

# Design and Construction of a Pharmacy Sales Information System

## (Case Study: Hero Farma Pharmacy)

Sanggita Erinne Widyastami Suwito  
Faculty of Computer Science  
Duta Bangsa University  
Surakarta, Indonesia  
sanggita82@gmail.com

Agustina Srirahayu  
Faculty of Computer Science  
Duta Bangsa University  
Surakarta, Indonesia  
agustina@udb.ac.id

Nibras Faiq Muhammad  
Faculty of Computer Science  
Duta Bangsa University  
Surakarta, Indonesia  
nibras\_faiqmuhammad@udb.ac.id

**Abstract** — Hero Farma Pharmacy in Boyolali serves more than 40 daily transactions, but still uses manual recording through *Microsoft Excel* which is prone to *human error*, data duplication, and delays in reporting. This study aims to design and build a web-based sales information system to improve the efficiency and accuracy of pharmacy operations. The research method used is waterfall, which includes needs analysis through interviews and observations, system design using UML, implementation with *Laravel 10* and *React.js* integrated through *Inertia.js*, and testing using the *blackbox* testing method. The implementation results show that the system was successfully built with a structured database. *Blackbox testing* on 8 main functions and system performance testing. This web-based information system is proven to be able to replace manual *Excel processes*, minimize recording errors, increase operational efficiency, and support better managerial decisions to support pharmacy performance.

**Keywords**—*information systems, pharmacy, sales, Laravel, React.js, Inertia.js, blackbox testing*

### I. INTRODUCTION

Hero Farma Pharmacy, located in Boyolali, Central Java, serves more than 40 daily sales transactions and collaborates with more than 10 drug distributors. However, the process of recording transactions, managing stock, and generating sales reports is still done manually using *Microsoft Excel* by the admin or pharmacist. The reports are then sent to the pharmacy manager or owner. This manual approach is prone to *human error*, such as data duplication and inaccurate recording [1]. Furthermore, daily reports take up to several hours each day to create, and monthly reports take an additional one to two days. This situation directly impacts operational efficiency and delays the managerial decision-making process [2].

A similar situation was also found in previous research [3], which stated that the use of *Excel* in drug stock management is prone to data inconsistencies and reporting delays. Fatkhurochman and Nusa Persada [4] added that manual systems are unable to support the *real-time transaction needs* of the pharmacy environment.

Several previous studies have shown that implementing a web-based information system can be a solution to these obstacles. Rahmadani and Harris[5] stated that a web-based information system can improve

transaction recording accuracy and facilitate real-time stock monitoring. Research by Sasongko et al. [6] also demonstrated the success of an integrated sales system in managing stock data and financial reports at the Central Farma Tayan Pharmacy. Furthermore, several other studies concluded that digital systems expedite the recording process and improve the quality of customer service [7][8][9].

flexible information systems that support real-time needs, the *Laravel-Inertia* approach is considered effective. *Inertia.js*, when combined with *Laravel*, simplifies communication between server-side and modern front-end frameworks. This integration eliminates the need to create separate APIs, thereby speeding up the development cycle and providing a seamless user experience [10].

This research aims to design and develop a web-based sales information system and financial reports at Hero Farma Pharmacy. This system is expected to improve operational efficiency and data recording accuracy, as well as minimize manual recording errors through *real-time access* [11]. The web platform was chosen because it does not require additional installation and can be accessed through various devices [12][13]. System data is managed using *MySQL*, with the user interface built using *React.js* for interactive displays [14], and *Laravel* as *the backend* with a *Model-View-Controller (MVC)* pattern and *routing features*. [15]. System development follows a systematic waterfall approach and is appropriate for the specified needs [16].

### II. METHODS

This research applies several methods to support success in designing and developing a pharmacy sales information system, as explained in the following section:

#### A. Method of collecting data

Data collection methods are used to obtain data relevant to the research problem. The data collection techniques applied include:

1. Primary data was obtained directly from research subjects through interviews and field observations at Hero Farma Pharmacy. In-depth interviews and observations were conducted with the pharmacy staff to empirically identify problems [17].
2. Secondary data, obtained through literature studies from various supporting sources, such as

scientific journals, articles, and other literature studies related to information systems, pharmacy management, and software development technology.

