

WEB-BASED INFORMATION SYSTEM DESIGN FOR DRUG SALES AND INVENTORY MANAGEMENT AT BATUBANTAR PHARMACY BATUBANTAR BANTEN

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Abstract—Manual management of drug sales and inventory can lead to recording errors, delays in report generation, and difficulties in monitoring stock levels and drug expiration dates. These problems were also identified at Apotek Batubantar, indicating the need for an integrated information system to improve operational efficiency. This study aims to design and develop a web-based Drug Sales and Inventory Information System for Apotek Batubantar. The research employed a qualitative approach with data collected through observation, interviews, and literature review. System development was carried out using the Rapid Application Development (RAD) method. The system was developed using the Laravel framework and MySQL database. The results show that the system integrates drug and supplier data management, sales transactions, inventory restocking, and report generation. The system also provides automatic stock updates, minimum stock notifications, and alerts for drugs approaching their expiration dates. These integrated features represent the main contribution of the developed system by combining sales, inventory, and automated stock monitoring in a single web-based platform. Performance testing using GTmetrix achieved a Performance score of 85% (Grade B) and a Structure score of 93%, with a Largest Contentful Paint of 1.1 seconds and Total Blocking Time of 12 milliseconds. Security testing using Acunetix identified no high risk vulnerabilities. These results demonstrate that the developed system can support the operational activities of Apotek Batubantar in managing drug sales and inventory more efficiently.

Keywords: drug inventory, drug sales, information system, Laravel, rapid application development.

Abstrak—Pengelolaan penjualan dan persediaan obat yang masih dilakukan secara manual dapat menyebabkan kesalahan pencatatan, keterlambatan penyusunan laporan, serta kesulitan dalam memantau stok dan masa kedaluwarsa obat. Permasalahan tersebut juga terjadi di Apotek Batubantar sehingga diperlukan sistem informasi terintegrasi untuk meningkatkan efisiensi operasional. Penelitian ini bertujuan merancang dan membangun Sistem Informasi Penjualan dan Persediaan Obat Berbasis Web pada Apotek Batubantar. Metode penelitian yang digunakan adalah pendekatan kualitatif dengan teknik pengumpulan data melalui observasi, wawancara, dan studi pustaka. Pengembangan sistem menggunakan metode Rapid Application Development (RAD). Sistem dibangun menggunakan framework Laravel dan basis data MySQL. Hasil penelitian menunjukkan bahwa sistem mengintegrasikan pengelolaan data obat dan supplier, transaksi penjualan, transaksi restok, serta pembuatan laporan. Sistem juga menyediakan pembaruan stok secara otomatis, notifikasi stok minimum, dan peringatan obat yang mendekati masa kedaluwarsa. Integrasi fitur tersebut menjadi kontribusi utama sistem dengan menggabungkan proses penjualan, persediaan, dan pemantauan stok secara otomatis dalam satu platform berbasis web. Hasil pengujian kinerja menggunakan GTmetrix memperoleh Performance sebesar 85% (Grade B) dan Structure sebesar 93%, dengan Largest Contentful Paint sebesar 1,1 detik dan Total Blocking Time sebesar 12 milidetik. Pengujian keamanan menggunakan Acunetix menunjukkan tidak ditemukan kerentanan dengan tingkat High Risk. Hasil tersebut menunjukkan bahwa sistem yang dikembangkan dapat mendukung kegiatan operasional Apotek Batubantar dalam mengelola penjualan dan persediaan obat secara lebih efisien.

Kata Kunci: *persediaan obat, penjualan obat, sistem informasi, Laravel, pengembangan aplikasi cepat.*

INTRODUCTION

The development of information technology has driven digitalization across various sectors, including the healthcare sector. Pharmacies, as healthcare service facilities, require information systems capable of supporting drug sales and inventory management effectively and efficiently. Web-based information systems can facilitate the management of transaction data, drug inventory, and reporting, thereby supporting more accurate and accessible information management. developed a web-based drug inventory management information system to support the management of drug stock and inventory activities (Ruliyanto Andryana, & Gunaryati, 2021). developed a web-based drug sales information system to support drug sales transaction management (Rofi'ah, Hantoro, & Mugiarto, 2022). developed a web-based drug ordering information system that provides drug availability information and supports drug ordering activities (Artanto, Febrianto, & Satrio, 2022).

