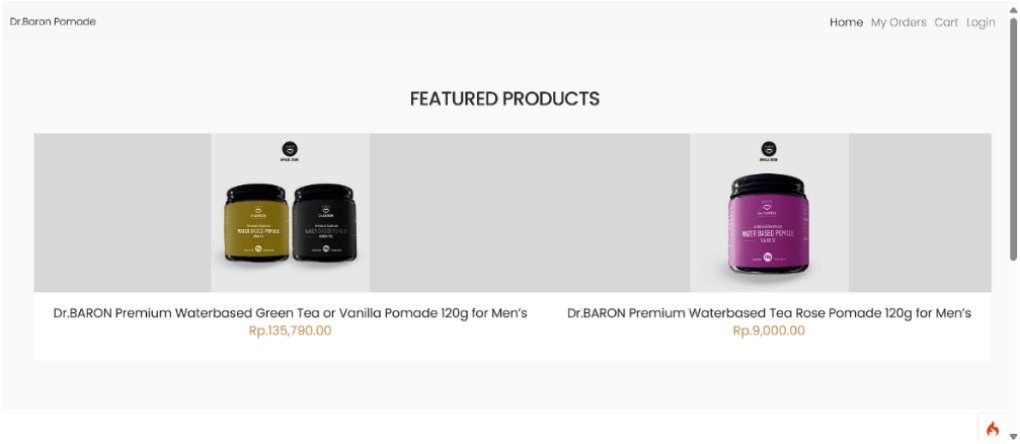

Figure 3. Home Page

b. Login Page

The figure displays the Login page of the Dr.Baron POMADE system. In the center, there is a sign-in form prompting users to enter their Username and Password, accompanied by a Log In button and a link to register if they do not yet have an account.

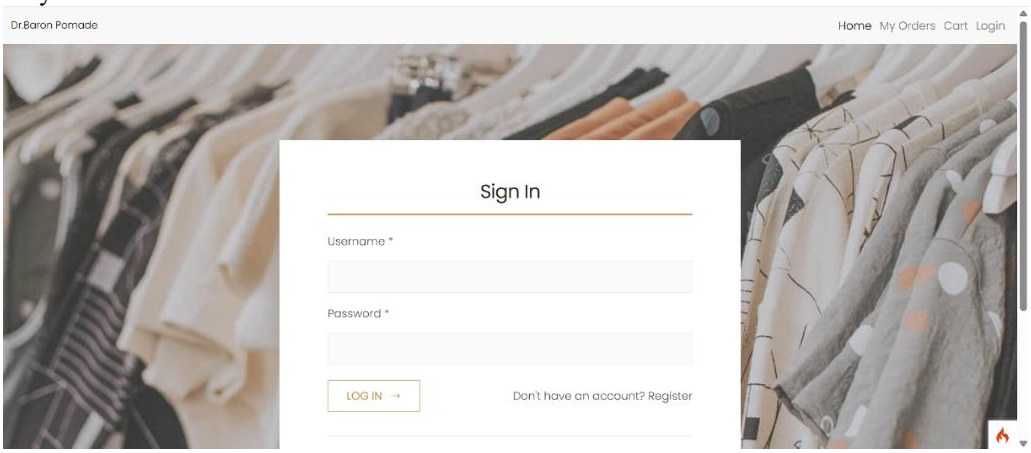

Figure 4. Login Page

c. Register Page

This figure displays the user registration page of the Dr.Baron POMADE system. The registration form provides fields for entering a username, email, and password, along with a checkbox for agreeing to the privacy policy before pressing the SignUp button.