## B. System Development Methods

This research uses the Waterfall system development method, which was chosen because it has a structured and easily controlled workflow [18]. This method consists of five stages:

### 1. System Requirements Analysis

This stage involves identifying and gathering user requirements through interviews, observations, and literature review. The needs analysis is conducted using *the PIECES (Performance, Information, Economy, Control, Efficiency, Services) approach* to evaluate the weaknesses of the current manual system and detail the requirements of the system to be developed, both functionally and non-functionally. This stage is the result of observing business processes and will be tailored to user requirements [19].

### 2. System Design

At this stage, the system is designed using *the Unified Modeling Language (UML)*. The design includes *use case diagrams* and *activity diagrams* to visualize the system flow of key features such as product management, sales transactions, and reporting.

### 3. Implementation

The system was developed as a web-based application. The *Laravel framework served as the backend*, while *React.js served as the frontend*. Both were integrated using *Inertia.js*, with the database managed using *MySQL*. This approach enabled an interactive, responsive, and structured system.

### 4. Testing

Testing was conducted using the *Black Box Testing method*, which aims to ensure that system functions operate according to specifications without the need to review the program code. The techniques used include *equivalence partitioning*, and *boundary value analysis*, which have proven effective in detecting errors and have been used in various information systems studies [20][13]. In addition, quantitative system performance testing was also conducted to evaluate the results of system implementation on pharmacy operational efficiency.

### 5. Maintenance

The maintenance phase is carried out after the system is implemented, including *bug fixes*, system adjustments based on user feedback, feature updates as needed, and performance

monitoring to ensure the system remains optimal and relevant.

## III. RESULTS AND DISCUSSION

From the results of the research on the Hero Farma Pharmacy sales information system, namely:

### 1. System Requirements Analysis

A system requirements analysis was conducted using *the PIECES (Performance, Information, Economy, Control, Efficiency, Services) approach* to identify weaknesses in the manual system previously used at Hero Farma Pharmacy. Data were collected through interviews with the owner, admin/pharmacists, and warehouse employees, as well as direct observation of the sales process, stock management, and transaction reports.

Table 1. *PIECES Analysis*

Parameter	Old System	New System
<i>Performance</i>	The process of recording transactions and stock is slow because it has to be input manually in <i>Excel</i> and there is often duplication or incorrect data input.	Fast and automatic transaction and stock recording processes.
<i>Information</i>	Stock information and sales reports are often inaccurate or delayed.	Stock information and sales reports are always updated and can be accessed in <i>real-time</i> .
<i>Economy</i>	It takes more time to summarize data, print reports, correct errors.	Save time, paper costs, and reduce the risk of recording errors.
<i>Control</i>	There are no access rights settings, so data is easily changed without activity logs.	There are access rights for users (admin, warehouse, owner) as well as transaction activity control and stock control.
<i>Efficiency</i>	Recording and reporting takes a long time and is prone to <i>human error</i> .	Automatic recording and reporting process, easy to operate system, supports faster audit and monitoring.
<i>Services</i>	Customer service is slow due to long transaction times; receipts are often written manually.	Faster service, more accurate drug data, automatic receipt printing, more satisfied customers.

### 2. System Design

The system design was carried out using the *UML (Unified Modeling Language)* method to visualize functional requirements, activity flows, and system structure. *UML* was chosen because it can visualize actor-system interactions, business processes, and

entity relationships in an organized and easy-to-understand manner [18]. The diagrams used include:

a) Use Case

Use case diagrams are used to describe the relationship between actors (admin/pharmacists, warehouse employees, and owners) with general system functionality, such as managing products, conducting transactions, and accessing reports.

