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Design and Implementation of Point-of-Sales Systems for Goodfather Vapor

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Abstract

Goodfather Vapor has experienced a significant increase in the number of customers, necessitating a more efficient system for transaction management. The aim of this study is to design and implement a web-based Point of Sale (POS) system to replace the current manual method. The software development method applied is the waterfall model, which includes the stages of requirement analysis, design, implementation, and testing. During the analysis phase, various challenges in manual transaction management were identified, such as the risk of recording errors and data loss. The implementation results show that the POS system can speed up the transaction process and improve data accuracy. After testing, the system successfully reduced transaction time and decreased recording errors. Thus, the implementation of this web-based POS system is expected to enhance operational efficiency and provide a better shopping experience for customers, while maintaining service quality amid the surge in customer numbers.

Keyword: Cashier Information System, Point of Sales, Waterfall method, Web-based.

INTRODUCTION

The development of technology is very fast, especially in this digital era, where at the same time technology plays an important role in various social and business aspects. The use of technology in business is often used to help make it easier to complete business processes. For example, the use of computers by small companies and large companies to help with the transaction process, create reports, manage data, and distribute information efficiently. As the business grew rapidly, cashier system technology became very important for Goodfather Vapor. Technology can help speed up the transaction process, reduce errors in record-keeping, and provide accurate reports. With a technology-based cashier system, Goodfather Vapor can manage transaction data more efficiently, improve customer satisfaction, and maintain service quality. The implementation of cashier system technology also allows real-time stock monitoring, so business owners can make faster and more accurate decisions (Arinal et al., 2022). Given the company's history of growing rapidly since its inception, the adoption of this technology is a strategic step to support store operations and maintain business growth. Human-computer interaction is a field of science that studies how to design, evaluate, and implement interactive computer systems so that they can be used easily by humans (Amsaras & Dewi, 2022).

This POS application was built based on a needs analysis from Goodfather Vapor, which is located on Jl. Raya Klakahrejo, Surabaya. This application is made based on a website using the Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), and Hypertext Pre-Processor (PHP) 7.4.19 programming languages (Syafrizal, 2021). The framework used to develop this application is Laravel, and the database used is MySQL 5.7.33. one of the programming languages that is open, apart from being open, PHP also functions as a data manager in a server (Naofal et al., 2022). Laravel

is an open source PHP Framework with a Model-View-Controller (MVC) design that is used to build website applications (Naofal et al., 2022).

The results of the design and implementation of this application can help make it easier for Goodfather Vapor to overcome previous business process problems, so that the process of recording and storing data can be well integrated. With this application, Goodfather Vapor can manage sales transactions faster, more accurately, and more efficiently. In addition, the app allows real-time monitoring of stock of goods and generates accurate reports, allowing business owners to make more informed and quick decisions. The implementation of this technology also helps Goodfather Vapor to keep pace with business competition in today's era of technological advancement, where speed, accuracy, and efficiency are the main demands (Hasibuan, 2023).

Without an update to the sales system on Goodfather Vapor, accurate stock data collection will not be guaranteed, and the use of transaction types will not be properly resolved, resulting in stock data that does not match the actual conditions. As the business grew and the number of customers continued to increase, Goodfather Vapor needed a website-based application that could be used to manage the sales system at each Goodfather Vapor branch. The Point of Sales (POS) application itself is software designed to record sales transactions (Arina Nur Syahputri & Dimas Aryo Anggoro, 2020). PoS is a modern version of conventional cash registers, which can be integrated with several supporting tools to support the transaction process (Susila, 2023).

METHODS

This research involves two stages of data collection. First, the researcher interviewed the store owner and asked a few questions about the data needs and business procedures. The next step is to develop a software system using the SDLC (System Development Life Cycle) method, which is implemented with the Waterfall Method. The Waterfall method is a linear and sequential approach to software development, where progress flows in one direction through phases like requirements, design, implementation, testing, and maintenance. This model is beneficial for projects with well-defined requirements but can be rigid in handling changes once development has started. The Waterfall method remains relevant in scenarios where documentation and process structure are prioritized (Saravanos & Curinga, 2023).