Apotek Batubantar faces similar challenges, as its drug sales, inventory management, and report preparation processes are still carried out manually. These conditions can make operational processes less efficient, complicate inventory monitoring, and increase the risk of discrepancies between recorded and actual inventory. Manual inventory management can also make it difficult to monitor drugs approaching their expiration dates and maintain appropriate stock levels. Therefore, a computerized information system is needed to integrate drug sales and inventory management according to the operational requirements of Apotek Batubantar.

Previous studies have developed pharmacy information systems with different focuses and implementation approaches. developed a web-based drug inventory information system using the FIFO method, focusing on drug inventory management (Akbar, Zulfadly, & Apriani, 2025). developed a web-based drug sales information system at PT. Sidhi Sari Pharma to support drug sales activities and reporting processes (Dharma, Astawa, & Giri, 2023). implemented a desktop-based application for drug sales and inventory management at Apotek Wisa Farma (Sriyani & Anggraini, 2024). developed a web-based drug inventory information system at Fadhilah Farma using the Rapid Application Development (RAD) method (Lusiana, Imelda, & Salam, 2024).

Other studies have also explored web-based technologies and development methods for

pharmacy and sales information systems. developed a web-based pharmacy information system using the RAD method for drug stock management and sales transaction recording (Savytra et al., 2026). developed a web-based sales information system using the Laravel framework (Irma & Hakim, 2026). These studies demonstrate the application of information systems to support sales and inventory activities, but the scope, platform, development method, and system features differ according to the needs of each research object.

Based on these previous studies, this research focuses on developing an integrated web-based system that combines drug data management, sales transactions, drug restocking, inventory control, reporting, minimum-stock notifications, and expiration-date monitoring within a single system. The research gap addressed in this study is the need for an integrated information system specifically tailored to the operational requirements of Apotek Batubantar. The contribution of this research is the integration of sales and inventory management with minimum-stock notifications and expiration-date monitoring, accompanied by functional testing to evaluate whether the developed features operate according to the specified requirements. The system is developed using the Rapid Application Development (RAD) method because it supports rapid and iterative development and allows user requirements to be incorporated during the development process. applied the RAD method in the development of a pharmacy information system (Vienna, 2024). This research employs a qualitative approach through observation, interviews, and literature review to identify system requirements. The objective of this research is to design and develop a Web-Based Drug Sales and Inventory Information System at Apotek Batubantar to improve the management of drug sales, inventory, restocking, reporting, minimum-stock monitoring, and expiration-date monitoring.

MATERIALS AND METHODS

This study employs a qualitative approach to obtain an understanding of the business processes involved in drug sales and inventory management at Apotek Batubantar as a basis for designing and developing a web-based information system. The research was conducted from April 24, 2026, to July 3, 2026. Data were collected through observation, interviews, and literature review.

Observation was conducted directly at Apotek Batubantar during the research period to identify the existing operational processes related to drug sales, inventory management, drug

restocking, and report preparation. The observation focused on the flow of activities, procedures, data recorded, documents used, and problems encountered in the existing manual processes. The results of the observation were used as a basis for identifying problems and determining system requirements.

Interviews were conducted with three informants consisting of a pharmacist, an administrative staff member, and a cashier. The informants were selected because they were directly involved in the operational activities of Apotek Batubantar and had knowledge of the existing drug sales and inventory management processes. The interviews used a semi-structured approach, with questions covering the existing sales and inventory procedures, problems encountered in the current process, user roles, data requirements, reporting requirements, and expectations for the proposed system. The information obtained from the interviews was documented and analyzed to identify the functional and non-functional requirements of the system.

The literature review was conducted by examining scientific journals, books, and other relevant references related to information systems, drug sales, inventory management, software development, and system testing. Previous research has applied RAD to support iterative system development and analysis according to user requirements. Research on web-based purchasing and inventory management has also demonstrated the application of RAD in developing systems for managing inventory activities (Melyani et al., 2024). These studies were used as references in determining the development approach applied in this research.

The requirements obtained from observation and interviews were validated with the pharmacy personnel involved in the research. The validation process was conducted by confirming the identified requirements with the pharmacist, administrative staff, and cashier to ensure that the requirements corresponded to the actual operational needs of Apotek Batubantar. Requirements that did not correspond to the operational conditions were reviewed and adjusted based on the results of user confirmation. The validated requirements were then classified into functional and non-functional requirements. Functional requirements were determined based on the activities and functions that the system must provide, including user data management, drug data management, supplier data management, sales transactions, drug restocking, inventory management, report generation, minimum-stock notifications, and expiration-date monitoring. Non-functional requirements were determined based on the operational

characteristics required by the system, including usability, performance, security, compatibility, and accessibility.

