

## DEVELOPMENT OF A WEB-BASED PURCHASE ORDER SYSTEM IN THE PURCHASING DIVISION USING THE AGILE MODEL (CASE STUDY: CV KLAMBY)

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### Abstract

This study aims to design and develop a web-based purchase order (PO) system equipped with an integrated approval feature by implementing the Agile development methodology. Agile is chosen for its iterative, flexible, and user-oriented development approach. The research follows several stages, including planning, requirements analysis, system design, development, testing, implementation, and evaluation. The system was developed using JavaScript (Node.js) and MySQL, and tested through blackbox testing. The results show that the system effectively facilitates PO creation, vendor and product data management, and supports secure, automated multi-level approval. The implementation of this system has been proven to enhance the efficiency and accuracy of procurement processes, reduce human error, and provide better-organized documentation. This system is expected to serve as a digital solution that can be adopted by other companies and strengthen the application of Agile methodology in information system development projects.

**Keywords:** Agile, Approval, Information System, Purchase Order, Web-Based Application



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## INTRODUCTION

The rapid advancement of science and technology has significantly transformed business operations (Amraouy et al., 2025). Technology adoption plays a crucial role in enhancing efficiency, accuracy, and competitiveness (Hutton et al., 2024). Within procurement management, a well-structured system is fundamental for ensuring cost-effectiveness, operational continuity, and service quality through data-driven decision-making.

Prior research has emphasized the digitalization of procurement processes through web-based Purchase Order (PO) systems (Duan et al., 2025). These studies demonstrated improvements in efficiency and documentation but largely overlooked the integration of structured and automated approval mechanisms (Puthenveetil & Sappati, 2024). As a result, approval workflows remained manual or external to the system, creating delays, limited transparency, and increased risks of communication errors.

CV Klamby, a rapidly growing fashion company under the brand Wearing Klamby, currently manages its procurement using Google Spreadsheet for documentation and WhatsApp for approval processes (Monteiro et al., 2024). While these tools enable accessibility and real-time collaboration, they also introduce significant limitations (Khan et al., 2025), such as the absence of data validation, weak security controls, and poor scalability as data volume increases.

Considering these challenges, there is a clear need for the development of a web-based PO system with integrated approval features (Kang et al., 2025). Such a system would not only streamline procurement processes but also provide greater transparency, accountability, and data security (Matekaire & Siriram, 2025). Ultimately, the implementation of an integrated solution is expected to reduce human error (Spreitzenbarth et al., 2024), accelerate approval cycles, and support the sustainable growth of the company's operations.

## RESEARCH METHOD

The research was conducted at CV Klamby, located at Jl. Islamic II No. 5, Islamic Village, Kelapa Dua, Tangerang (Govindan et al., 2024). The study was carried out over a four-month period, from February 2025 to May 2025. The research activities covered all stages, including planning, data collection, system design, system development, testing, deployment, and final evaluation.

### *Research Design*

This study applies an Agile-based development model to support the iterative and adaptive process of system development (Ganesan et al., 2024). Agile enables researchers to work flexibly in short cycles, allowing rapid adjustments to user requirements during the research process (Vaidh et al., 2025). The approach is intended to ensure that the web-based purchase order (PO) system can be developed in alignment with user needs, minimize errors, and enhance system responsiveness.

### *Research Target/Subject*

The research target is the procurement process within the Purchasing Division of CV Klamby, which currently faces challenges in managing PO documents due to manual procedures using Google Spreadsheet and WhatsApp for approval (Javaid & Haleem, 2025). The research subjects include staff members from the Purchasing Division, specifically Mr. Tris Suprianto as the Purchasing Supervisor, who was involved in providing input regarding existing workflows, problems, and system requirements.

