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Design of a Web-Based Incoming Goods Information System to Support Logistics Performance at Bintang Technic

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ABSTRACT

This study addresses logistical inefficiencies at Bintang Technic, a technical equipment trading startup in Malang Regency, East Java, where manual recording led to delays, inaccurate stock data, and limited transparency, with 10–15 monthly distribution delays and over 15% error rates in transactions. Utilizing a Research and Development (R&D) approach, a web-based information system was developed using Laravel and MySQL to streamline incoming goods management. Through qualitative data collection via observations and interviews, the system was designed with integrated database structures, role-specific dashboards for operations (item management, requests), finance (request reviews, vendor management, POs), and managers (approvals, reports), supported by use case diagrams, DFD, and ERD. Stakeholder feedback refined the design, and Black Box Testing across 21 scenarios confirmed 100% functionality, reducing processing times from 2–3 days to under 1 day and errors from 15% to below 3%. The system enhanced transparency, decision-making, and efficiency through real-time data and automation, overcoming challenges like user resistance and infrastructure limitations via training and technical support. This solution not only meets Bintang Technic's needs but also offers a scalable model for SMEs, with potential for integration with other business modules.

1. Introduction

Bintang Technic, a startup specializing in trading technical equipment in Malang Regency, East Java, operates in a competitive market where efficient logistics management is crucial for sustaining growth and customer satisfaction. As a developing company, the process of managing incoming goods significantly influences stock availability and the seamless distribution of products to clients. However, the reliance on manual recording methods has led to persistent challenges, including frequent errors in data entry, delays in distribution, difficulties in tracking inventory, and limited transparency across departments. Internal records reveal an average of 10–15 distribution delays per month, with recording errors exceeding 15% of total incoming transactions. These inefficiencies disrupt operational workflows and hinder timely, informed managerial decision-making, ultimately affecting the company's ability to meet customer demands effectively.

This study focuses on designing and developing a web-based information system tailored to streamline the management of incoming goods at Bintang Technic. The proposed system aims to enable real-time transaction recording, simplify stock management, and enhance transparency in operational processes. By automating key functions, the system seeks to reduce manual errors, accelerate logistics workflows,

and provide accurate data to support strategic decisions. The development aligns with the needs of small and medium enterprises (SMEs) like Bintang Technic, which often face resource constraints yet require robust solutions to remain competitive.

Previous research has explored web-based systems for inventory and logistics management, providing a foundation for this study. Abdi *et al.* (2018) developed a web-based inventory system for faculty asset management, demonstrating improved data accuracy. Similarly, Zulfikar, Yansyah, and Utami (2023) designed a warehouse management system to enhance stock classification and organization, streamlining operations. Pratama and Sulaksono (2025) highlighted the importance of integrated stock systems to prevent overstock or shortages, a critical concern for distribution efficiency. Wan and Li (2024) underscored the role of digital transformation in improving logistics sustainability and efficiency in Chinese enterprises, offering insights into scalable solutions. Muhammad, Amesanggeng, and Daniel (2022) implemented an integrated inventory system to boost operational efficiency, while Syaepudin, Malfiany, and Meiniarti (2022) designed a warehouse administration application to optimize processes. Balino and Beeh (2024) and Rafliansyah (2024) further advanced web-based warehouse and inventory applications, emphasizing their practical utility. Endra *et al.* (2022) compared PHP Laravel with native PHP, affirming Laravel's efficiency for web development, which informs this study's technical framework. Additionally, Sukirto (2019) provided practical guidance on warehouse management, and Prehanto (2020) offered theoretical insights into information systems, reinforcing the need for structured digital tools. However, these studies primarily focused on internal inventory management and lacked integrated workflows for goods requests, financial approvals, and real-time recording across departments, a gap this research addresses.