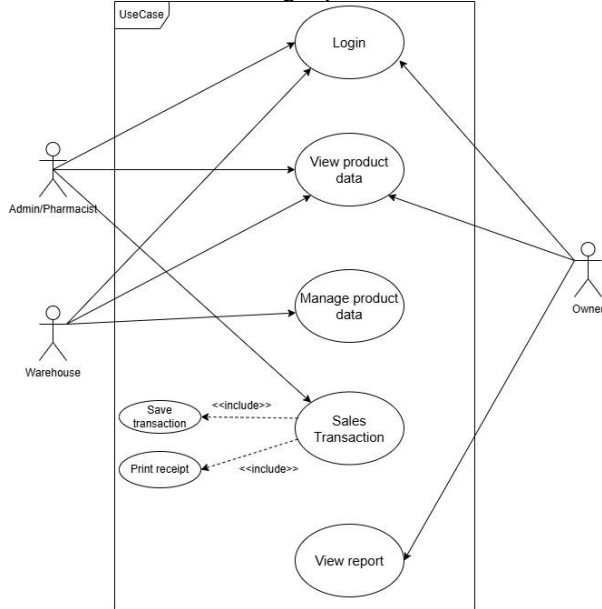


Figure 1 Use Case Diagram

b) Activity Diagram

Activity diagrams are used to visualize the workflow sequence of an activity involving interactions between actors and features within a system. This facilitates understanding of the system's workflow.

1) Activity Diagram View Product Data

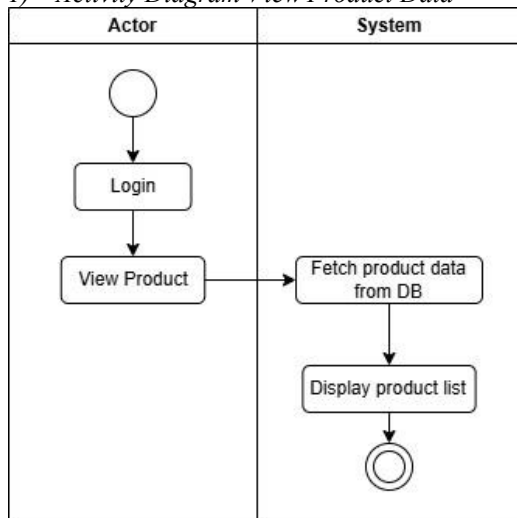


Figure 2 Activity Diagram View Product Data

In the activity diagram, the actor or user first logs into the system. After successfully logging in, the user selects a menu to view product data. The system then retrieves product data from the

database and presents the user with a list of products. The system then displays the complete product list.

2) Activity Diagram Manage Product Data

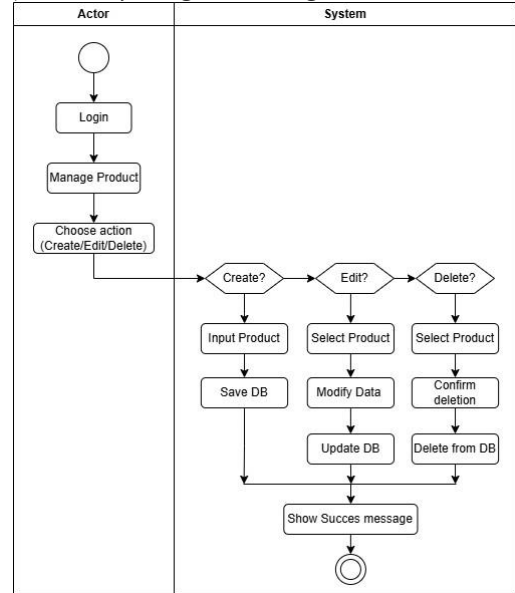


Figure 3 Activity Diagram Manage Product Data

In this process, the user logs in to the system and then selects a menu to manage products. The user can choose the Create, Edit, or Delete action. If the user selects create, the user inputs new product data and the system saves it to the database. If the user selects edit, the user selects a product, changes the data, and then the system updates the database. If the user deletes, the user selects a product and confirms the deletion, and then the system deletes the product from the database.