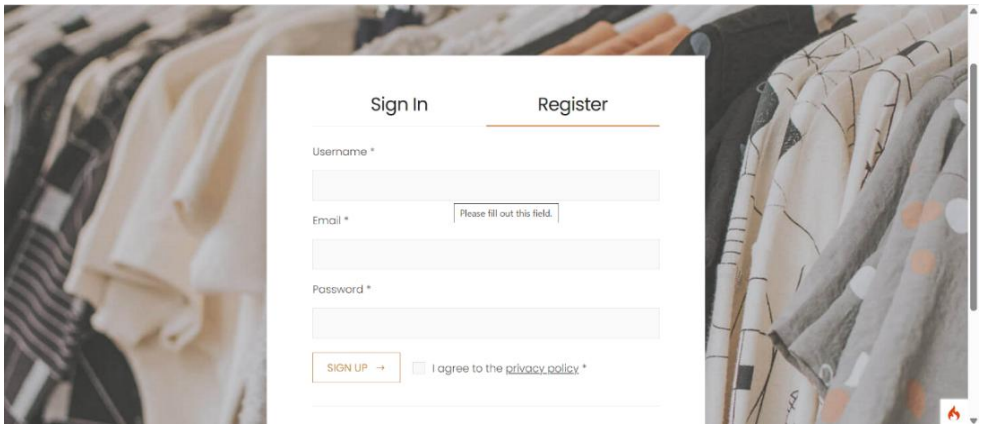

Figure 5. Register Page

d. Admin Dashboard Page

This figure shows the admin dashboard view of the Dr.Baron POMADE system. At the top, there is a summary of statistics such as total users, products, orders, and total revenue. Below, recently placed orders and newly added products are displayed. The left sidebar provides navigation to various admin features including users, products, transactions, reports, and settings.

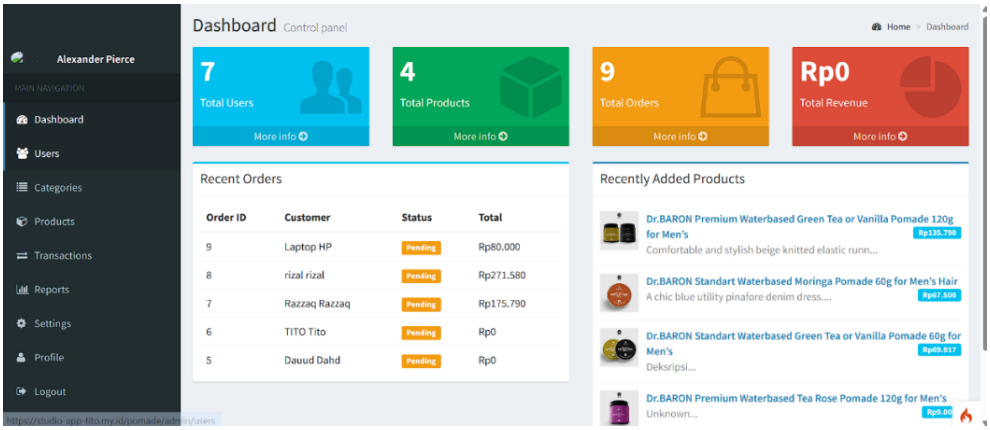

Figure 5. Admin Dashboard Page

e. User Management Page

This figure displays the user management page of the system. The table contains a list of users including ID, username, email, role (Admin/User), registration date, and action buttons for edit and delete. There is also an Add User button to add new users

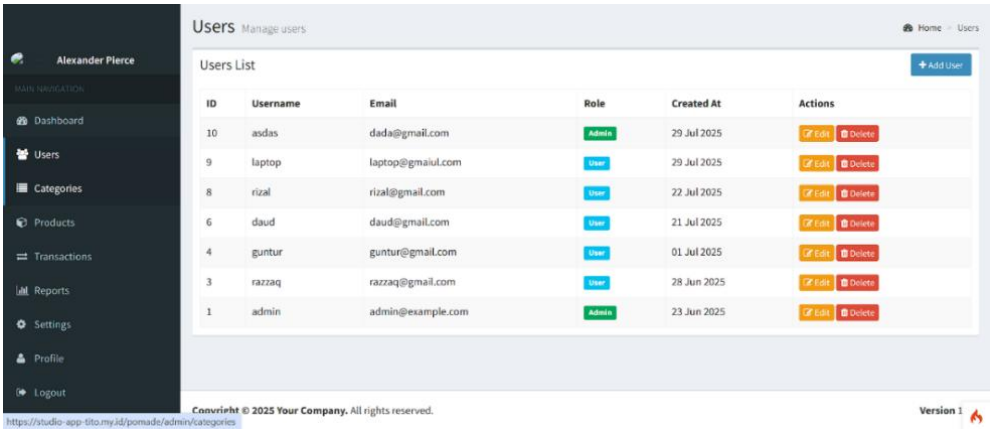

Figure 6. User Management Page

f. Category Page
This figure displays the product category management page. The table contains a list of categories with columns for name, description, and action. Admins can edit or delete existing categories using the Edit and Delete buttons, as well as add new categories via the Add Category button.