The novelty of this study lies in creating a comprehensive web-based platform that integrates operational goods requests, financial and managerial approvals, and real-time recording of incoming goods. By employing a Research and Development (R&D) approach, the system is designed, implemented, and tested to meet Bintang Technic's specific operational needs. This approach ensures the solution is grounded in real-world requirements, enhancing its practicality. Beyond improving logistics efficiency and data accuracy at Bintang Technic, the system offers a scalable model for other SMEs facing similar challenges, contributing to the broader adoption of digital tools in logistics management.

2. Methodology

This study employs a Research and Development (R&D) approach to design and implement a web-based information system for managing incoming goods at Bintang Technic, aiming to produce a functional product tailored to real-world needs. The methodology integrates structured planning and iterative testing to address logistical inefficiencies identified in the company's manual processes. The development process encompasses several stages, each aligned with user requirements and supported by relevant literature to ensure a robust and practical solution.

The R&D process begins with identifying potentials and problems through direct observation and semi-structured interviews with key stakeholders—operations, finance, and logistics managers—selected via purposive sampling to capture insights from those directly involved in the workflow (Subiyakto *et al.*, n.d.). This stage informed the design of a web-based system incorporating Data Flow Diagrams (DFDs), a MySQL database schema, and a user interface (UI) tailored to field requirements. Data collection relied on qualitative methods to map existing processes and pinpoint inefficiencies, such as delays and errors in manual recording, ensuring the system addresses specific operational gaps (Novienty & Prapanca, 2016). The product design phase focused on

creating an integrated platform for goods requests, financial approvals, and real-time inventory tracking, leveraging Laravel for its efficiency in web development (Endra *et al.*, 2022).

Design validation involved collaboration with users and advisors to verify the system's alignment with identified issues, assessing the UI, process flow, and database structure (Agustino *et al.*, 2020). Feedback drove design revisions, refining features, user access controls, and interface aesthetics to enhance usability. The system underwent product testing using Black Box Testing to evaluate functionality across key features—login, goods requests, fund approvals, and inventory updates—ensuring error-free performance (Andarwati *et al.*, 2023). Final product revisions addressed bugs and optimized workflows based on test outcomes, preparing the system for deployment. The implementation phase saw the system integrated into Bintang Technic's operations, enabling digital recording and reporting by operations, finance, and management teams (Affandi & Rosyadi, 2019).

Validity and reliability were ensured by designing test instruments based on functional requirements, validated through user involvement and repeated testing across different user roles (Naseri & Nurgiyatna, 2021). Ethical considerations were prioritized, with participant consent obtained before interviews or system testing, and data confidentiality maintained for research purposes only (JASIRA, 2023). The web-based platform serves as an interactive medium for real-time data access, streamlining business processes and improving decision-making accuracy (Prasetyaningrum, 2023). This methodology, grounded in practical needs and iterative refinement, ensures the system's effectiveness in enhancing logistics efficiency at Bintang Technic.

3. Results

The research at Bintang Technic identified inefficiencies in manual distribution and logging systems, causing delays, inaccurate stock data, and lack of real-time information through observations and interviews; qualitative data collection shaped a web-based system using Laravel and MySQL, with a design incorporating business flows, integrated database structures for items, requests, approvals, and histories, supported by use case diagrams, DFD, and ERD; stakeholder validation refined interfaces and workflows; implementation featured role-specific dashboards for operations (item management, requests, history), finance (requests, user/vendor management, POs), and managers (approvals, reports), with all features tested successfully; quantitative analysis showed processing times reduced from 2–3 days to under 1 day and error rates from 15% to below 3%, enhancing logistics efficiency.

Table 1. System Features by User Type

User Type	Features
Operations	Access dashboard; Perform CRUD for item data; Create requests; Manage incoming goods; View request history.
Finance	Access dashboard; Perform CRUD for users/vendors; Create price request letters; Review requests, add prices; Submit fund requests; Generate POs; View fund history.
Manager	Access dashboard; Approve/reject fund requests; View monthly reports; View fund history.