The system development method used in this study is Rapid Application Development (RAD). RAD was selected because it supports rapid and iterative software development and allows user involvement during the development process. The application of RAD in previous information system research demonstrates its use in analyzing and developing systems according to stakeholder and administrator requirements (Wijaya et al., 2024). The RAD stages applied in this research consist of Requirements Planning, User Design, Construction, and Testing and Implementation (Cutover).

Requirements Planning

This stage identifies and analyzes system requirements based on the results of observation and semi-structured interviews. The requirements include user management, drug management, supplier management, sales transactions, drug restocking, inventory management, report generation, minimum-stock notifications, and expiration-date monitoring. The requirements are then validated with the users involved in the pharmacy's operational activities.

User Design

At this stage, the system design is prepared based on the validated requirements. The design includes database design, UML modeling, and user interface design. The proposed design is reviewed according to the operational requirements of Apotek Batubantar. The use of RAD for information systems involving purchasing and inventory management has also been implemented in previous research.

Construction

The system is developed using Laravel and PHP as the programming environment and MySQL as the database management system. The construction stage implements the previously designed modules, including user management, drug data, supplier data, sales transactions, drug restocking, inventory management, reports, minimum-stock notifications, and expiration-date monitoring. The development of web-based pharmacy inventory systems has also been implemented in previous research, including systems that manage transactions, inventory reports, and expired drug information (Ramayu, 2023).

Testing and Implementation (Cutover)

The completed system is tested before implementation to determine whether the

developed functions operate according to the specified requirements. Testing consists of Black Box Testing, GTmetrix testing, and Acunetix security testing. Black Box Testing focuses on the functionality of the system without examining its internal implementation, making it appropriate for testing inventory information systems (Setiyani, 2019). Black Box Testing has also been applied to pharmacy ERP systems covering inventory, purchasing, sales, and reporting modules (Yulianti et al., 2022).

1. Black Box Testings

Black Box Testing was conducted to evaluate the functionality of the system based on predetermined test scenarios and expected outputs. Nine main functional scenarios were tested, covering login, user data management, drug data management, supplier data management, sales transactions, drug restocking, and report generation. Testing was conducted using a laptop, Microsoft Edge browser, and Wi-Fi connection. A test was considered successful when the actual output corresponded to the expected output without functional errors.

2. GTmetrix Testing

GTmetrix testing was conducted on the deployed website to evaluate its web performance. The evaluation included Performance Score, Structure Score, Fully Loaded Time, TTFB, FCP, TTI, LCP, CLS, Total Page Size, and Total Page Requests.

3. Acunetix Security Testing

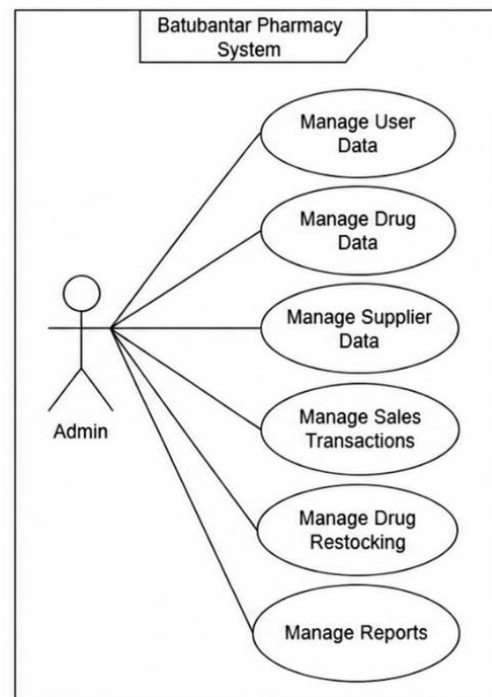
Acunetix security testing was conducted on the deployed website to identify security findings and classify them according to Critical, High, Medium, Low, and Informational severity levels. The results were evaluated based on the severity of the findings, with particular attention to Critical and High severity findings.

RESULTS AND DISCUSSION

System Requirements Analysis

Based on the results of observations and interviews, the developed system was designed to address the manual processes involved in drug sales and inventory management at Apotek Batubantar. The system implements two user roles, namely Admin and Cashier, with access rights adjusted to their respective responsibilities.

