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# Design and Development of a Drug Purchasing Information System at Harrison Pharmacy Bogor

Ratih Wahyuningrum[1], Dimas Arya Yudistira[2]

*Department of Information Systems, Faculty of Computer Science, Institut Bisnis Nusantara*
*Jl. Pulomas Timur 3A Blok A No. 2 Pulo Gadung, East Jakarta, INDONESIA*
[1]ratihfath33@gmail.com, [2]arya.dimas8400@gmail.com

**Abstract— Harrison Pharmacy Bogor still relies on manual processes to manage drug purchases from distributors, using notebooks and simple documents. This condition causes problems such as slow data retrieval, a high risk of recording errors, and difficulty in preparing purchase reports quickly and accurately. This study aims to design and develop a web-based drug purchasing information system using the Waterfall development method. The system is built with the PHP programming language on the Laravel framework, MySQL as the database, and XAMPP as the local server. The developed system covers the management of distributor data, drug data, ordering, payment, order confirmation, invoice creation, and purchase reports. Black Box Testing results show that all system functions work as expected. The system is expected to improve the efficiency, accuracy, and transparency of the drug purchasing process at Harrison Pharmacy Bogor.**

Keywords— Information System, Drug Purchasing, Pharmacy, Laravel, MySQL, Waterfall

**Intisari— Apotek Harrison Bogor masih mengandalkan proses manual dalam pengelolaan pembelian obat dari distributor, menggunakan buku catatan dan dokumen sederhana. Kondisi ini menimbulkan permasalahan seperti lambatnya pencarian data, tingginya risiko kesalahan pencatatan, serta sulitnya penyusunan laporan pembelian secara cepat dan akurat. Penelitian ini bertujuan merancang dan membangun sistem informasi pembelian obat berbasis web menggunakan metode pengembangan Waterfall. Sistem dibangun dengan bahasa pemrograman PHP berbasis framework Laravel, MySQL sebagai basis data, dan XAMPP sebagai server lokal. Sistem yang dikembangkan mencakup pengelolaan data distributor, data obat, pemesanan, pembayaran, konfirmasi pesanan, pembuatan faktur, dan laporan pembelian. Hasil pengujian Blackbox Testing menunjukkan seluruh fungsi sistem berjalan sesuai yang diharapkan. Sistem ini diharapkan dapat meningkatkan efisiensi, akurasi, dan transparansi proses pembelian obat di Apotek Harrison Bogor.**

Kata kunci— Sistem Informasi, Pembelian Obat, Apotek, Laravel, MySQL, Waterfall

## I. INTRODUCTION

Advances in information technology have brought significant transformation to various sectors, including the healthcare sector. One important aspect of pharmacy operations is the process of purchasing drugs from distributors, which must be managed accurately, efficiently, and accountably to ensure the availability of medicines for the public.

Harrison Pharmacy in Bogor currently relies on manual record-keeping—using logbooks and basic applications like Microsoft Access—to manage the procurement of medicines from distributors. This method has become increasingly suboptimal as transaction volumes have grown to reach hundreds of millions of rupiah, leading to several challenges, including slow data retrieval, a high risk of recording errors, and difficulty in generating accurate and timely procurement reports.

Based on these problems, a web-based information system is needed that can manage the drug purchasing process in a computerized and integrated manner. The system designed in this study is built using the PHP programming language with the Laravel framework, and MySQL as the database management system, supported by XAMPP as the local server. The Laravel framework was chosen for its ability to support the development of modular, structured, and secure applications.

## II. BACKGROUND

### *Information Systems*

According to Wahyudi and Ridho, an information system is a set of interrelated components that work together to achieve an intended goal [1]. An integrated information system can help pharmacies improve the efficiency, productivity, and accuracy of data on drug purchase transactions from distributors.

### *Purchasing*

According to Assauri, purchasing is an important function in the successful operation of a company. This function is responsible for obtaining materials of the required quantity and quality, available when needed, at prices consistent with prevailing prices [2]. In the context of a pharmacy, drug purchasing from distributors must be managed well so that stock is always maintained.