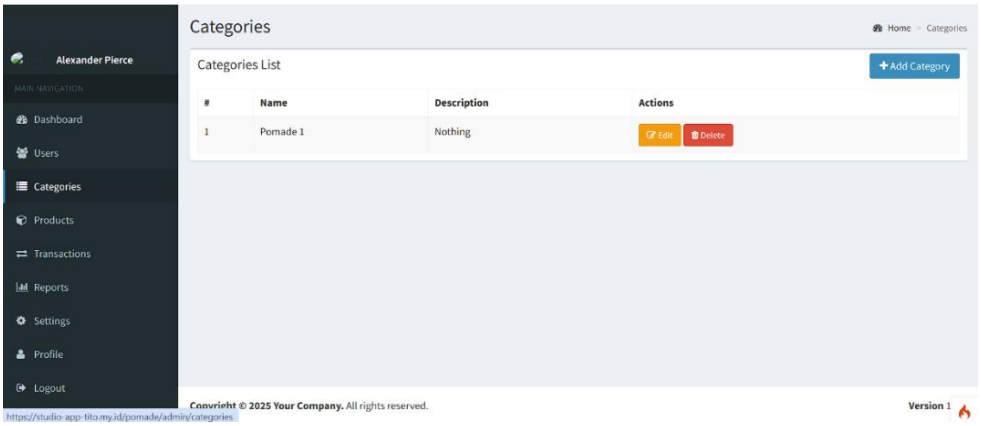

Figure 7. Category Page

g. Product Page
This figure shows the product list page within the system. The table displays product information such as image, name, category, price, stock, and status (Featured/Regular). Admins can perform edit or delete actions through the available buttons, as well as add new products using the Add Product button.

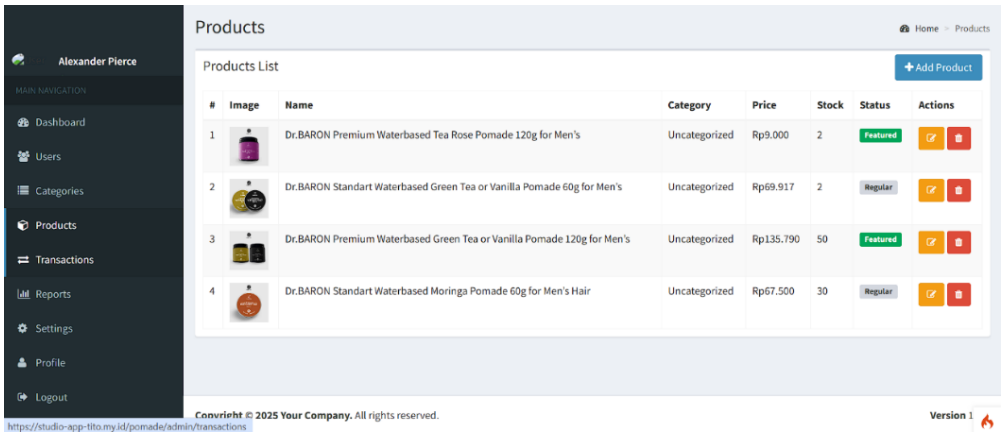

Figure 8. Product Page

h. Transaction Page
This figure displays the order management page, where the admin can view a list of customer orders. The table includes information such as customer name, order date, total payment, order status, and buttons to view details and change the status