3) Sales Transaction Activity Diagram

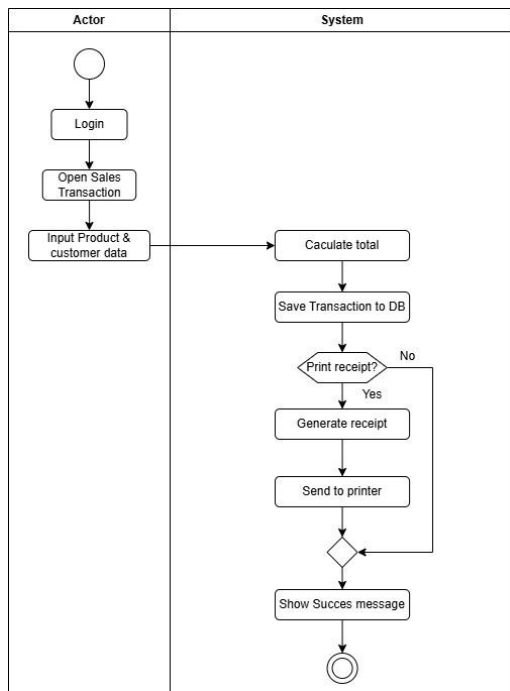


Figure 4 Activity Diagram Sales Transaction

In this *activity diagram* , the user *logs* into the system. After successfully *logging in* , the user selects the transaction/POS menu. The user enters product and customer data. The system then calculates the total transaction, saves the transaction data to the database, and asks if a receipt is desired. If so, the system creates a receipt and sends it to the printer. Finally, the system displays a completion or success message.

4) *Activity Diagram View Report*

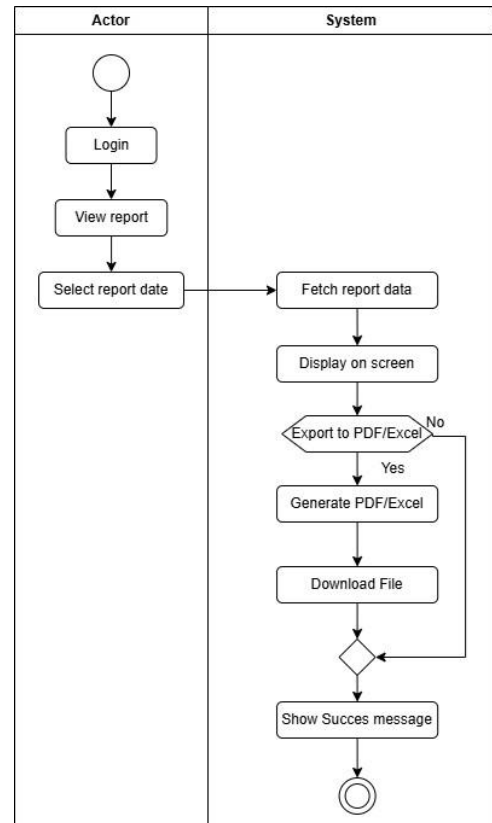


Figure 5 Activity Diagram View Report

For this process, the user *logs in* and then selects the report menu. The user selects the reporting timeframe, whether weekly, monthly, or yearly. The system then retrieves the report data, displays it on the screen, and provides the option to export the report in PDF or *Excel format* . If exported, the system provides a download link. The system then displays a success message.

c) *Class Diagram*

*Class diagrams* are used to represent data structures and relationships between entities in a system in an organized manner. The following is an illustration of a *class diagram* for a pharmacy sales information system.

