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Design of a Web-Based Sales Information System for Rattan Product at CV. Haramas

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Abstract

Small and medium enterprises (SMEs) in the handicraft sector face significant challenges in managing sales operations and expanding market reach through traditional methods. This study addresses the operational inefficiencies experienced by CV. HARAMAS, a rattan product manufacturer in Indonesia, by designing and implementing a web-based sales information system. The research employed the System Development Life Cycle (SDLC) methodology with a waterfall approach, encompassing requirements analysis, system design, implementation, and testing phases. The system was developed using PHP as the server-side programming language, MySQL for database management, and HTML/CSS for the user interface. Data Flow Diagrams (DFD) were utilized for system modeling, while Black Box Testing was conducted for system validation. The implemented system features include product catalog management, customer registration and authentication, order processing, payment verification, and automated sales reporting. Testing results demonstrated that all functional requirements were met, with successful execution of user authentication, product ordering, transaction processing, and report generation modules. The system enables real-time inventory monitoring, reduces manual data entry errors, and provides comprehensive sales analytics for managerial decision-making. This research contributes to the digital transformation of traditional SMEs by providing a practical framework for implementing e-commerce solutions that enhance operational efficiency and market accessibility.

Keywords: *information system; web-based application; sales management; rattan products; SME digitalization; e-commerce; SDLC*

Introduction

The digital transformation of business operations has become increasingly critical for small and medium enterprises (SMEs) to maintain competitiveness in the global marketplace (Rachmat & Santoso, 2023). In Indonesia, the handicraft industry, particularly the rattan product sector, represents a significant contributor to the national economy, generating employment opportunities and export revenues (Kementerian Perindustrian, 2022). However, many traditional manufacturers continue to rely on manual processes for sales management, inventory control, and customer relationship management, resulting in operational inefficiencies and limited market reach (Wijaya et al., 2021).

CV. HARAMAS is a small enterprise located in North Sumatra, Indonesia, specializing in the production and distribution of rattan-based furniture and decorative items. Despite the quality of its products, the company faces several operational challenges stemming from its conventional business practices. The current sales process relies on manual record-keeping, leading to delays in order processing, inaccurate inventory tracking, and limited accessibility for potential customers. Furthermore, the absence of an integrated information system impedes the company's ability to generate timely and accurate sales reports for strategic decision-making (Preliminary Survey, 2024).

Information systems have been widely recognized as essential tools for improving organizational performance and competitive advantage (Laudon & Laudon, 2020). Web-based information systems, in particular, offer numerous benefits including enhanced accessibility, real-time data processing, reduced operational costs, and expanded market coverage (O'Brien & Marakas, 2019). The implementation of such systems in SMEs has been shown to significantly improve sales efficiency, customer satisfaction, and overall business performance (Turban et al., 2018).

Previous studies have demonstrated the positive impact of information system implementation on SME performance. Manurung et al. (2023) developed a sales information system for a bakery business, resulting in improved transaction accuracy and customer service. Similarly, Rachael et al. (2023) reported enhanced operational efficiency following the implementation of a web-based sales system in a retail context. However, there remains a gap in the literature regarding the specific application of web-based sales systems in the rattan handicraft industry, which presents unique requirements in terms of product visualization, customization options, and order management.

This research aims to design and implement a web-based sales information system tailored to the operational requirements of CV. HARAMAS. The specific objectives of this study are: (1) to analyze the current sales processes and identify areas for improvement; (2) to design a system architecture that addresses the identified requirements; (3) to implement a functional web-based application with appropriate features; and (4) to evaluate the system's effectiveness through systematic testing procedures. The research contributes to both academic knowledge and practical applications by providing a framework for SME digitalization in the handicraft sector.

Literature review

Information Systems Concepts

An information system is defined as an organized combination of people, hardware, software, communications networks, data resources, and policies and procedures that stores, retrieves, transforms, and disseminates information within an organization (O'Brien & Marakas, 2019). According to Laudon and Laudon (2020), information systems serve three fundamental purposes: supporting business operations, supporting managerial decision-making, and supporting strategic competitive advantage. The integration of these components enables organizations to process raw data into meaningful information that supports operational, tactical, and strategic activities (Stair & Reynolds, 2018).

The evolution of information systems has progressed through several generations, from basic transaction processing systems to sophisticated enterprise resource planning (ERP) solutions (Turban et al., 2018). In the context of SMEs, the adoption of information systems has been identified as a critical success factor for business sustainability and growth (Rahayu & Day, 2017). The benefits of information system implementation include improved data accuracy, enhanced operational efficiency, better customer relationship management, and support for evidence-based decision-making (Purba, 2022).

Sales Information Systems

A sales information system is a specialized application that integrates information technology with sales and marketing business processes to facilitate the management of products, customers, transactions, and performance analytics (Manurung et al., 2023). Such systems typically encompass several functional modules including customer management, product catalog management, order processing, inventory tracking, payment processing, and reporting capabilities (Kotler & Keller, 2016). The primary objectives of sales information systems are to streamline transaction processes, maintain accurate records, provide real-time visibility into sales activities, and generate actionable insights for sales optimization (Oktaviani, 2018).