### *Website*

According to Elgamar, a website is a medium consisting of many interconnected pages (hyperlinks), whose function is to provide information in the form of text, images, video, sound, and animation, or a combination of all of them [3].

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*Laravel Framework*

Laravel is a PHP framework based on the MVC (Model-View-Controller) architecture that facilitates the structured and efficient development of web applications. Laravel provides various built-in features such as Eloquent ORM for database management, an authentication system, and routing management, which ease the development of web-based information systems [4].

*System Development Model (Waterfall)*

The development method used in this study is the Waterfall model by Roger S. Pressman. Waterfall is defined as a sequential and systematic software development model. Its process follows a flow from requirements analysis and definition, system and software design, implementation and unit testing, to integration and system testing [5]. This model was chosen because each stage has clear and structured outputs.

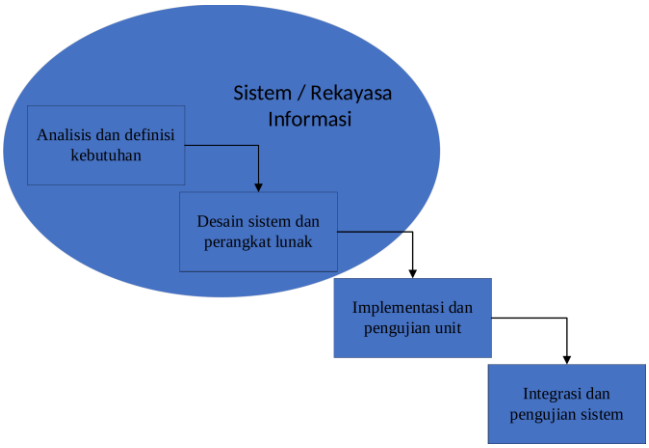



Figure 1 System Development Model (Waterfall)

*Requirements analysis and definition*

The system's services, constraints, and goals are established through consultation with users, and are then defined in detail to serve as the system specification.

*System and software design*

The system design stage allocates system requirements to both hardware and software by establishing the overall system architecture. Software design involves identifying and describing the fundamental software system abstractions and their relationships.

*Implementation and unit testing*

At this stage, the software design is realized as a set of programs or program units. Testing involves verifying that each unit meets its specification.

*Integration and system testing*

The individual program units or programs are integrated and tested as a complete system to ensure that the software requirements are met. After testing, the software can be delivered to the customer.

The system development stages using the Waterfall method in this research are as follows:

Requirement Analysis and Definition: This stage is conducted to identify and understand the requirements for a medication procurement information system at Apotek Horrison Bogor. Analysis is carried out through observation, interviews, and literature review to gather information regarding the existing medication procurement process. Requirement analysis encompasses functional requirements, non-functional requirements, software and hardware requirements, as well as an analysis of the current medication procurement process at Apotek Horrison Bogor. The results of this stage serve as the foundation for designing the medication procurement information system.

System and Software Design: This stage involves designing the system based on the previously conducted requirement analysis. The design process aims to ensure that the system being built is easier to understand and develop. This stage includes:

Designing with Unified Modeling Language (UML), covering Flowcharts, Use Case Diagrams, Activity Diagrams, Sequence Diagrams, Class Diagrams, and the database.

Designing the user interface.

Designing the database using MySQL, with XAMPP serving as the local server. d. The resulting design serves as a reference for the system implementation process.

Implementation and Unit Testing: This stage involves translating the system design into an actual application. The medication procurement information system is developed in accordance with the established design. Programming is performed using the PHP language with the Laravel framework, alongside HTML, CSS, and JavaScript for the user interface. The system utilizes a MySQL database and the XAMPP web server. Unit testing is conducted to ensure that each function or module within the system operates according to its specified design.

Integration and System Testing: This stage involves combining all program units into a complete, integrated system. Following integration, the system undergoes testing to ensure that its functions align with user requirements. The testing method employed is Black Box Testing, an approach that focuses on system functionality without regard to the internal code structure. Testing is conducted on each system feature, such as the management of medication data, suppliers, purchase transactions, and reports.