The Admin has access to all main system functions, including managing user data, drug data, supplier data, sales transactions, drug restocking, and reports. These functions allow the Admin to control master data as well as monitor operational activities within the pharmacy system.



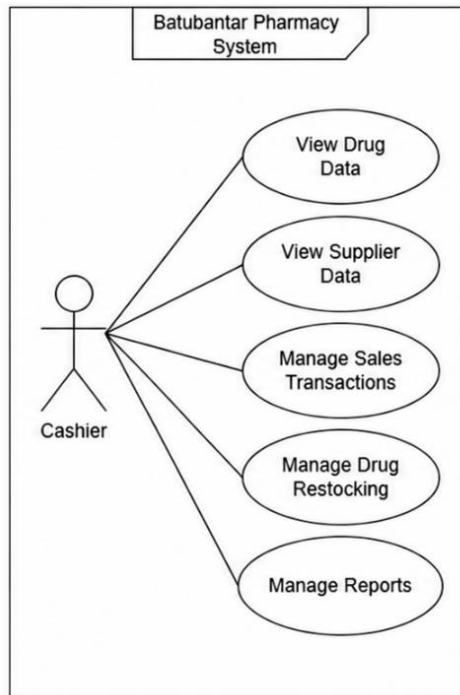
Source: (Research Results, 2026)

Figure 1. Admin Use Case Diagram

Figure 1 illustrates the use case diagram for the Admin role. The Admin is responsible for managing the main data and transaction processes in the system. The available functions include Manage User Data, Manage Drug Data, Manage Supplier Data, Manage Sales Transactions, Manage Drug Restocking, and Manage Reports.

For the Cashier role, the system provides access to operational functions required to support daily transaction activities. The Cashier can view drug and supplier information, manage sales transactions, manage drug restocking, and access reports related to pharmacy operations.

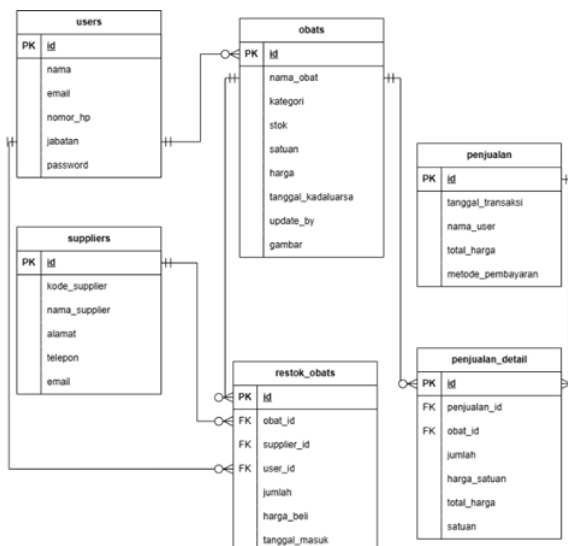
Figure 2 shows the use case diagram for the Cashier role. The functions available to the Cashier include View Drug Data, View Supplier Data, Manage Sales Transactions, Manage Drug Restocking, and Manage Reports. Compared with the Admin, the Cashier does not have access to user management and does not have full authority to modify drug and supplier master data.



Source: (Research Results, 2026)

Figure 2. Cashier Use Case Diagram

The database structure of the developed system is represented using an Entity Relationship Diagram (ERD). The ERD describes the relationships among the main entities required to support data storage and transaction processing in the pharmacy system.



Source: (Research Results, 2026)

Figure 3. Entity Relationship Diagram

Figure 3 presents the Entity Relationship Diagram of the system, which consists of several main entities, including users, obats, suppliers, penjualan, penjualan_detail, and restok_obats.

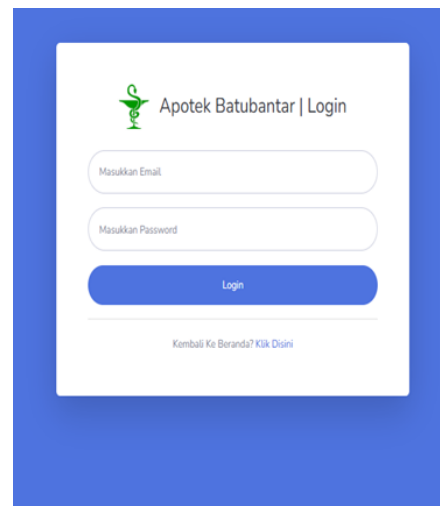
These entities support user management, drug and supplier data management, sales transactions, sales transaction details, and drug restocking activities. The relationships among these entities are designed to maintain data integration between master data and transaction data within the system.