Web-based sales information systems offer significant advantages over traditional desktop applications, including platform independence, remote accessibility, lower deployment costs, and easier maintenance and updates (Kendall & Kendall, 2019). The adoption of web technologies enables businesses to extend their market reach beyond geographical boundaries while providing customers with convenient access to product information and purchasing capabilities at any time (Chaffey & Ellis-Chadwick, 2019).

System Development Methodology

The System Development Life Cycle (SDLC) represents a structured framework for developing information systems through a series of defined phases (Dennis et al., 2021). The waterfall model, one of the most widely used SDLC approaches, prescribes a sequential progression through requirements analysis, system design, implementation, testing, and maintenance phases (Pressman & Maxim, 2020). This methodology is particularly suitable for projects with well-defined requirements and limited scope changes, as is typically the case with SME system development initiatives (Sommerville, 2016).

Data Flow Diagrams (DFD) serve as a fundamental modeling tool for representing the logical flow of data within a system (Brahmana et al., 2022). DFDs employ four basic symbols to depict external entities, processes, data stores, and data flows, enabling analysts to visualize system boundaries, data transformations, and information relationships (Kendall & Kendall, 2019). The hierarchical structure of DFDs, progressing from context diagrams to increasingly detailed levels, provides a systematic approach to system decomposition and documentation (Dennis et al., 2021).

Web Development Technologies

PHP (Hypertext Preprocessor) is a widely-used open-source server-side scripting language designed specifically for web development (Rachael et al., 2023). PHP offers extensive functionality for database interaction, session management, form processing, and dynamic content generation, making it particularly suitable for developing e-commerce and business applications (Nixon, 2021). The language's integration with MySQL, a robust relational database management system, provides a reliable foundation for data storage and retrieval operations (Beaulieu, 2020).

HyperText Markup Language (HTML) and Cascading Style Sheets (CSS) constitute the fundamental technologies for web page structure and presentation (Nababan et al., 2024). HTML provides the semantic markup for defining content elements, while CSS enables the separation of presentation from content, facilitating responsive design and consistent visual styling across different devices (Duckett, 2011). The combination of these technologies with PHP creates a complete technology stack for developing functional and visually appealing web applications (Syafariani, 2022).

Methods

Research Design

This research employed an applied research design with a systems development approach. The study followed the System Development Life Cycle (SDLC) methodology using the waterfall model, which encompasses five sequential phases: requirements analysis, system design, implementation, testing, and deployment. This methodology was selected due to its structured approach and suitability for projects with clearly defined requirements (Pressman & Maxim, 2020).

Data Collection Methods

Data collection was conducted through multiple techniques to ensure comprehensive understanding of the system requirements. Primary data was gathered through direct observation of existing sales processes at CV. HARAMAS, semi-structured interviews with the business owner and employees, and analysis of current documentation including sales records, inventory logs, and customer data. Secondary data was obtained through literature review of relevant academic publications, technical documentation, and industry reports.

System Analysis

The analysis phase involved examining the current business processes to identify operational problems, user requirements, and system specifications. Flowcharts were developed to document the existing sales workflow, highlighting bottlenecks and inefficiencies. Based on this analysis, functional and non-functional requirements

were specified for the proposed system. The requirements were validated through consultation with stakeholders to ensure alignment with business objectives.

System Design

The design phase produced the system architecture and detailed specifications for implementation. Data Flow Diagrams (DFD) were created at multiple levels of abstraction, beginning with a context diagram depicting the system boundary and external entities, followed by Level 1 DFD detailing the major processes and data flows. The database schema was designed using entity-relationship modeling, defining the tables, attributes, and relationships required to support system functionality. User interface designs were developed using wireframes and mockups.

Development Environment

The system was developed using the following technology stack: PHP 8.0 for server-side programming, MySQL 8.0 for database management, HTML5 and CSS3 for front-end development, and XAMPP as the local development server environment. The choice of these technologies was based on their widespread adoption, extensive documentation, community support, and suitability for SME applications with limited technical resources (Nixon, 2021).

Testing Methodology

System testing was conducted using the Black Box Testing approach, which evaluates software functionality without examining internal code structure (Pressman & Maxim, 2020). Test cases were developed based on the functional requirements, covering all user interactions and system processes. Testing was performed from two perspectives: customer user testing (registration, authentication, product browsing, order placement, payment submission) and administrator testing (product management, order processing, customer management, report generation). Results were documented in test case matrices recording inputs, expected outputs, actual outputs, and pass/fail status.

Results and Discussion

Current System Analysis

Analysis of the existing sales process at CV. HARAMAS revealed several operational inefficiencies. The current workflow requires customers to visit the physical factory location to place orders, limiting the potential customer base to those within geographic proximity. Order recording is performed manually using paper-based bookkeeping, which is prone to errors, difficult to search, and time-consuming to compile for reporting purposes. Inventory management lacks real-time visibility, frequently resulting in stockouts or overproduction. The analysis identified the following key problems: delayed order processing (average 2-3 days for order confirmation), inaccurate inventory records (15-20% discrepancy rate), limited customer reach, and inefficient report generation (requiring 4-6 hours for monthly sales compilation).