*UML (Unified Modeling Language)*

UML is a highly reliable tool in the development of object-oriented systems. UML provides a visual modeling language that enables developers to create system blueprints in a standard form that is easy to understand [6]. The diagrams used include the Use Case Diagram, Activity Diagram, Sequence Diagram, and Class Diagram. The following are several diagrams in UML:

*Use Case Diagram*

According to Ahmad, a Use Case Diagram is a sequence of interrelated interactions between a system and its actors. A use case is carried out by describing the type of interaction between a program's user and the system itself, and is used to shape the behavior of the system to be built [6].

*Activity Diagram*

According to Elly Rahayu et al., an Activity Diagram is a diagram that can model processes vertically and is an extension of the use case that includes an activity flow [6].

*Class Diagram*

According to Muhammad Yusril Helmi Setyawan and Dinda Ayu Pratiwi, a Class Diagram is a diagram that depicts the structure and description of classes, packages, and objects, as well as their relationships to one another. Class diagrams are used to model the static structure of a system [6].

*Black Box Testing*

Black Box Testing is testing that focuses on the functional specifications of the software. The tester defines a set of input conditions and tests the program's functional specifications to ensure that the system works as expected [7].

*Related Studies*

TABLE I
RELATED STUDIES

| No | Title | Results | Differences |
|---|---|---|---|
| 1 | Design of a Web-Based Sales Information System at Mitra Sehat Pharmacy [8] | The information system successfully reduced manual recording errors and produced purchase and sales reports. | Focuses on sales; this study focuses specifically on purchasing from distributors, with invoice and order confirmation features, using Laravel. |
| 2 | Website-Based Information System on Drug Purchases and Sales at Pharmacy [9] | The web-based system improved the accuracy of computerized processing of purchase, sales, and stock data. | Covers purchasing and sales; this study covers only purchasing from distributors, with a structured invoice feature, using Laravel. |
| 3 | Design of a Web-Based Pharmacy Information System: Optimizing Customer Service [10] | Implementation of a web-based information system improved operational efficiency, reduced stock shortages, and improved customer service. | Emphasizes customer service in general; this study focuses on the complete purchasing flow from distributors, from ordering through to invoices and reports. |
| 4 | Design and Development of a Web-Based Point of Sale System and Application for Pharmacies [11] | The web-based POS system improved the efficiency of the sales process, reduced human error, and facilitated stock management. | Oriented toward sales transactions; this study builds a system dedicated to purchasing from distributors, with order confirmation and invoice management features. |
| 5 | Design and Development of a Web-Based Pharmacy Management Information System: Aya Farma Pharmacy [12] | The pharmacy management information system processes purchase transactions, sales, and stock reports in a computerized manner. | Covers comprehensive pharmacy management; this study goes deeper into the distributor purchasing module, using Laravel. |

## III. RESEARCH METHODOLOGY

*Research Methodology*

The research employs field research, namely direct observation to examine the existing system, interviews to gather information on the requirements of the system to be built, and the obstacles that frequently occur in managing drug purchases at Harrison Pharmacy Bogor.

The research approach employed is a descriptive approach using qualitative methods. This approach is utilized to understand the phenomena occurring within the pharmaceutical procurement system, identify the challenges encountered, and determine the needs and opportunities for system improvement.

*Data Collection Methods*

*Observation*

In the observation stage, the object under study is observed directly to obtain the necessary data without asking questions of the subjects. The observation data obtained include observations of the flow of the drug purchasing system currently running at Harrison Pharmacy Bogor.

*Interviews*

In-depth interviews were conducted with the management and staff of Harrison Pharmacy Bogor. The aim was to collect comprehensive information about system requirements, desired features, and users' expectations of the system to be built.

*Literature Study*

A literature study was conducted to collect data by relying on theories that support the design of this system, drawn from journals, papers, books, and scholarly works related to information systems, purchasing, pharmacies, and web technology.