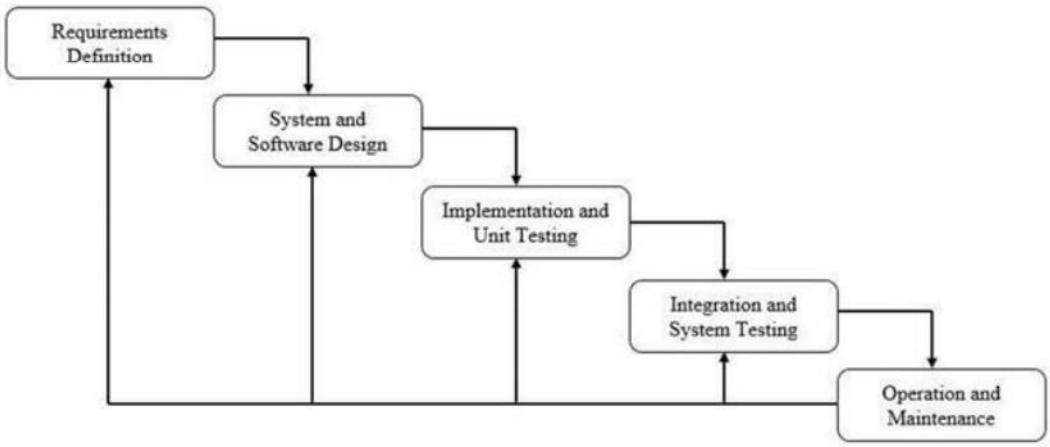

Figure 1. Waterfall Method

Requirements Definition

At this stage, the researcher examines all the development requirements and then conducts an analysis to determine the detailed requirements that the software to be created must meet (Hasbi & Istabul, 2023). The focus of this analysis is to find the needs of the user. The results of the analysis show that Goodfather Vapor needs a cashier information system to assist in the transaction process and product management. This request was based on several problems faced by Goodfather Vapor, including the recording of transactions that still used notes, which resulted in losses, the busyness

of store owners who could not come to the store often to check the stock of goods, and the constant inaccurate sales reports.

System and Software Design

After the requirements definition stage, the next stage is system design using several design methods such as context diagrams, ERD, CDM, PDM. the design process aims to make it easier for the author to develop the cashier system needed by goodfather vapor. The following is a context diagram design based on user needs.

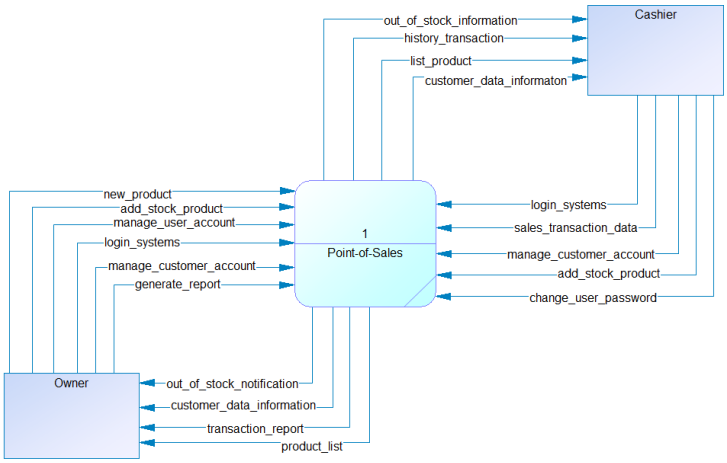

Figure 2. Context Diagram

In Figure 2. the sales information system that will be created has 2 types of users, namely the owner, and cashier. Cashiers have an important role in using the system and recording transactions. cashiers and owners generally have the same access, but the difference is that the owner can generate transaction reports and view transaction reports while the cashier cannot. The next design is the Conceptual Data Model (CDM). CDM functions to ensure that the system to be built meets the right data and information needs (Carvalho et al., 2022). The following are the results of the CDM design can be seen in the picture below.