### ***Research Procedure***

The research procedure in this study follows several phases adapted from the Agile methodology to ensure systematic and iterative development. The process begins with the planning phase, which involves identifying existing problems in the purchase order (PO) process, particularly the reliance on Google Spreadsheet for documentation and WhatsApp for approval, which lacks proper validation, automation, and structured approval tracking (Kadri et al., 2025). This is followed by the data collection phase, conducted through observation, interviews, and literature review. Observation focuses on analyzing current workflows (Henkel & Ivens, 2025), while interviews with the purchasing supervisor provide detailed system requirements, and literature studies contribute theoretical foundations and comparisons with similar systems. The next phase is system design, where initial sketches and interface designs are created using Whimsical (Alon et al., 2025), along with the development of Unified Modeling Language (UML) diagrams such as use case, sequence, activity, and entity relationship diagrams to represent workflows and database structures. Subsequently, the system development phase involves implementing the PO application using JavaScript, with Node.js for backend development, MySQL for database management, and Laragon for local server testing. After development, the testing phase is carried out using black-box testing to evaluate the functional aspects of the system and ensure that all features operate according to the specified requirements. The system is then deployed to the production environment, which includes server configuration, database setup, and final testing to ensure system stability. Finally, the review phase is conducted iteratively after each sprint to assess system performance and incorporate user feedback for continuous improvement.

### ***Instruments, and Data Collection Techniques***

Data collection in this study was carried out using several techniques to ensure comprehensive and valid findings. Observation was conducted through direct examination of the purchasing workflow at CV Klamby to identify inefficiencies, particularly in document creation and approval processes. In addition, semi-structured interviews were conducted with the purchasing supervisor to confirm system requirements and validate the problems that had been identified. To support the empirical findings, a literature study was also undertaken by reviewing books, academic journals, and relevant online resources, providing a strong theoretical foundation and identifying best practices in procurement system development.

### ***Data Analysis Technique***

The data obtained was analyzed qualitatively and functionally (Bründl et al., 2025). Qualitative analysis was used to identify problems and requirements, while functional analysis ensured that the developed system addressed these problems. Black-box testing results were evaluated to validate system functionality against predefined specifications (Su et al., 2025). The analysis focused on efficiency improvements, error reduction, and support for structured decision-making within the procurement process.

## **RESULTS AND DISCUSSION**

### **System Development Results**

The system development process was carried out iteratively using the Agile methodology (Mukhopadhyay et al., 2024). The output of each sprint produced incremental improvements to the Purchase Order (PO) system, starting from basic PO creation features to an integrated approval workflow (Singh et al., 2025). The final system provides modules for PO creation, supplier management, approval requests, and reporting.

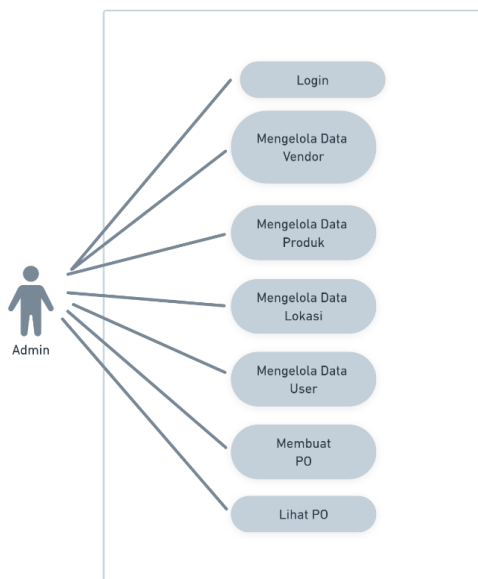
The results of user observation and interviews confirmed several critical problems in the existing workflow: lack of data validation, manual approval via WhatsApp, and high risk of human error. After system deployment, functional testing was conducted using black-box testing. The results are presented in Table 1.

**Table 1.** Results of Black-Box Testing on PO System Functions

No.	Test Scenario	Expected Output	Result	Status
1	Create new PO with valid data	PO successfully saved to database	OK	Passed
2	Submit PO for manager approval	Approval notification sent	OK	Passed
3	Approve PO by manager	Status updated to "Approved"	OK	Passed
4	Reject PO by manager	Status updated to "Rejected"	OK	Passed
5	Generate PO report	Report displayed/exported correctly	OK	Passed