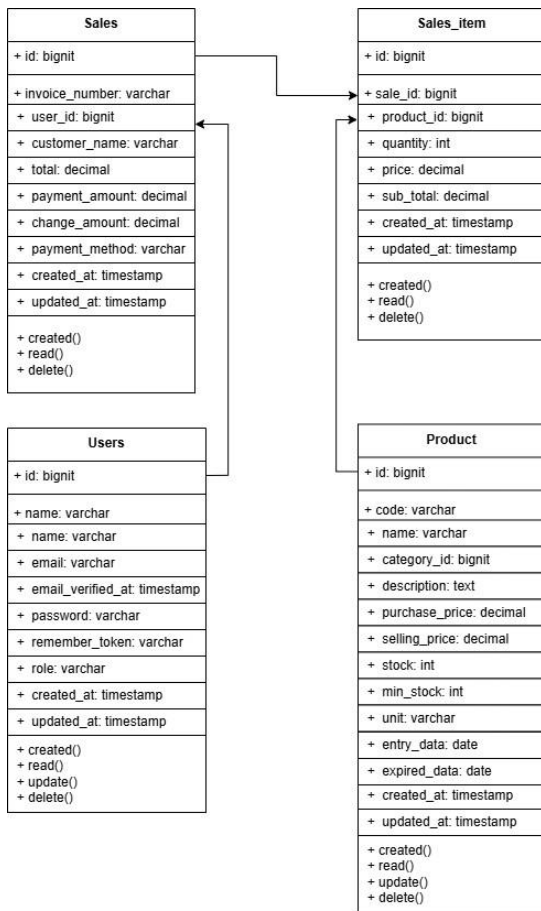


Figure 6 Class Diagram

3. Implementation

a) Login Page



Figure 7 Login Page

Users are required to enter an email and password that corresponds to their respective access rights to be able to enter the system.

b) Dashboard Page

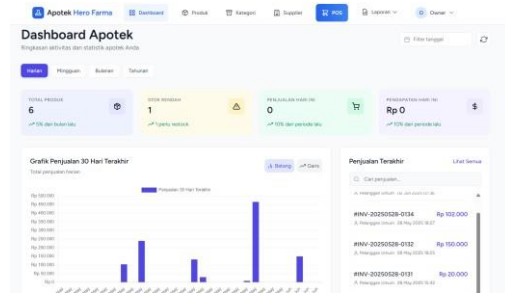


Figure 8 Dashboard Page

Displays a summary of key data such as total products, low inventory, daily sales, and revenue. A 30-day sales graph is available to monitor sales trends, as well as a list of recent transactions. There's also a navigation menu to product, category, supplier, report, and POS pages.

c) Product Page

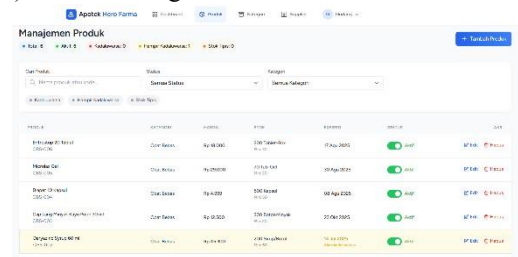


Figure 9 Product Page

The product page displays a complete list of pharmacy products with categories, stock, status, and action options. Search, filter, and add product buttons are available for entering new products.

d) Transaction Page

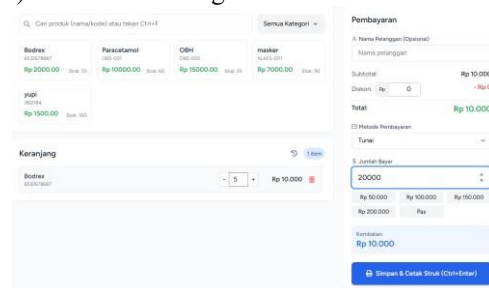


Figure 10 Transaction Page

The transaction/POS page displays a list of products, a shopping cart, payment details, payment method options, and a save button.

e) Sales Report Download



Figure 11 Sales Report Download

The downloaded sales report displays a sales summary, such as total sales, number of transactions, number of items sold, and best-selling products, as well as the average transaction.

During the development process, technical challenges were encountered in the integration between Laravel and Inertia.js, particularly with data synchronization between components. These issues were resolved through adjustments to state management and prop structure documentation. For users, brief training was required, as the transition from a manual system to a web-based system required adaptation.

The scientific contribution of this research lies in the use of modern technology in a pharmaceutical information system. The Laravel-Inertia-React approach, rarely used in pharmacy systems, demonstrated higher efficiency, a more interactive interface, and supported more real-time business processes. The system performance evaluation also provided quantitative evidence of performance improvements, which can serve as a benchmark for the development of similar systems in the healthcare sector.

4. Testing

a. Blackbox Testing

Blackbox testing method in this study uses equivalence partitioning and boundary value analysis techniques to verify the functions of the Hero Farma Pharmacy sales information system.