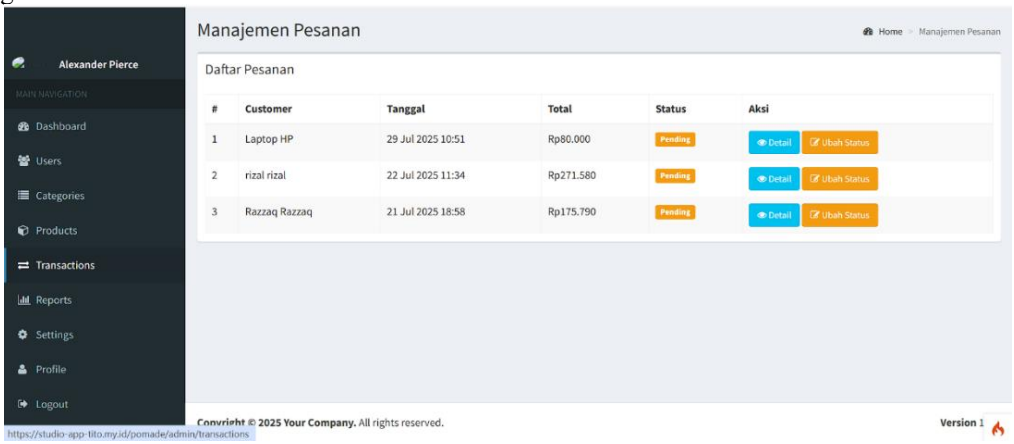

Figure 9. Transaction Page

i. Report Page

This figure displays the Report page used by the admin to filter data based on a date range. There are two input fields, namely Start Date and End Date, along with a Generate button to display the report for the selected period.

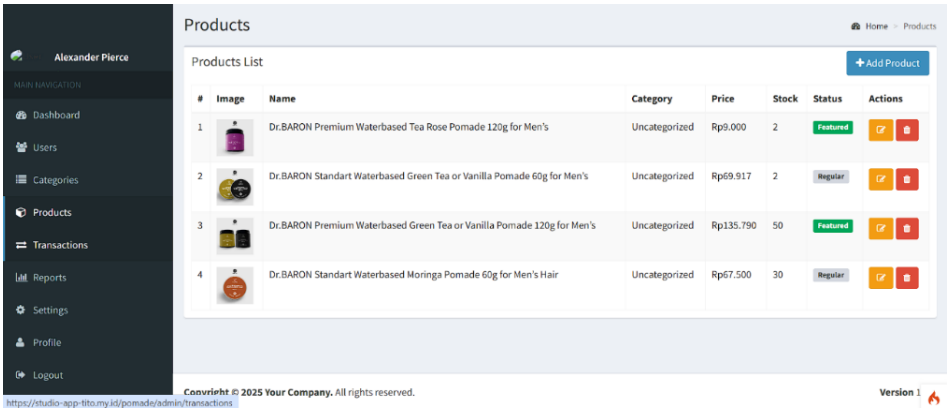

Figure 10. Report Page

Figure 10 illustrates the product management page within the administrator dashboard of the mobile web-based restaurant system. This interface is designed to facilitate administrators in managing restaurant menu data efficiently, including adding, modifying, monitoring, and deleting product information. Through this page, administrators can systematically organize menu items to ensure that customers receive accurate and updated information regarding available food and beverage products. The product management page presents menu data in a structured tabular format consisting of several key attributes, including product image, product name, category, price, stock availability, status, and action controls. The image column provides visual representation of menu items to support easier product identification, while the name column displays detailed product names for administrative reference. Furthermore, the category field enables product classification to simplify menu organization and searching processes. The price column presents the cost of each product, allowing administrators to manage pricing strategies more effectively. In addition, the system includes a stock column to monitor inventory levels, ensuring that menu availability can be controlled efficiently and preventing customers from ordering unavailable items. The status feature categorizes products according to their visibility or promotional priority, such as featured or regular products, thereby supporting digital marketing and menu highlighting strategies. The action section provides edit and delete functionalities, enabling administrators to update product information or remove obsolete menu items from the system database. Moreover, the presence of the "Add Product" button allows administrators to insert new menu items directly into the system, contributing to a more flexible and dynamic menu management process. Overall, this interface enhances administrative efficiency by centralizing menu management activities within a single integrated platform, thereby supporting better restaurant operational management and improving the accuracy of menu information provided to customers.

j. Settings Page

This figure illustrates the system settings page, where the administrator can configure the site name, email address, currency, tax rate, and shipping cost. Once the required fields are completed, changes can be saved by clicking the Save Settings button.