### System Workflow

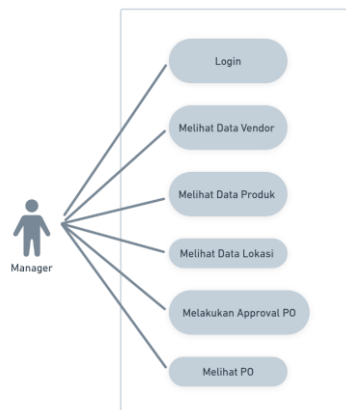
The system workflow illustrates the overall process of purchase order (PO) management, starting from request submission until final approval (Chavez et al., 2025). Initially, a user submits a purchase order request by filling out the required details such as item, quantity, budget allocation, and justification (Huang et al., 2025). Once submitted, the request enters the approval workflow, where it is sequentially reviewed by authorized personnel (e.g., supervisors, managers, and finance officers). Each level of approval is logged by the system to ensure accountability and transparency (Garay Gallastegui & Reier Forradellas, 2024). If a request is rejected at any stage, feedback is provided to the requester, who may revise and resubmit. The workflow ensures that only approved purchase orders proceed to the procurement stage, aligning organizational spending with established policies.



**Figure 1.** Use Case Admin

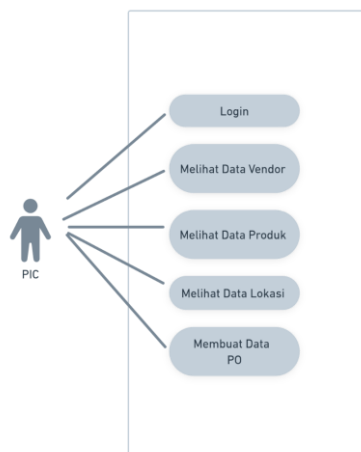
Figure 1 illustrates the Admin Use Case Diagram of the system, showing the interactions between the admin and the main system functionalities. The admin is responsible for managing

key operations such as user management, data input, updating records, and monitoring system activities. This diagram highlights how the admin controls and coordinates various processes to ensure the system runs efficiently and securely.



**Figure 2.** Use Case Manager

Figure 2 illustrates the Manager Use Case Diagram of the system, showing the interactions between the manager and the system's core functionalities. The manager typically performs activities such as reviewing purchase orders, approving or rejecting requests, and monitoring overall procurement processes. This diagram highlights the manager's role in decision-making and control to ensure that purchasing activities are carried out efficiently and in accordance with organizational policies.



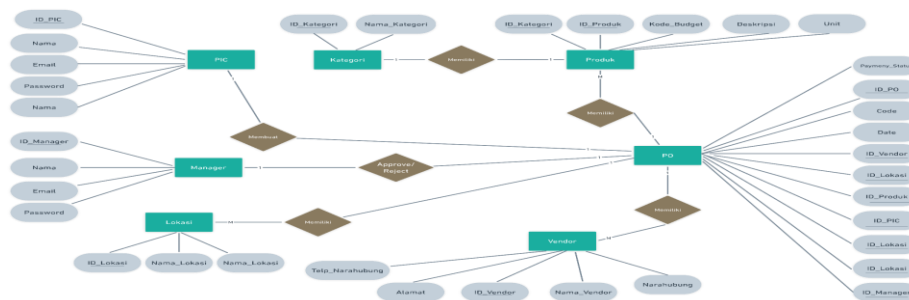
**Figure 3.** Use Case PIC

Figure 3 illustrates the PIC (Person in Charge) Use Case Diagram of the system, showing how the PIC interacts with the main functionalities related to operational tasks. The PIC is typically responsible for creating purchase orders, managing item data, and submitting requests for approval. This diagram highlights the PIC's role in initiating and handling day-to-day procurement activities within the system.

### Database Schema / ERD

The database schema is designed to support efficient and reliable management of purchase order data (Castillo et al., 2024). The core entities include Users, Purchase Orders, Approval Stages, and Suppliers. The Users table stores employee and approver information with role-based access (Palvia et al., 2024). The Purchase Orders table records all transaction details, including items, quantity, total cost, and status. The Approval Stages table links purchase orders to their

approval history, maintaining a trace of decisions across different hierarchical levels. Meanwhile, the Suppliers table stores vendor data for future reference and integration with procurement systems (Balakera et al., 2024). This relational database structure not only supports normalization and data integrity but also facilitates real-time tracking of requests, approvals, and financial allocation.