System Implementation

The implementation stage involved developing the application using Laravel as the framework, PHP as the programming language, and MySQL as the database management system. The following section presents the implementation of several main pages of the system.

1. Login Page

The login page provides authentication before users access the system. The system determines the functions available to each user according to the assigned role.

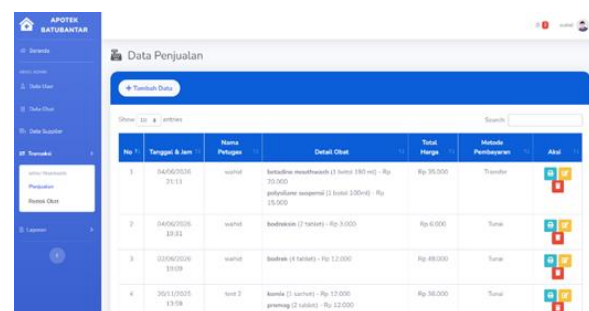


Source: (Research Results, 2026)

Figure 4. Login Page

2. Sales Transaction Page

The sales transaction page is used to record drug sales. After a transaction is successfully recorded, the system automatically decreases the stock of the corresponding drug according to the quantity sold.

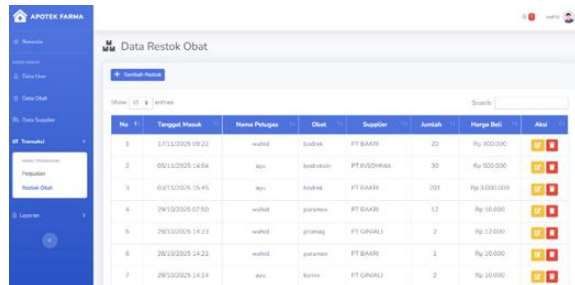


Source: (Research Results, 2026)

Figure 5. Sales Transaction Page

3. Drug Restocking Page

The drug restocking page is used to record incoming drug stock, including the drug, supplier, quantity, purchase price, and date of entry. The system automatically increases the corresponding drug stock based on the recorded restocking quantity.



No.	Tanggal Masuk	Nama Pemasok	Obat	Supplier	Jumlah	Harga Beli	Aksi
1	17/11/2025 09:22	medis	Insulin	PT BAKIN	20	Rp 300.000	
2	05/11/2025 14:04	medis	Insulin	PT BAKIN	30	Rp 300.000	
3	04/11/2025 16:45	medis	Insulin	PT BAKIN	200	Rp 300.000	
4	29/10/2025 07:50	medis	Insulin	PT BAKIN	12	Rp 10.000	
5	28/10/2025 14:23	medis	Insulin	PT BAKIN	2	Rp 10.000	
6	28/10/2025 14:22	medis	Insulin	PT BAKIN	1	Rp 10.000	
7	28/10/2025 14:14	medis	Insulin	PT BAKIN	2	Rp 10.000	

Source: (Research Results, 2026)

Figure 6. Drug Restocking Page

System Testing

The testing results are presented quantitatively to evaluate the functionality, performance, and security of the developed system. The evaluation consists of Black Box Testing, GTmetrix performance testing, and Acunetix security testing.

1. Performance Testing

The performance testing results obtained using GTmetrix are presented in Table 1.

Table 1. GTmetrix Testing Results

No.	Performance Indicator	Result
1	Grade	B
2	Performance Score	85%
3	Structure Score	93%
4	Fully Loaded Time	1.8 seconds
5	Time to First Byte (TTFB)	459 ms
6	First Contentful Paint (FCP)	761 ms
7	Time to Interactive (TTI)	712 ms
8	Largest Contentful Paint (LCP)	1.1 seconds
9	Cumulative Layout Shift (CLS)	0.24
10	Total Page Size	1.39 MB
11	Total Page Requests	80

Source: (Research Results, 2026)

The GTmetrix evaluation resulted in a Grade B, with a Performance Score of 85% and a Structure Score of 93%. The Fully Loaded Time was 1.8 seconds, while the LCP was 1.1 seconds. The TTFB was 459 ms, FCP was 761 ms, and TTI was 712 ms. The system had a total page size of 1.39 MB with 80 page requests. These measurements provide quantitative evidence of the performance characteristics of the deployed web application.