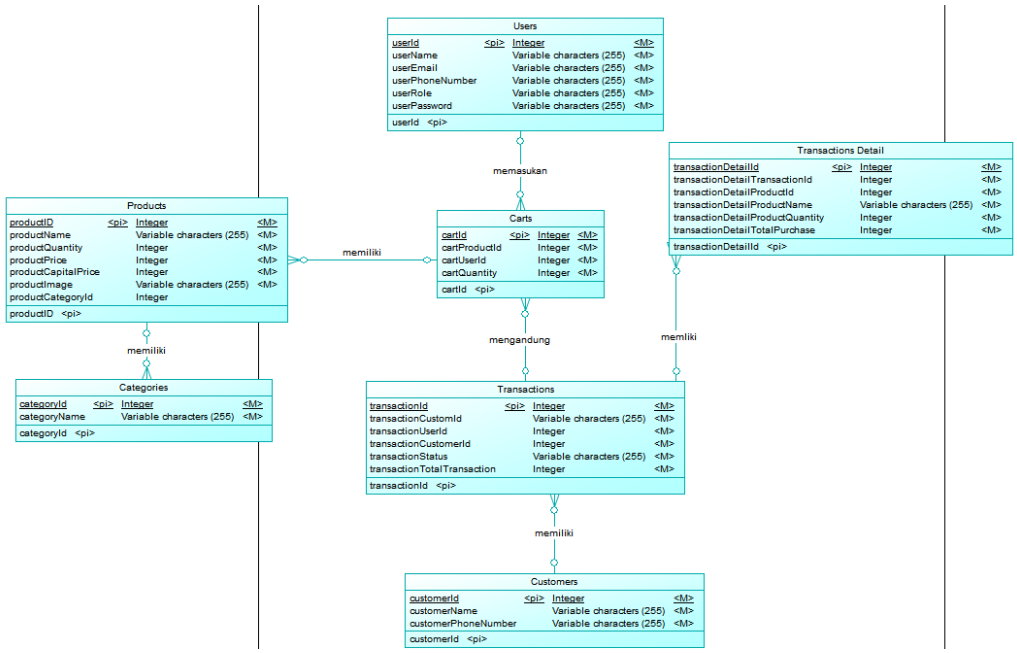

Figure 3. Conceptual Data Model

From the results of the conceptual data model, there are seven entities that are interconnected with their respective relationships. In the figure 3, it can be seen that the process starts from when the user adds data which will later continue to connect until the transaction is successfully made. First, the user will store the product data to be purchased in the cart table, after that the transaction table will store data from product data, user data, and detailed transaction data. From the image above, the relationship of each table is also described. In each of these tables, the type of data used to accommodate the data in the table is also allocated, as well as the length of the data in each column.

Implementation and Unit Testing

The implementation stage involves implementing the planned system design into the working software code. This process includes user interface development, integration with databases, as well as programming the business logic that underlies Point-of-Sales (POS) operations. Once the implementation is complete, the unit testing phase is carried out to ensure each individual component or unit of the system is functioning according to its specifications. The test method used is Blackbox testing. Unit testing aims to detect and correct errors in the early stages of development, thereby improving the quality and reliability of the system (Praniffa et al., 2023). In the context of this research, unit testing will verify that critical features such as inventory management, transaction processing, and financial reporting are running as expected before the system is fully integrated and further tested in real-world scenarios.

Table 1. Test Scenario Table Black Box

Fitur	Test scenarios	Expected results	Testing results
In this column there are several features that will be tested	In this column, it will be described how the scenario of the testing process will be carried out	In the following column, the expectations of the test results carried out will be explained	In the following column, the actual test results will be revealed

Operation and Maintanace

The operation and maintenance stages are critical phases after the "Goodfather Vapor" Point-of-Sales (POS) system is implemented and tested. The operation phase includes the use of the system in a real business environment, where the system is started to be used by the end user to support day-to-day transactions, inventory management, as well as financial reporting. During this phase, the performance of the system is monitored to ensure that all functions are running properly and in accordance with business needs.