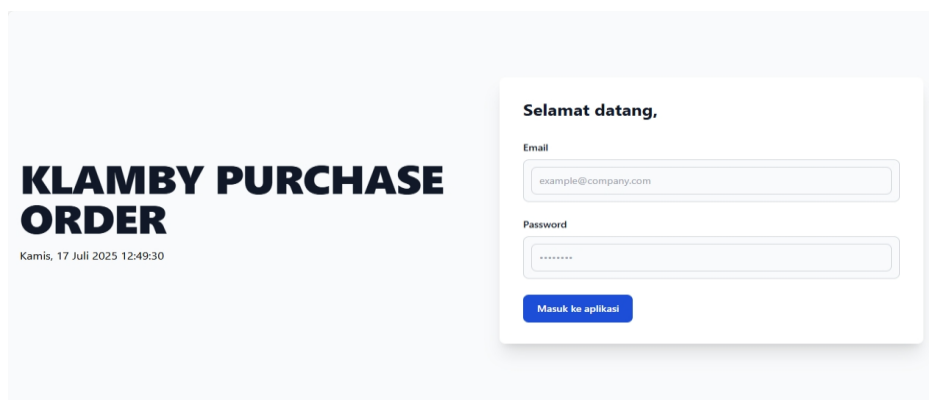


**Figure 4.** Database Schema / ERD

Figure 4 presents the Database Schema or Entity Relationship Diagram (ERD) of the system, which illustrates the structure of the database and the relationships among its entities. The diagram typically includes key components such as users, purchase orders, items, and approval records, along with their attributes and connections. It provides a clear overview of how data is organized and managed, ensuring consistency, integrity, and efficient data processing within the system.

### User Interface

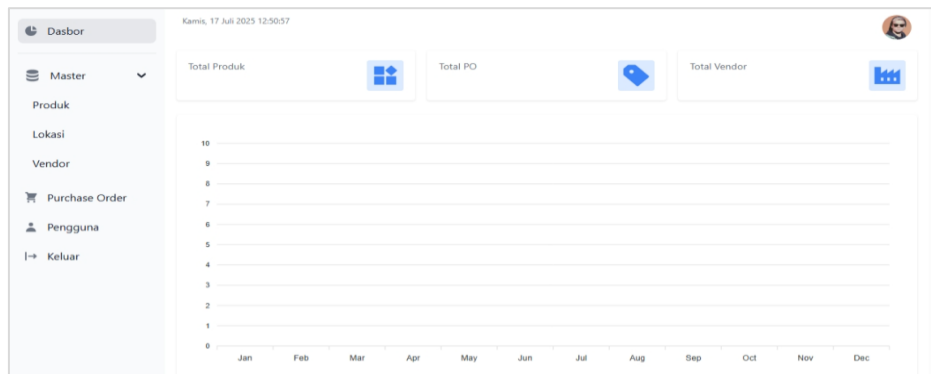
The user interface is designed with simplicity and usability in mind, allowing employees and approvers to interact with the system efficiently (Nabli et al., 2025). The Purchase Order Form enables users to input order details through structured fields, minimizing input errors (Longato et al., 2024). The Dashboard provides a centralized view for monitoring PO status, pending approvals, and notifications. Approvers can review requests directly from the dashboard and take necessary actions (approve, reject, or request revision) (Capozza et al., 2025). Visual indicators such as progress bars, color-coded statuses, and alerts enhance the user experience by making the approval process transparent and easy to follow (Zhao & Zhang, 2024). Screenshots of the form and dashboard highlight the system’s practical implementation, ensuring accessibility.



**Figure 5.** Login View

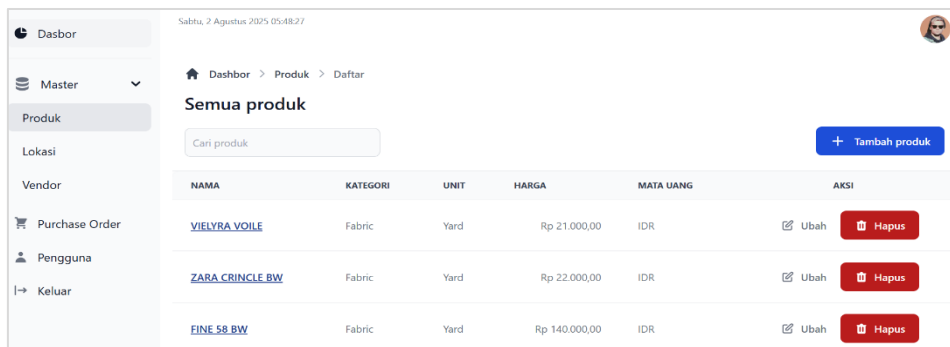
Figure 5 shows the Login View of the system, which provides a secure interface for users to access the application. This view typically includes fields for entering a username and

password, along with authentication mechanisms to verify user credentials. It ensures that only authorized users can log in and access system features according to their roles.