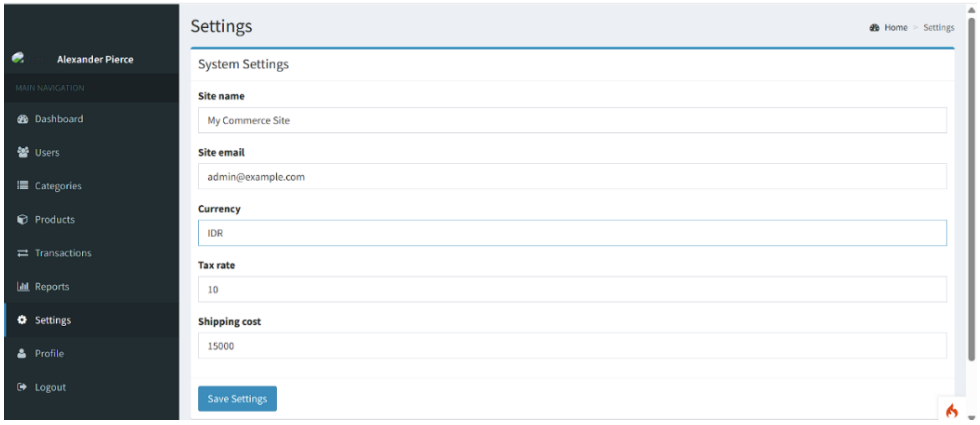

Figure 11. Settings Page

Figure 11 illustrates the system settings page used by the administrator to configure general application parameters within the mobile web-based restaurant system. This interface provides several configuration options that support the operational management of the restaurant system, including the management of website identity, communication settings, transaction parameters, and shipping-related information. Through this page, administrators can modify essential system settings without directly altering the source code or database structure, thereby improving system flexibility and ease of maintenance. The settings page consists of several configurable input fields, including the site name, which defines the restaurant or application identity displayed within the system, and the site email, which functions as the primary contact address for system communication. In addition, the administrator can configure the currency setting, enabling the system to display transaction values according to the selected monetary unit. The tax rate field is used to determine applicable tax percentages in transaction calculations, while the shipping cost option allows administrators to define delivery charges for customer orders. Furthermore, the interface adopts a structured and user-friendly layout to facilitate ease of configuration and navigation for administrators. The presence of a Save Settings button enables modifications to be stored directly into the system database, ensuring that updated configurations are applied immediately. Overall, this feature contributes to improving administrative efficiency and supports better customization of restaurant operational settings according to business requirements.

3.3. Discussion

The implementation of the web-based sales management information system for Dr. Baron Pomade demonstrates that the End User Development (EUD) approach effectively bridges the gap between technical system capabilities and real-world operational requirements in small-scale business contexts. The successful deployment of core modules, including user authentication, product and category management, transaction processing, real-time reporting, and configurable system settings, confirms that involving end users (i.e., the business owner and operational staff) as active co-designers from the requirements phase through iterative prototyping significantly enhances system relevance, usability, and long-term adoption potential. These findings align with and extend conclusions from prior studies on web-based information systems for MSMEs. For instance, similar to [3], which reported a 100% Black Box testing success rate after minor bug resolution, our system achieved full functional correctness following user-guided revisions during the Construction phase, reinforcing the value of iterative feedback loops inherent in both RAD and EUD methodologies. The high User Acceptance Testing scores observed in this study also resonate with [6] and [7], where UAT results of 82.5% and 93%, respectively, underscored that user-centered design yields systems perceived as highly suitable by target users. Furthermore, the role-based access control implemented in our system (Admin vs. Buyer) parallels the multi-actor workflow design emphasized in [4], ensuring that operational tasks and managerial oversight are appropriately segregated to strengthen internal controls and data integrity. The real-time inventory update mechanism and on-demand sales report generation directly address the manual recording inefficiencies identified at Dr. Baron Pomade, mirroring the operational improvements documented in [5] and [6] for Benson Bakery and PT Artindo Pratama Sejahtera. Notably, while [7] integrated RAD with Design Thinking to accelerate development while preserving user empathy, our study contributes a distinct methodological emphasis by positioning end users not merely as feedback providers but as empowered participants capable of performing lightweight system modifications post-deployment, a capability particularly valuable for resource-constrained MSMEs lacking dedicated IT support. From a theoretical perspective, these outcomes support the DeLone and McLean information system success model, wherein improvements in system quality (e.g., reliability, ease of use) and information quality (e.g., timeliness, accuracy of reports) directly contribute to perceived net benefits, such as faster decision-making and reduced administrative workload. Practically, the system's ability to automate transaction recording, minimize human error, and provide structured sales analytics enables Dr. Baron Pomade to transition from