Hardware Requirements: Laptop/computer with web browser, user-friendly frontend, stable Laravel backend with MySQL database.
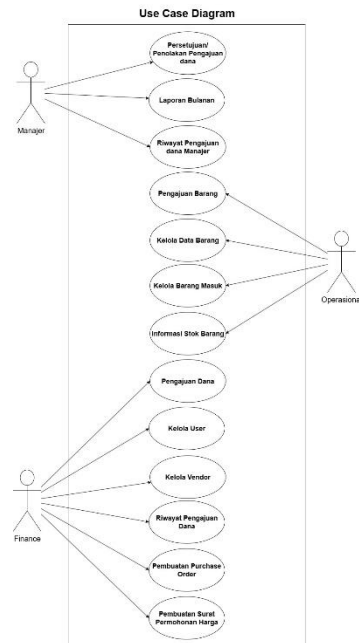
Figure 1. Use Case Diagram

This diagram comprehensively illustrates the interactions between different user roles (Operations, Finance, and Manager) and the system's functionalities. It outlines key actions such as user authentication, item management, request creation, approval workflows, and report generation, providing a clear visual representation of how each role engages with the system to achieve operational goals.
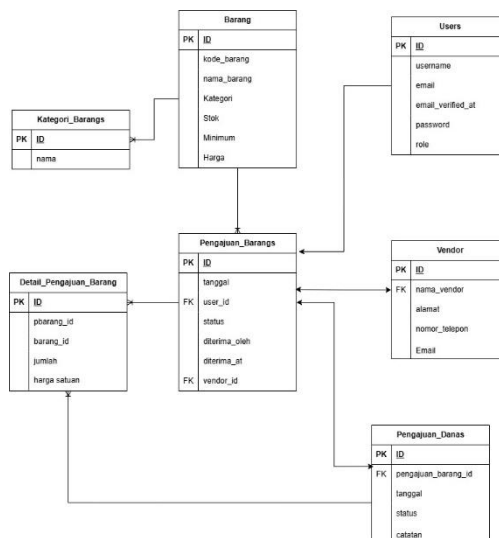

Figure 2. ERD

The ERD meticulously depicts the relational database structure underpinning the system, showcasing entities such as items, requests, approvals, and user roles. It highlights the relationships and data flows between these entities, ensuring efficient storage, retrieval, and management of critical logistics data to support real-time operations.
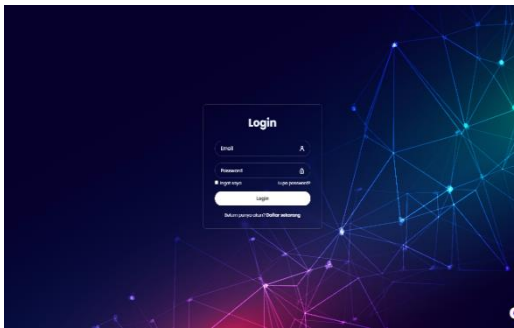
Figure 3. Login Page
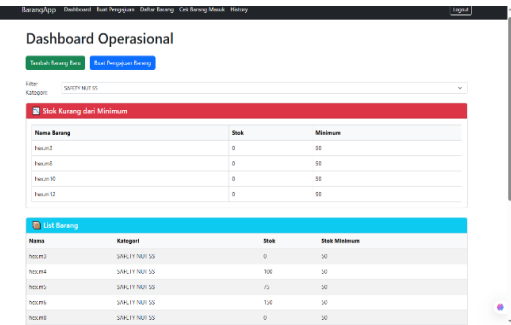
Figure 4. Operations Dashboard