The maintenance stage involves ongoing activities to keep the system functioning optimally and relevant to business development. This includes software updates, handling bugs that may arise, as well as system improvements based on user feedback or changes in business needs. Maintenance also includes additional training for users and technical support, ensuring that the system can continue to provide maximum value to Goodfather Vapor's business operations.

RESULTS AND DISCUSSION

Based on the results of the previous analysis and the system design developed, this stage will outline the results of the Point-of-Sales system design for Goodfather Vapor. The results refer to the system interface as well as the outcomes of testing using black box testing.

System Interface Implementation
Login

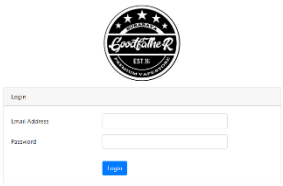

Figure 4. Login

The image above shows the initial display of the system when it is first opened. When a user logs in with owner access rights, the interface for the owner will appear, containing the entirety of the modules, while the cashier will receive a display without the overall dashboard of the system.

Dashboard

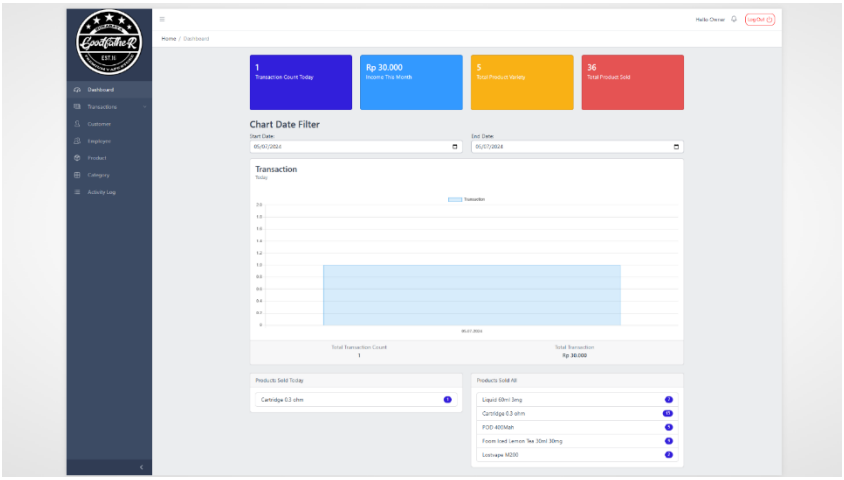

Figure 5. Dashboard

The image above shows the main page display when successfully logged into the system. In the example image, the login is done with owner access rights, allowing the display of all available modules. Of course, the modules shown in the image still have sub-modules that contain the features present in the system.

Transaction page

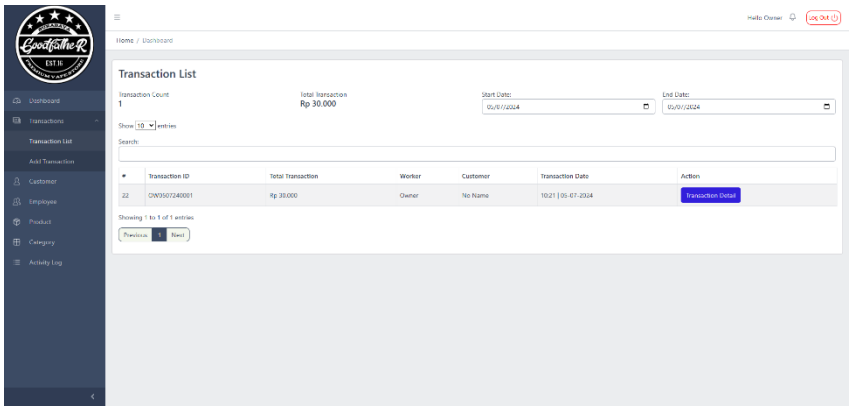

Figure 6. Transaction page

The image above shows the main page display for users with cashier access rights. Here, users can view the list of transaction history that has been carried out previously.