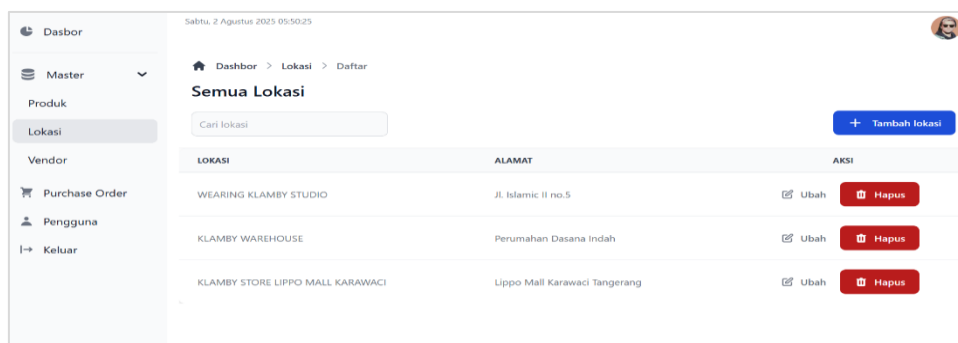
**Figure 6.** Admin Dashboard View

Figure 6 presents the Admin Dashboard View of the system, which serves as the main interface for administrators to monitor and manage system activities. This view typically displays summarized information such as user data, purchase orders, approvals, and system status, along with navigation options to access key features. It enables the admin to efficiently control and oversee overall system operations.



**Figure 7.** Product View

Figure 7 presents the Product View of the system, which displays a list of products along with their key information. This view typically includes details such as product name, code, category, price, and stock level, allowing users to manage and monitor product data efficiently. It supports accurate inventory control and facilitates easy access to product-related information.



**Figure 8.** Location View

Figure 8 presents the Location View of the system, which displays information related to storage or operational locations within the organization. This view typically includes details such as location names, codes, and descriptions, allowing users to manage and organize data based on specific areas. It supports efficient tracking and allocation of products or resources across different locations.

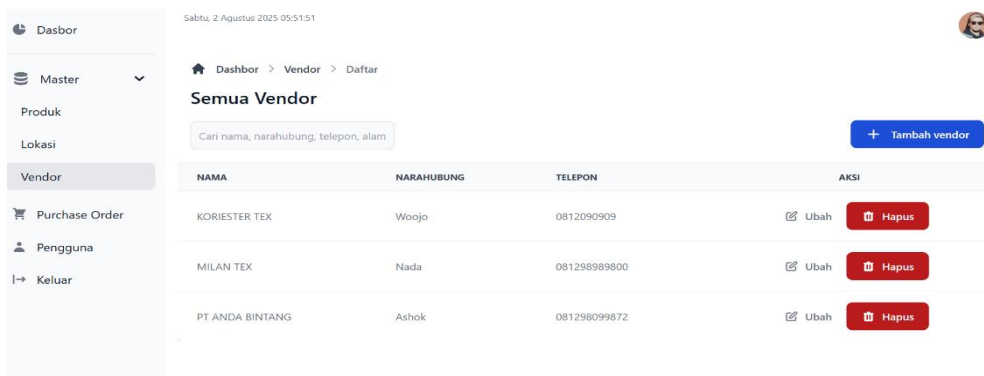


Figure 9. Vendor View

Figure 9 presents the Vendor View of the system, which displays detailed information about suppliers involved in the procurement process. This view typically includes data such as vendor names, contact information, addresses, and transaction records, allowing users to manage supplier relationships effectively. It supports efficient procurement operations by ensuring accurate and organized vendor data management.