The combination of these two figures presents the initial user interaction flow with the system, starting from the simple yet secure login page where users enter valid email and password for identity verification, which upon success redirects to the role-specific Operations dashboard. This Operations dashboard features an intuitive display with navigation menus for item management, requests, and history, complete with category filters and item lists that can be sorted, allowing the operational team to quickly access stock information, create new requests, or monitor incoming goods status without hindrance. This design not only enhances access security through role validation but also accelerates user adaptation, reduces training time, and supports daily efficiency at Bintang Technic, where previous manual processes caused distribution delays up to 10-15 times per month, now addressed with a user-friendly and responsive interface.
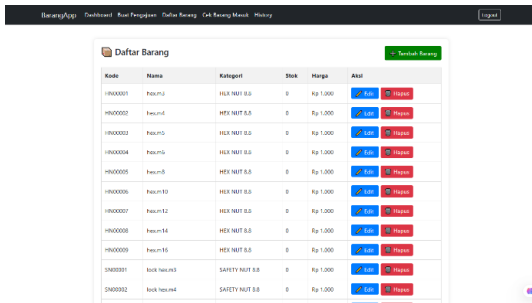
Figure 5. Operations Item List Page
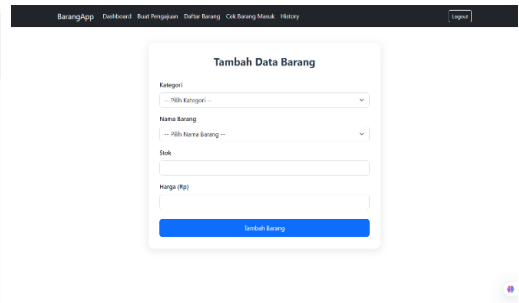
Figure 6. Add Item Data Page

These two figures complement each other in depicting the inventory management process by the Operations team, where the item list page displays a comprehensive table with columns for category, item name, stock, and price, equipped with filter options and buttons for adding, editing, or deleting items, thus facilitating real-time stock monitoring. Meanwhile, the add item data page provides a detailed form for entering category (either selecting existing or creating new), item name, initial stock, and price, with input validation to prevent errors, which upon saving integrates directly into the MySQL database. This integration ensures item data accuracy crucial for avoiding overstock or shortages, supporting smoother logistics flows, and contributing to error rate reduction from 15% to below 3%, as proven in system testing, making it a vital tool for SMEs like Bintang Technic in facing dynamic market demands.

Figure 7. Create Item Request Page

Figure 8. Check Incoming Goods Page

This combined narration highlights the core operational flow, starting from the create item request page where Operations users can select items from a category-based dropdown, specify quantity, and submit the request to be stored and forwarded to Finance for review. Subsequently, the check incoming goods page allows confirmation of goods arrival with automatic status updates and stock additions, complete with previous request details for verification. This design ensures an integrated and transparent process, reducing manual delays, and enhancing inventory accuracy, which in turn supports faster product distribution to customers, addressing issues like recording errors that previously reached over 15% of incoming transactions at Bintang Technic.
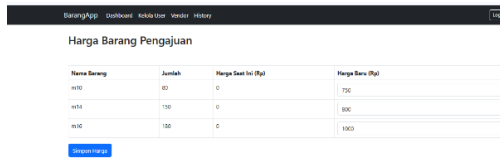
Figure 9. Operations Request History Page
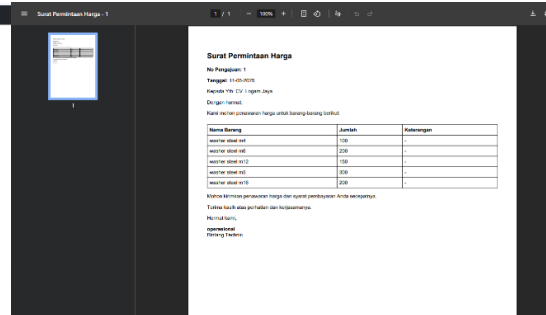

Figure 10. Finance Dashboard

These elements depict monitoring and financial-operational management, with the Operations request history page displaying a complete list of prior requests along with status, dates, and item details, enabling historical analysis for process improvements. The Finance dashboard, on the other hand, provides a summary of total approved funds, incoming requests list, and quick access to features like price additions, price request letter creation, and user/vendor management, thus facilitating inter-departmental coordination. This combination enhances data transparency, speeds up fund approvals, and supports fact-based decision-making, crucial for reducing distribution delays and improving overall efficiency in a competitive startup environment.