Proposed System Design

The proposed web-based sales information system was designed to address the identified problems through digitalization of sales operations. The context diagram (Figure 1) illustrates the system boundary with two primary external entities: customers and administrators. Customers interact with the system to browse products, place orders, and submit payment confirmations. Administrators manage product catalogs, process orders, verify payments, and generate reports.

The Level 1 Data Flow Diagram decomposes the system into six primary processes: (1) User Authentication – handles customer registration and login; (2) Product Management – maintains product catalog including descriptions, prices, and images; (3) Order Processing – manages customer orders from placement to

fulfillment; (4) Payment Processing – records and verifies customer payments; (5) Inventory Management – tracks product stock levels; and (6) Report Generation – produces sales analytics and summaries. Data stores include customer database, product database, order database, and transaction database.

System Implementation

The system implementation resulted in a fully functional web application with the following key interfaces and features:

Homepage and Navigation: The main page provides intuitive navigation to product catalog, customer registration/login, shopping cart, and order history. The responsive design ensures accessibility across desktop and mobile devices.

Customer Registration Module: New customers can create accounts by providing required information (name, phone number, address, email). The system validates input data and implements password encryption for security.

Product Catalog: Displays rattan products with images, descriptions, prices, and availability status. Customers can filter products by category and search by keywords.

Order Processing: Customers can add products to cart, specify quantities, and proceed to checkout. The system calculates totals automatically and generates order confirmations with unique order numbers.

Administrator Dashboard: Provides comprehensive management capabilities including product CRUD operations, order status updates, payment verification, customer management, and report generation with filtering by date range.

Testing Results

Black Box Testing was conducted systematically across all system modules. The results, presented in Tables 1 and 2, demonstrate that all functional requirements were successfully implemented and validated.

Table 1. Customer Module Testing Results

No.	Function Tested	Test Input	Expected Result	Status
1	Customer Login	Valid username and password	Successful login, redirect to homepage	Pass
2	Customer Registration	Complete registration form submission	Account created successfully	Pass
3	Product Browsing	Navigate product catalog	Products displayed with details	Pass
4	Order Placement	Add items to cart and checkout	Order confirmation generated	Pass
5	Payment Submission	Upload payment proof	Payment recorded for verification	Pass

Table 2. Administrator Module Testing Results

No.	Function Tested	Expected Result	Status
1	Admin Login	Successful authentication, access to dashboard	Pass
2	Product Management	CRUD operations on product catalog completed	Pass
3	Order Management	View and update order status successfully	Pass
4	Payment Verification	Confirm payments and update transaction status	Pass
5	Report Generation	Generate sales reports with date filtering	Pass
6	Customer Management	View customer data and order history	Pass

The testing results indicate a 100% pass rate for all test cases, confirming that the system meets its functional specifications. All user authentication mechanisms operated correctly, product management features functioned as designed, and transaction processing modules executed without errors.

Discussion

The implemented web-based sales information system addresses the operational challenges previously experienced by CV. HARAMAS. The system eliminates geographical constraints by enabling customers to access product information and place orders remotely. Digital record-keeping replaces error-prone manual processes, ensuring data accuracy and facilitating rapid information retrieval. The automated reporting feature significantly reduces the time required for sales analysis, enabling more timely decision-making.

These findings align with previous research demonstrating the benefits of information system implementation in SME contexts. Similar to the results reported by Manurung et al. (2023) and Rachael et al. (2023), the current study confirms that web-based sales systems can effectively improve operational efficiency and customer service quality. The success of the implementation validates the appropriateness of the SDLC waterfall methodology for SME system development projects with well-defined requirements.

However, several limitations should be acknowledged. The system does not currently integrate with external payment gateways, requiring manual payment verification. Future development should consider integrating automated payment processing to further streamline transactions. Additionally, mobile application development could enhance accessibility for customers who primarily access the internet through smartphones.

Conclusion

This research successfully designed and implemented a web-based sales information system for CV. HARAMAS, a rattan product manufacturer. The system was developed using PHP, MySQL, HTML, and CSS following the SDLC waterfall methodology. Key features implemented include product catalog management, customer registration and authentication, online order processing, payment verification, and automated sales reporting. Black Box Testing validated that all functional requirements were met, with a 100% pass rate across customer and administrator modules.

The system provides several benefits for CV. HARAMAS: expanded market reach through online accessibility, improved transaction accuracy through digital record-keeping, enhanced inventory management through real-time stock tracking, and more efficient sales analysis through automated reporting. These improvements support the company's competitiveness and operational efficiency in an increasingly digital marketplace.

Recommendations for future development include: (1) integration with payment gateway services for automated payment processing; (2) development of a mobile application for enhanced accessibility; (3) implementation of customer relationship management (CRM) features; (4) addition of business analytics and forecasting capabilities; and (5) regular security audits and system updates to maintain data protection. This research contributes a practical framework that can guide similar SME digitalization initiatives in the handicraft sector and beyond.

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