Transaction Detail

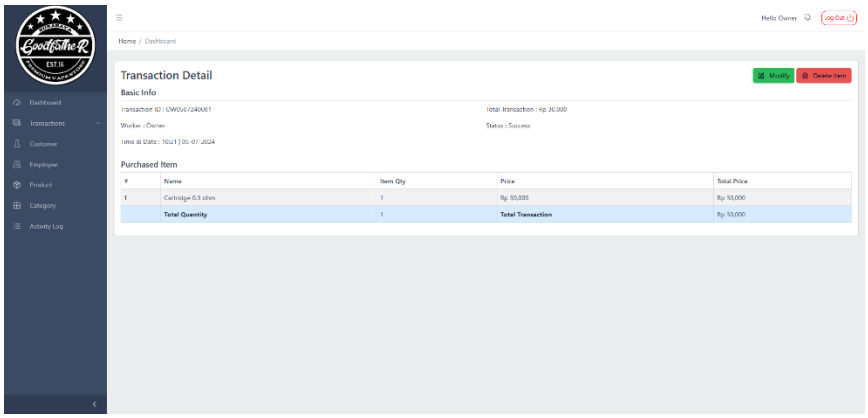

Figure 7. Transaction Detail

The image above displays the detailed transaction page in the Goodfather Vapor Point-of-Sales (POS) system, where users can review and verify the transaction details they have previously added. On this page, users can view complete information such as the list of purchased products, quantity of items, price per unit, total price, and the payment method used. In addition, this page also provides options to edit or delete items from the transaction, ensuring that all stored data is accurate before the transaction is completed. This feature helps improve accuracy and transparency in the sales process, as well as making it easier for users to manage transactions more efficiently.

New Transaction

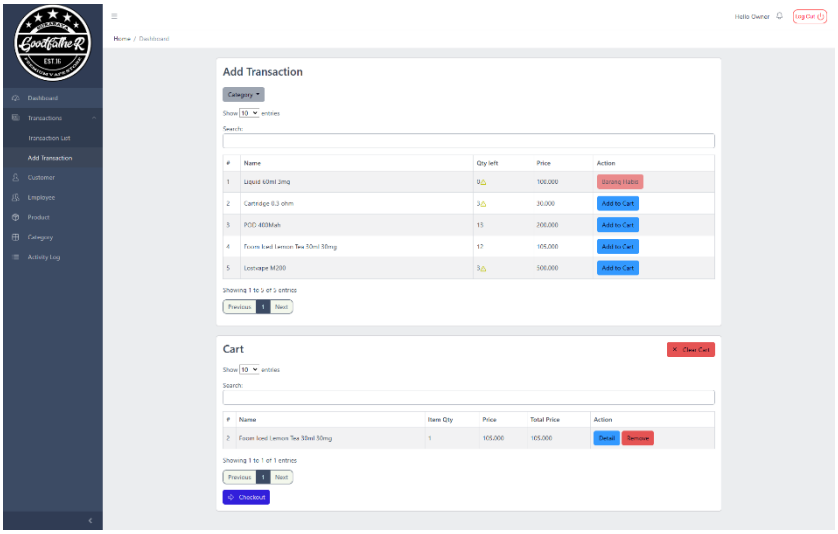

Figure 8. New Transaction

Designed to facilitate the addition of new transactions. Users can search for and select products from the available list, view the stock quantity, and add them to the shopping cart. At the bottom of the page, there is a shopping cart displaying the selected products, where users can adjust the quantity, remove items, or empty the entire cart if needed. After all items have been added and verified, the user can proceed with the transaction by clicking the "Checkout" button to complete and process the payment. This page allows for the efficient and accurate management of transactions within the POS system.