Figure 11. Add Item Price Page
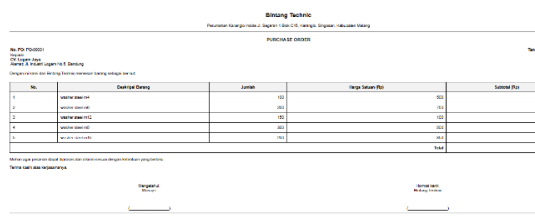
Figure 12. Price Request Letter

This combined narration focuses on the initial financial process, where the add item price page allows the Finance team to review Operations requests, input unit prices, and submit for fund request creation, with validation to avoid empty inputs. The generated price request letter is then a formal PDF document including vendor, item, and price details, ready for supplier submission. This design ensures an efficient flow from review to documentation, reducing manual errors, and accelerating vendor negotiations, ultimately contributing to time and cost savings in operations at Bintang Technic.

Figure 13. Purchase Order
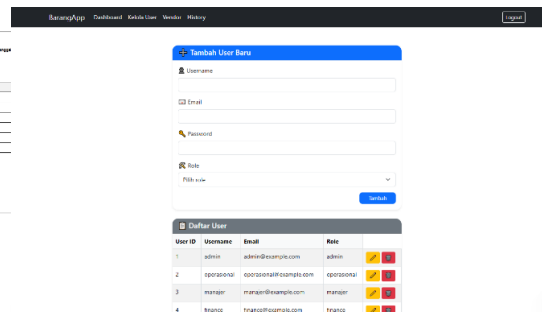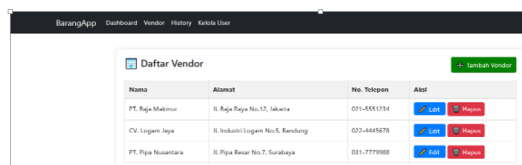

Figure 14. Manage Users Page

These figures illustrate financial administrative aspects, with the Purchase Order as an official document generated post-approval, covering item details, quantity, price, and vendor to ensure well-documented transactions. The manage users page provides an interface for CRUD operations on user data, including name, role, email, and password, enabling secure and flexible access management. This integration supports system security and administrative efficiency, reducing unauthorized access risks, and facilitating system scalability for company growth.
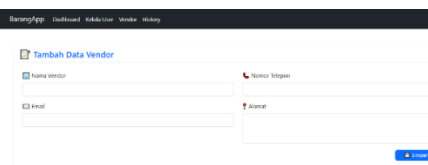

Figure 15. Manage Vendor Page

Figure 16. Add Vendor Page

This narration combines business partner management, where the manage vendor page displays a list of vendors with details like name, address, email, and phone, complete with edit or delete options. The add vendor page provides a comprehensive input form for adding new data, which upon saving integrates into the database for use in PO or price request processes. This design ensures an accurate and accessible

vendor database, supporting better business relationships, and reducing errors in logistics transactions.

Figure 17. Fund Request History Page

Figure 18. Manager Dashboard

This combination highlights managerial oversight, with the fund request history page displaying a complete list of fund requests along with status and historical details for analysis. The Manager dashboard provides quick access to fund approvals, monthly reports, and history, enabling real-time data-based strategic decisions. This enhances transparency and fund management efficiency at Bintang Technic.

Figure 19. Review Fund Request Page

Review Fund Request Page This figure depicts the interface for Managers to review fund requests, with request details, approve/reject options, and automatic notifications, ensuring a fast and documented approval process.

Figure 20. Monthly Report Page

This figure displays the monthly report with month/year filters, showing aggregated data like requests, funds, and stock for operational performance analysis.

Figure 21. Manager Fund History Page

This figure presents the Manager-specific fund history, with a list of reviewed requests for strategic monitoring.