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## IV. RESULTS AND DISCUSSION

*Requirements Analysis and Definition*

*Use Case Diagram*

The use case diagram of the Drug Purchasing System at Harrison Pharmacy is shown in the figure below:

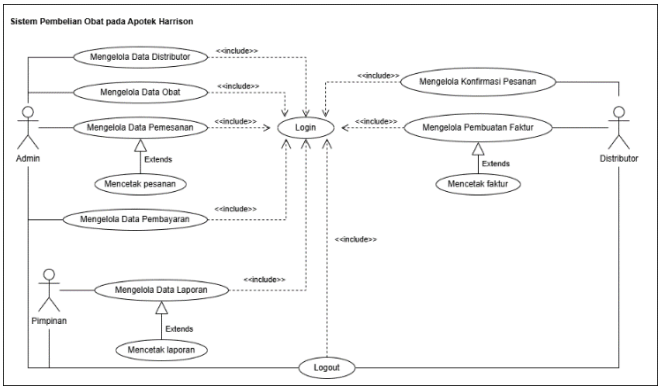



Figure 2 Use Case Diagram

*Activity Diagram*

The activity diagrams of the Drug Purchasing System at Harrison Pharmacy are shown in the figures below:

*Activity Diagram: Add Order Data*

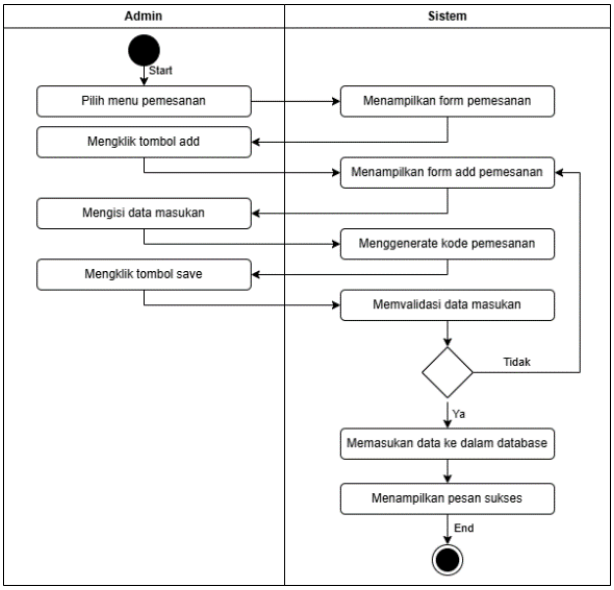



Figure 3 Activity Diagram: Add Order Data

*Activity Diagram: Order Confirmation*

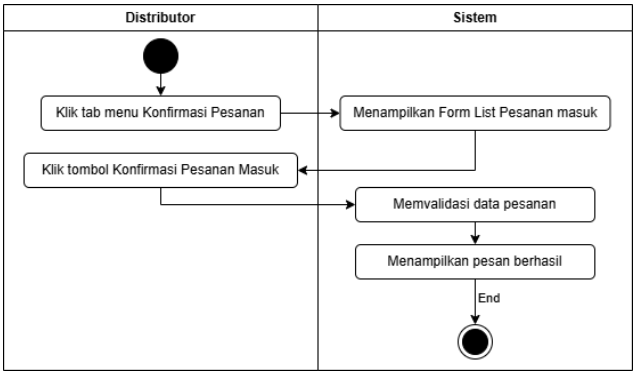



Figure 4 Activity Diagram: Order Confirmation

*Activity Diagram: Add Invoice*