Product List

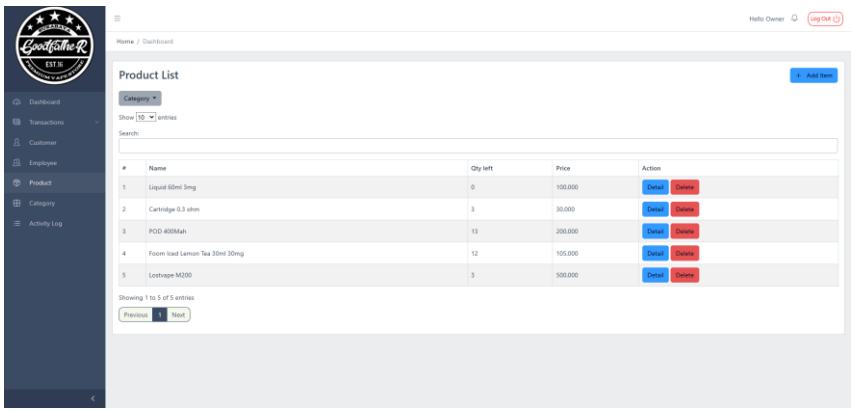

Figure 9. Product List

The image depicts a "Product List" page within an inventory management or e-commerce system. The page shows a table listing various products along with their quantity, price, and actions that can be taken, such as viewing details or deleting the product. The left sidebar includes navigation options like Dashboard, Transactions, Customers, Categories, Employees, and Activity Log, indicating that this system is designed for managing multiple aspects of a business. The "Add Item" button suggests that new products can be easily added to the list. The page layout is clean, with clear buttons for user interaction, facilitating efficient inventory management.

Customer list

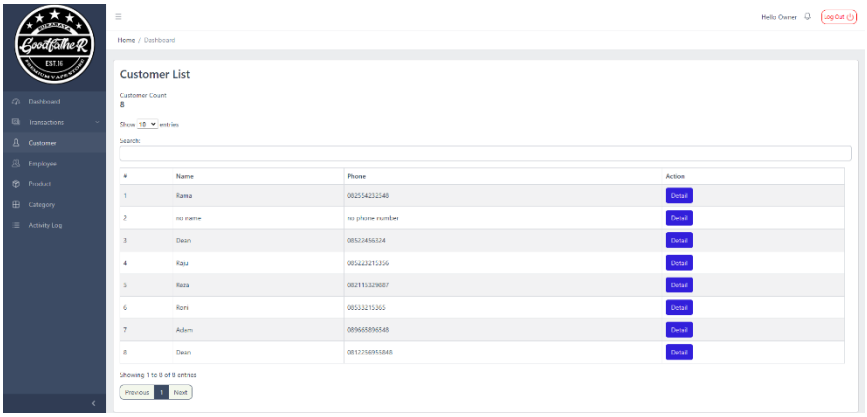

Figure 10. Customer List

The image displays a "Customer List" page within a business management system. The page shows a table that lists customers by name and phone number, along with an action column featuring a "Detail" button for each entry. This indicates that users can view more detailed information about each customer. The left sidebar offers navigation to other sections like Dashboard, Transactions, Employees, Categories, and Activity Log, implying that the system is comprehensive for managing different aspects of customer and business operations. The page layout is simple and user-friendly, allowing for easy access and management of customer data.