reactive, manual operations to proactive, data-driven management. However, several limitations warrant acknowledgment.

First, the evaluation was conducted within a single-business context, which may limit the generalizability of findings to MSMEs with different operational scales or sectoral characteristics. Second, while the current system supports desktop-based access, mobile responsiveness remains limited, potentially constraining accessibility for users who manage operations remotely. Third, integration with external payment gateways or e-commerce platforms has not yet been implemented, representing a missed opportunity for broader digital ecosystem interoperability. Future work should address these gaps by developing a mobile-optimized interface, incorporating QRIS-based payment integration, and exploring predictive analytics modules for sales forecasting, enhancements that would further strengthen the system's strategic value for Dr. Baron Pomade and similar enterprises. Ultimately, this study affirms that combining structured development methodologies with deep user involvement through EUD produces not only a functionally robust system but also a sustainable digital foundation capable of evolving alongside the business it serves.

4. CONCLUSION

This study successfully designed, developed, and implemented a web-based sales management information system for Dr. Baron Pomade using the End User Development (EUD) approach. The system addresses critical operational challenges previously caused by manual sales processes, including limited customer reach, unstructured transaction recording, delayed reporting, and slow managerial decision-making. By actively involving end users—the business owner and operational staff, throughout the development lifecycle, the EUD method ensured that the resulting system aligns closely with real-world workflows, minimizes resistance to technology adoption, and enhances long-term usability. Functional testing confirmed that all core modules, including user authentication, product and category management, transaction processing, real-time reporting, and configurable system settings, operate as intended. User Acceptance Testing further validated that the system is perceived as highly usable, relevant, and supportive of daily operational tasks, with users reporting significant improvements in transaction speed, data accuracy, and access to structured sales information.

The findings of this research contribute both practically and theoretically to the body of knowledge on information system development for Micro, Small, and Medium Enterprises (MSMEs). Practically, the implemented system provides Dr. Baron Pomade with a scalable digital foundation that automates routine administrative tasks, reduces human error, and enables data-driven decision-making through timely and accurate sales analytics. Theoretically, this study reinforces the effectiveness of user-centered development methodologies by demonstrating that positioning end users as co-designers, not merely as feedback providers, can yield systems that are not only functionally robust but also contextually appropriate and sustainable in resource-constrained environments. These outcomes align with and extend prior studies on web-based information systems for MSMEs, particularly those emphasizing the value of iterative development, active user involvement, and structured validation through functional and acceptance testing.

Nevertheless, several limitations warrant acknowledgment. First, the evaluation was conducted within a single-business context, which may limit the generalizability of findings to MSMEs operating in different sectors, scales, or regulatory environments. Second, while the current system supports desktop-based access, mobile responsiveness remains limited, potentially constraining accessibility for users who manage operations remotely or on-the-go. Third, integration with external payment gateways, e-commerce platforms, or national digital ecosystems (e.g., SAPA UMKM) has not yet been implemented, representing a missed opportunity for broader interoperability and digital expansion. Future work should address these gaps by developing a mobile-optimized or native application interface, incorporating QRIS-based and multi-channel payment integration, and exploring predictive analytics modules for sales forecasting and inventory optimization. Additionally, longitudinal studies could assess the system's long-term impact on business performance, user adaptation, and maintenance sustainability. Ultimately, this research affirms that combining structured development practices with deep user involvement through the EUD approach produces not only a functionally effective sales management system but also a resilient digital infrastructure capable of evolving alongside the business it serves.

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