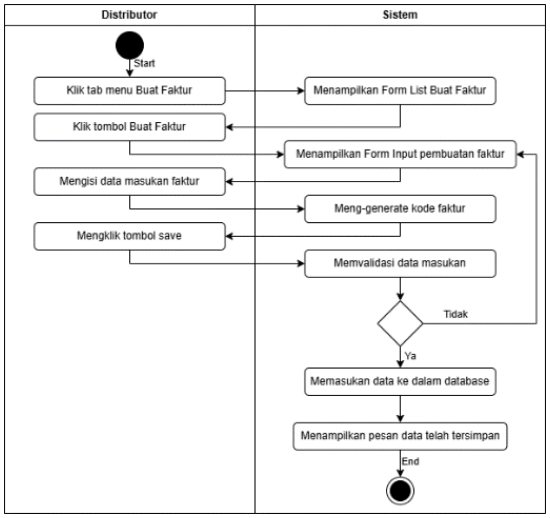



Figure 5 Activity Diagram: Add Invoice

*Activity Diagram: Add Payment Data*

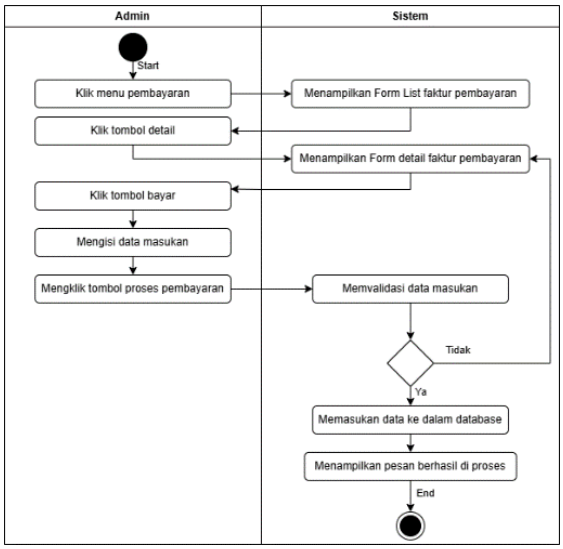



Figure 6 Activity Diagram: Add Payment Data

*Class Diagram*

The class diagram of the Drug Purchasing System at Harrison Pharmacy is shown in the figure below:

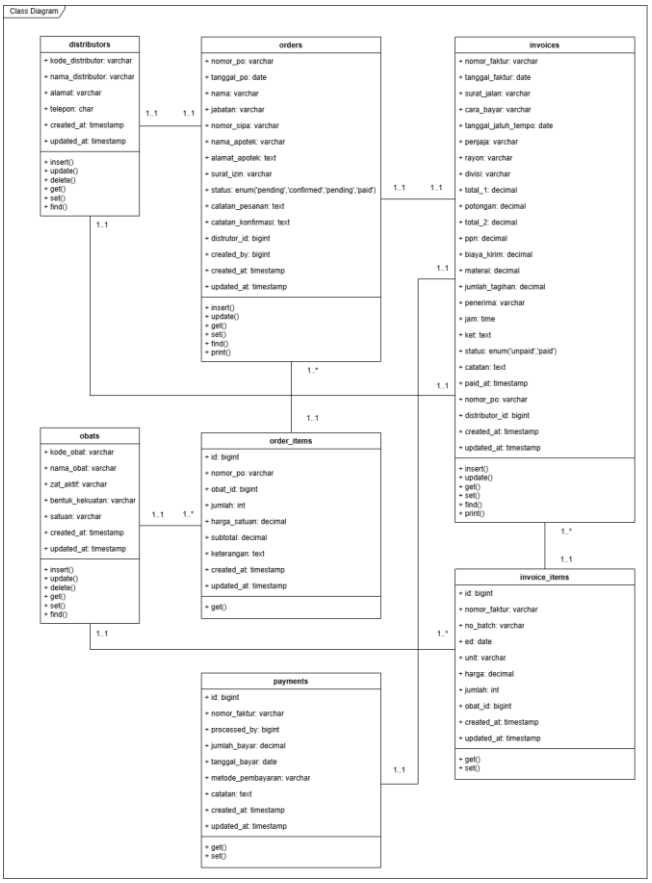



Figure 7 Class Diagram

The class diagram illustrates the system for procuring or ordering medications from distributors, extending through to the invoice payment process.

The `orders` table serves as the hub for ordering transactions, the `invoices` table acts as the center for billing transactions, and the `payments` table functions as the record for payment entries.