Employee List

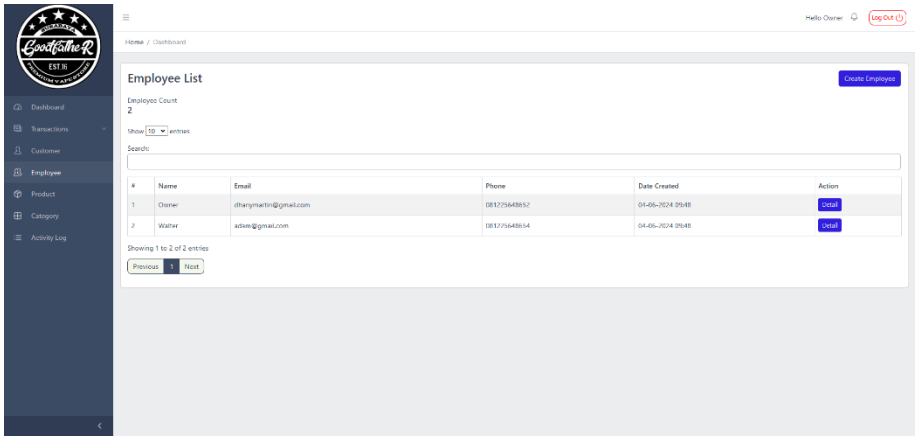

Figure 10. Customer List

The image displays an "Employee List" page within a business management system. This page shows a table listing employees along with their names, email addresses, phone numbers, and the date each employee's information was created in the system. An "Action" column includes a "Detail" button for each employee, allowing users to view more detailed information. The page features a "Create Employee" button, indicating that new employees can be added to the system. The layout is clean and straightforward, with navigation options on the left sidebar for different sections like Dashboard, Transactions, Customers, Products, Categories, and Activity Log, making it easy for users to manage employee data efficiently.

System Testing Implementation

Table 2. Result Blackbox Testing

Fitur	Test scenarios	Expected results	Testing results
Login	Enter correct credentials	User successfully logs in	User successfully logs in

Login	Enter incorrect credentials	System displays an error message	System displays an error message
Add Product	Enter complete product details	Product is added to the product list	Product is added to the product list
Add Product	Enter incomplete product details	System displays an error message	System displays an error message
Sales Transaction	Select a product, enter quantity, and complete transaction	Transaction is completed and receipt is printed	Transaction is completed and receipt is printed
Sales Transaction	Enter invalid quantity	System displays an error message	System displays an error message
Sales Report	Generate sales report for a specific period	Report is displayed with accurate data	Report is displayed with accurate data
Sales Report	Generate report with no sales data	System displays an error message	System displays an error message
Stock Management	Update product stock	Product stock is updated correctly	Product stock is updated correctly
Stock Management	Attempt to update stock with invalid data	System displays an error message	System displays an error message
User Management	Add a new user with the correct role	New user is added with the correct role	New user is added with the correct role
User Management	Add a user with incorrect data	System displays an error message	System displays an error message

Based on the blackbox testing results for the Point-of-Sales (POS) system for Goodfather Vapor, the system performs effectively across various functionalities. The login process correctly handles valid and invalid credentials, ensuring appropriate user access and error feedback. The product addition feature successfully adds products with complete details and appropriately handles incomplete information. Sales transactions and reports are processed accurately, with the system providing clear error messages for invalid inputs and no sales data. Stock management updates are executed correctly, and user management functions as expected, validating new users with correct roles and handling incorrect data with appropriate error messages. Overall, the POS system demonstrates reliable performance and effective error handling, meeting the expected operational standards.

CONCLUSION

The results of the blackbox testing conducted on the Point-of-Sales (POS) system for Goodfather Vapor indicate that the system functionally meets all the specifications and requirements set forth. Testing was conducted with various input scenarios, such as financial reporting, payment processing, inventory management, and sales. Every main feature of the system operates well and produces the expected output accurately.

In scenarios such as routine transactions, discount management, and returns, the system works well. In addition, the system can update inventory data and generate financial reports based on transaction data. No bugs or malfunctions were found in the main features of the system, indicating that it is ready for use in daily business operations.

Therefore, the results of the black box testing indicate that the Goodfather Vapor POS system is reliable in meeting operational needs and has a high level of accuracy in performing its functions. These testing results also demonstrate that the system is fully ready for use in a real business environment.

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