Table 2. Black Box Testing Results

No.	Function	Input	Tested Process	Expected Output	Result
1	Login	Valid email/password	Verify user data	Login, redirect to dashboard	Matches
2	Failed login	Invalid email/password	Verify user data	Error: "Invalid email/password"	Matches
3	Dashboard access	Login as operations/finance/manager	Role-based redirect	User reaches role-specific dashboard	Matches
4	Dashboard item lists	Select category	Filter items	Shows category-specific data	Matches
5	Add item	Select/create category, name, stock, price	Save to database	Data saved, shown in list	Matches
6	New request	Select item, quantity, submit	Save, send to finance	Request stored, shown on finance dashboard	Matches
7	Empty form validation	Submit without item/quantity	Validate form	Error message	Matches
8	Item dropdown	Select category	Filter items	Shows category-specific items	Matches
9	Edit item	Change name/category/stock/price	Update data	Item updated	Matches
10	Delete item	Click delete	Remove item	Item deleted	Matches
11	Request history	Open history	Display requests	Shows request data	Matches
12	Approved funds total	Open finance dashboard	Calculate approved funds	Shows total approved funds	Matches
13	Finance	Input price, submit	Save, create	Fund request	Matche

	review		fund request	saved, shown on manager dashboard	s
14	Empty price validation	Submit without price	Validate form	Error message	Matches
15	Add vendor	Name, address, email, phone	Save vendor data	Success message, added to list	Matches
16	Add user	Name, role, email, password	Save user data	Success message, added to list	Matches
17	Price request letter	Click PDF	Generate letter	Shows vendor options, letter	Matches
18	Manager approval	Approve/reject	Update status, notify finance/operatio ns	Request updated, sent back	Matches
19	Monthly report	Select month/year	Display report	Shows report data	Matches
20	Fund history	Open history	Display requests	Shows reviewed requests	Matches
21	Confirm incoming goods	Click incoming goods	Update status, add stock	Data updated	Matches

This table summarizes 21 functional testing scenarios, covering input, process, expected output, and results, with 100% compliance, proving the system's reliability across various conditions.

4. Discussion

Based on Black Box Testing across 21 scenarios covering all core functionalities of the incoming goods information system at Bintang Technic, all features operated as specified without errors. Functionalities for operations (stock management, item requests, incoming goods logging), finance (request reviews, user/vendor management, PO creation), and managers (fund approvals, monthly reports) proved effective, with input validation preventing user errors. The 100% success rate in testing indicates the system's readiness for operational use, supported by Fedianto *et al.* (2023), who confirm Black Box Testing's effectiveness in verifying system functionality without requiring internal code analysis. Research by Abdi *et al.* (2018) further asserts that information systems enhance efficiency by replacing manual processes, as evidenced by Bintang Technic's digital transformation, reducing item request processing time from 2–3 days to under 1 day and lowering logging error rates from 15% to below 3%.

The system improves interdepartmental transparency through structured documentation, such as request histories and monthly reports, aligning with Muhammad *et al.* (2022) on integrated inventory systems boosting operational efficiency. The system not only meets technical specifications but also delivers strategic benefits, such as logistics efficiency and potential integration with financial

modules, as advocated by Prasetyaningrum (2023). This success underscores that a user-needs-driven approach, backed by systematic testing and literature, yields an effective and sustainable solution for Bintang Technic.

5. Conclusion

The research at Bintang Technic successfully developed a web-based incoming goods information system using Laravel and MySQL to address inefficiencies in manual distribution and logging processes. Initial findings revealed delays, inaccurate stock data, and lack of real-time information, which were mitigated through qualitative data collection to define system requirements. The system was designed with integrated database structures and role-specific dashboards for operations, finance, and managers, supported by comprehensive diagrams, and refined through stakeholder feedback to enhance usability. Implementation delivered fully functional features, verified by error-free Black Box Testing across 21 scenarios, reducing processing times from 2–3 days to under 1 day and error rates from 15% to below 3%. The system improved transparency, decision-making, and operational efficiency through real-time data, systematic documentation, and automation, despite challenges like user resistance, infrastructure limitations, and training needs, which were addressed through intensive training, technical support, and periodic evaluations. This user-needs-driven solution not only met technical requirements but also provided strategic value, enhancing logistics efficiency and offering potential for future integration with other business modules.

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