The following is a summary of the relationships based on the function of each table:

TABLE II

RELATION TABLE

| No. | Hubungan tabel | Relasi | Fungsi |
|---|---|---|---|
| 1 | distributors – orders | 1:N* | Distributor receives orders |
| 2 | orders – order_items | 1:N | Stores order details |
| 3 | obats – order_items | 1:N | Identifies the medications ordered |
| 4 | orders – invoices | 1:1 | Links a purchase order (PO) to an invoice |
| 5 | invoices– invoice_items | 1:N | Stores invoice details |
| 6 | obats – invoice_items | 1:N | Identifies the medications included in an invoice |
| 7 | invoices – payments | 1:1* | Records invoice payments |

*System and Software Design*

*Mockup Design*

Mockup design is a depiction of the system interface before implementation. The following are several mockup designs of the drug purchasing information system at Harrison Pharmacy Bogor:

*Add Order Data Form Design*




Figure 8 Add Order Data Form Design

*Order Confirmation Form Design*




Figure 9 Order Confirmation Form Design

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*Add Invoice Form Design*

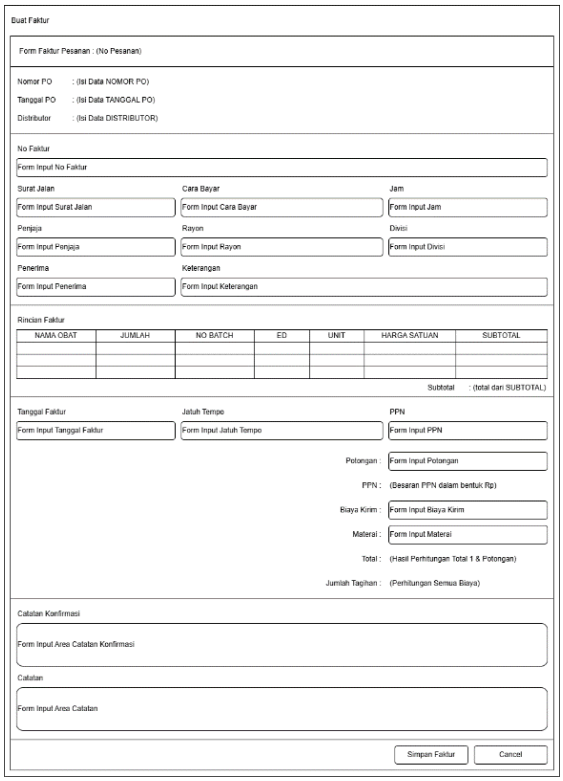



Figure 10 Add Invoice Form Design

*Add Payment Data Form Design*

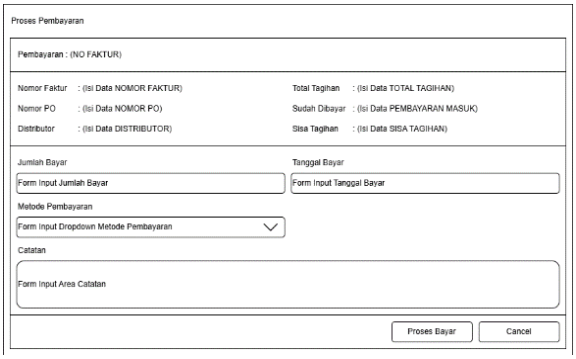



Figure 11 Add Payment Data Form Design

## *Implementation and Unit Testing*

### *System Interface*

Implementation and unit testing is the stage in which the design results are translated into an application using PHP, Laravel, MySQL, and XAMPP. The following are screenshots of the drug purchasing information system at Harrison Pharmacy Bogor:

*Add Order Data Form Interface*

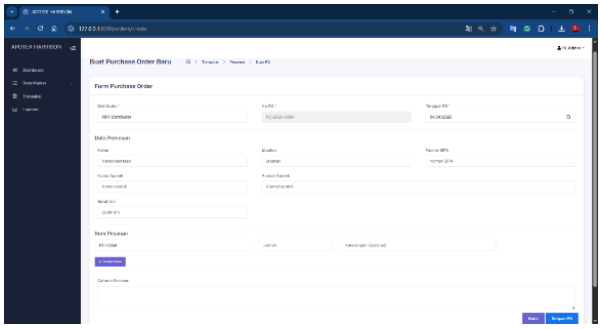


Figure 12 Add Order Data Form Interface

*Order Confirmation Form Interface*

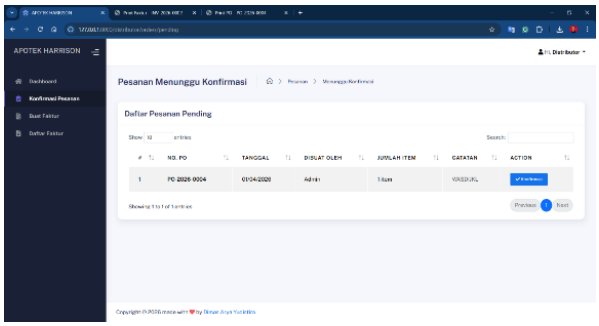


Figure 13 Order Confirmation Form Interface

*Add Invoice Form Interface*

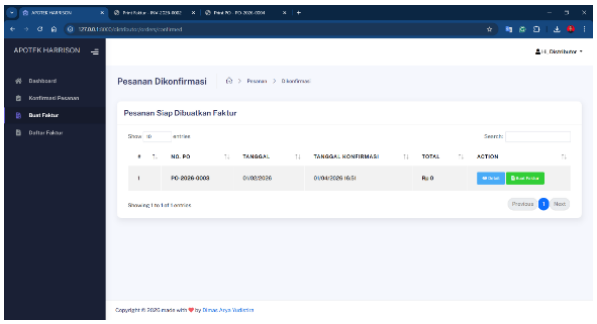


Figure 14 Add Invoice Form Interface

*Add Payment Data Form Interface*

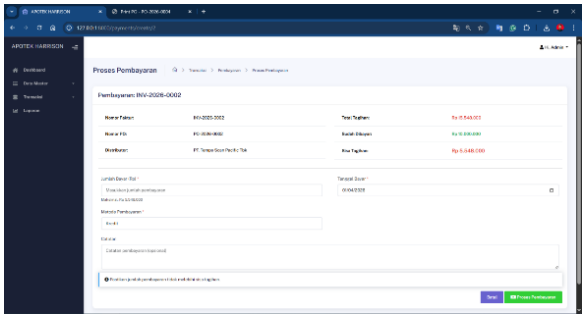


Figure 15 Add Payment Data Form Interface

*Integration and System Testing*

*Black Box Testing*

Testing was carried out using the Black Box Testing method, which focuses on system functionality without examining the program's code structure. The test results are as follows:

TABLE III

BLACK BOX TESTING

| No | Test Function | Expected Result | Conclusion |
|---|---|---|---|
| 1 | Login | Enters the dashboard according to role (Admin / Distributor / Manager) | As expected |
| 2 | Manage Distributor Data | Add, edit, delete, and search distributor data | As expected |
| 3 | Manage Drug Data | Add, edit, delete, and search drug data | As expected |
| 4 | Manage Order Data | Create, edit, view details of, and print purchase orders (POs) | As expected |
| 5 | Manage Payment Data | Process payment of distributor invoices | As expected |
| 6 | Manage Order Confirmation | The distributor confirms incoming orders | As expected |
| 7 | Manage Invoice Creation | The distributor creates invoices and generates PDFs | As expected |
| 8 | Manage Report Data | Display, filter, and print reports | As expected |
| 9 | Logout | The user ends the system session | As expected |

*Conclusion of Black Box Testing Results*

Based on the Black Box Testing results for all system functions, it can be concluded that the system works as expected. No significant issues were found in the system.

## V. CONCLUSION

Based on the results of the research and discussion, the following conclusions can be drawn:

The web-based drug purchasing information system at Harrison Pharmacy Bogor was successfully designed and built using the Waterfall development method, which comprises four stages: requirements analysis and definition, system and software design, implementation and unit testing, and integration and system testing. The system was built using PHP with the Laravel framework and MySQL as the database.

The system includes modules for managing distributor data, pharmaceutical product data, orders, payments, order confirmation, invoice generation, and purchase reports. Implementing this system helps address existing challenges by minimizing manual recording errors, accelerating data processing and retrieval, and facilitating access to sales reports.

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