2. Security Testing

The Acunetix security testing results are presented based on the severity classification of the identified findings.

Table 2. Acunetix Security Testing Results

No.	Severity Level	Number of Findings
1	Critical	0
2	High	0
3	Medium	1
4	Low	5
5	Informational	4
Total		10

Source: (Research Results, 2026)

The Acunetix scan identified 10 findings, consisting of 1 Medium, 5 Low, and 4 Informational findings. No Critical or High severity findings were identified. However, the presence of Medium and Low findings indicates that the system may still require further security improvements. Therefore, the test results should be interpreted as the security findings identified during the conducted scan and not as evidence that the application is completely free from security issues.

3. Black Box Testing

The Black Box Testing results for the nine main functional scenarios are presented in Table 3.

Table 3. Black Box Testing Results

No.	Test Scenario	Expected Result	Result
1	Login	User can log in according to the registered account and role	Successful
2	User Data Management	Admin can add, edit, delete, and view user data	Successful
3	Drug Data Management	Admin can add, edit, delete, and view drug data	Successful
4	Supplier Data Management	Admin can add, edit, delete, and view supplier data	Successful
5	Sales Transaction	System can process sales transactions and update drug stock	Successful
6	Drug Restocking	System can record drug restocking and increase drug stock	Successful
7	Restock Report	System can display and generate restock reports according to the selected period	Successful
8	Sales Report	System can display and generate sales reports according to the selected period	Successful
9	Drug Data Report	System can display and generate drug data reports	Successful

Source: (Research Results, 2026)

All nine tested scenarios produced actual results that corresponded to the expected results. Therefore, the functional testing achieved a success rate of 100% (9 of 9 scenarios). The results demonstrate that the main functions tested in the

application operated according to the defined functional requirements.

Discussion

The implementation results demonstrate that the developed system integrates the main drug sales and inventory management activities of Apotek Batubantar into a single web-based application. The system supports drug data management, supplier management, sales transactions, drug restocking, inventory management, and report generation. In addition, the minimum-stock notification and expiration-date monitoring features provide supporting information for inventory control.

The functional testing results show that all nine tested scenarios were successfully executed, resulting in a 100% success rate. This indicates that the tested functions, including authentication, master data management, sales transactions, restocking, and report generation, produced outputs corresponding to their defined requirements.

The performance testing provides measurable information regarding the deployed application's web performance. The 85% Performance Score, 93% Structure Score, and 1.8-second Fully Loaded Time indicate the measured performance characteristics of the system during testing. These results provide a more objective evaluation than relying solely on the overall Grade B classification.

The security testing results show that no Critical or High severity findings were detected. Nevertheless, one Medium and five Low findings were identified, demonstrating that the system still has security aspects that can be improved. The results therefore provide a basis for future security improvements rather than a conclusion that the application is completely secure.

Overall, the results indicate that the developed system has implemented the identified operational requirements of Apotek Batubantar and provides computerized support for drug sales and inventory management. The combination of functional, performance, and security testing provides measurable evidence for evaluating the implemented system.

CONCLUSION

Based on the results of the design and implementation of the Web-Based Drug Sales and Inventory Information System at Apotek Batubantar, it can be concluded that the developed system supports the management of drug data, sales transactions, and drug inventory in a more systematic and integrated manner compared with

the previously manual processes. The system integrates drug, supplier, sales, restocking, and inventory data, automatically updates drug stock after sales and restocking transactions, and provides notifications for minimum stock levels and drugs approaching their expiration dates.

The system also provides sales reports, restocking reports, and drug data reports to support the monitoring of pharmacy operations. Black Box Testing showed that all nine tested functional scenarios operated according to the expected results, with a success rate of 100%. GTmetrix testing resulted in a Grade B, with a Performance Score of 85% and a Structure Score of 93%. Acunetix testing identified no Critical or High severity findings, although Medium, Low, and Informational findings were still detected. These results indicate that the system met the tested functional requirements and provided measurable performance and security testing results.

This study is limited to the implementation and evaluation of the system at Apotek Batubantar and does not quantitatively compare operational effectiveness before and after system implementation. Future research can focus on evaluating operational efficiency using quantitative indicators, optimizing website performance, improving security based on the identified findings, and developing additional features such as sales analytics, drug demand forecasting, barcode scanner integration, and a mobile-based application.

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