Table 2 Login Page Testing

Test Case	Input	Expected Output	Status
Login with valid data	Username & Password according to	Login successful, redirect to dashboard	Success
Login with empty username	Username is empty & password is correct	Displays the error message "Username is required."	Success
Login with blank password	Username is correct & password is empty	Displays error message "Password is required"	Success
Login with incorrect data	Incorrect Username & Password	Displays error message "Login failed"	Success

Table 1 Product Data Entry Page

Test Case	Input	Expected Output	Status
Add product with valid data	Fill in all fields correctly	Product added successfully	Success
Add products by filling in inappropriate data	The data entered does not match the column	Displays error message	Success
Add products with empty columns	Columns are not all filled in	Displays error message "all fields are required"	Success

Table 2 Read Product Page

Test Case	Input	Expected Output	Status
Show product list	-	Showing all products	Success
Search for products with valid keywords	Keywords are filled in according to the data	Displaying the searched product	Success
Search for products with keywords that don't exist	The keyword entered is incorrect	Displays the message "Product not found"	Success

Table 3 Product Page Updates

Test Case	Input	Expected Output	Status
Update products with valid data	Fill in all fields correctly	Product data has been updated successfully	Success
Update product by filling in incorrect data	The data entered does not match the column	Displays error message	Success
Update products with empty columns	Columns are not all filled in	Displays error message "all fields are required"	Success

Table 4 Delete Product

Test Case	Input	Expected Output	Status
Delete Product	-	Product successfully deleted	Success

Table 5 Transaction Page

Test Case	Input	Expected Output	Status
Normal Sales Transaction	All transaction data is fulfilled	Transaction successful, stock reduced and receipt printed	Success
Transactions with quantity exceeding stock	Data filled in exceeds stock	Displays the error message "insufficient stock"	Success
Transactions without selecting a product	Empty transaction	Displays error message "selected product does not exist"	Success

Table 6 Report page

Test Case	Input	Expected Output	Status
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Reports can only be opened by the owner/manager	-	The report page does not appear if it is not owner/leader access.	Success
Download PDF and Excel reports	-	PDF and Excel files downloaded successfully	Success

Table 7 Dashboard Page

Test Case	Input	Expected Output	Status
Dashboard view	-	Displays sales graph, total products and sales	Success
Monthly sales chart	-	Displays sales chart per month	Success

#### b. System Performance Testing

System performance testing was conducted to evaluate the effectiveness of the sales information system on pharmacy operational efficiency and accuracy. This testing was conducted using a quantitative approach, comparing conditions before and after the implementation of the web-based system.

Table 9 System Performance Testing

Parameter	Before the System (Excel)	After System (Web-based)	Change (%)
Average transaction time per customer	± 5 minutes	± 2 minutes	Faster ± 70%
Daily report creation duration	± 2 hours	± 15 minutes	Faster ± 80%
Duration of monthly report creation	± 5 hours	± 30 minutes	Faster ± 80%
Recording error rate	± 10 – 15% per month	± 1%	Accuracy increased ± 90%
Maximum number of transaction services per hour	10 – 12 transactions	20 – 30 transactions	Up ± 90%
Percentage of pending reports	± 20	0%	Down 100%

Test results showed that the web-based information system significantly improved operational efficiency, reduced service times, and increased the accuracy of financial and inventory reports. This demonstrated that the system not only met specifications through black-box testing but also delivered significantly better performance.

#### 5. Maintenance

Maintenance of the Hero Farma Pharmacy sales information system needs to be carried out to ensure the system continues to run optimally and meets user needs in the long term, such as:

- Regularly check the server and network connection.
- Fix existing bugs or errors.

Regular hardware checks to keep the system running optimally.

#### IV. CONCLUSION

Based on the research results, the sales information system developed for Hero Farma Pharmacy is able to replace the previous manual system that was slow and prone to errors with a web-based system that is automated, fast, and controlled. The application of the PIECES analysis method and system design using Unified Modeling Language (UML) showed significant improvements in operational time efficiency, transaction speed, stock data accuracy, and strengthened security through user access rights management. The implementation of features such as dashboards, product management, Point of Sale (POS) transactions, and real-time reporting has been proven to support pharmacy business processes more effectively. The results of blackbox testing ensured that all functions run as needed, while system performance testing showed a significant increase in operational efficiency and accuracy. Therefore, routine system maintenance is still necessary to ensure the system remains optimal and relevant to the development of pharmacy needs in the future.

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