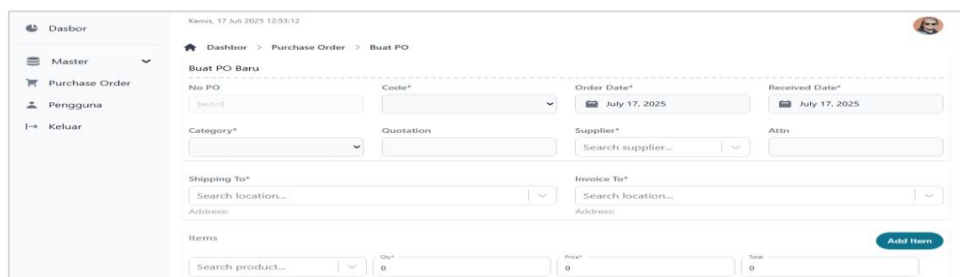


Figure 10. Purchase Order Form

Figure 10 presents the Purchase Order Form of the system, which is used to create and manage purchase order requests. This view typically includes fields for entering product details, quantities, vendor information, and order specifications, allowing users to submit structured and accurate purchase requests. It supports a streamlined procurement process by ensuring that all required information is properly documented before approval.

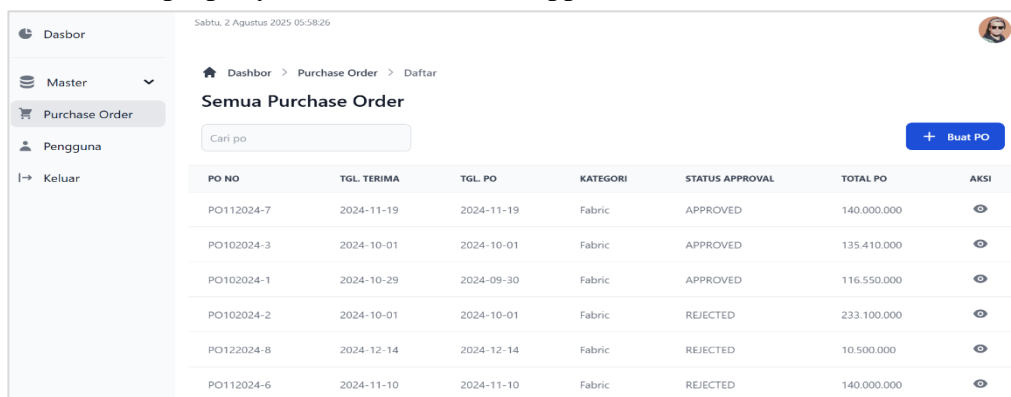


Figure 11. Purchase Order Data

Figure 11 presents the Purchase Order Data view of the system, which displays a list of all purchase orders in a structured table format. This view typically includes information such as PO number, receipt date, order date, category, approval status, and total amount, along with action options for each entry. It allows users to efficiently monitor, search, and manage purchase order records, supporting better tracking and decision-making in the procurement process.

**KLAMBY**  
**PURCHASE ORDER**

Code : SCM                      Quotation No :  
 PO No. : PO112024-7          Supplier : PT ANDA BINTANG  
 Order Date : 2024-11-19  
 Received Date : 2024-11-19  
 Category : Fabric              Attn : Dudi

Shipping To : KLAMBY WAREHOUSE Perumahan Desana Indah	Invoice To : WEARING KLAMBY STUDIO Jl. Islamic II no.5
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No	Description	Qty	UM	Price	Total
1	FINE SS BW	1000	Yard	140.000	140.000.000
Total					140.000.000
Note :					Tax
					Discount
					Grand Total
					140.000.000

Terms of Payment : Net 30  
 Paid By : Finance  
 PIC : Elsa

Approved By  
  
  
 (Zahara)  
 MANAGER

**Figure 12.** Purchase Order

Figure 12 presents the Purchase Order document generated by the system, which provides a formal and structured summary of a purchasing transaction. This document includes essential information such as PO number, supplier details, item description, quantity, price, total amount, payment terms, and approval signature. It serves as an official record to ensure accuracy, accountability, and transparency in the procurement process.

## CONCLUSION

The development of a web-based purchase order system with integrated approval workflow successfully addressed the inefficiencies of the existing manual and semi-digital processes at CV Klamby. The system improved procurement efficiency, reduced the risk of errors, and enhanced data traceability by eliminating reliance on Google Spreadsheets and WhatsApp-based approval methods. With features such as automated approval logging, role-based access control, and structured database management, the system provides a more transparent and accountable procurement process. Future work may focus on integrating the system with enterprise resource planning (ERP) platforms and expanding functionalities to support supplier evaluation and performance monitoring.

## AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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