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Development of a Point of Sale (POS) System for the Digitalization of Sales Transaction Recording Based on AI (Case Study: PT XYZ)

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ABSTRACT

Manual sales transaction management remains a common challenge for many small and medium-sized enterprises (SMEs), including PT XYZ, which still relies on physical receipts and handwritten recapitulation to record sales transactions. This condition increases the risk of recording errors, delays in data recapitulation, and difficulties in generating structured sales reports. This study aims to develop a web-based Point of Sale (POS) system integrated with an AI-based chatbot through Telegram and n8n workflow automation to support the digitalization of sales transaction records at PT XYZ. The system was developed using the Rapid Application Development (RAD) method, while data were collected through literature studies, observations, and interviews with the business owner. The developed system is capable of digitizing historical transactions through receipt data extraction using an AI chatbot while simultaneously supporting real-time transaction recording through a web-based POS system integrated into a centralized database. The black-box testing results indicate that all main system features operated according to user requirements, including product management, transaction recording, receipt digitization, and sales report generation. The implementation of the system improved transaction recording efficiency, minimized the risk of data loss, and produced more structured and accessible sales data. The findings demonstrate that the integration of AI chatbots and POS systems can serve as an effective sales transaction digitalization solution for SMEs.

Keyword: Point of Sale (POS), AI Chatbot, Sales Transaction Digitalization, n8n, SMEs

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1. INTRODUCTION

Manual sales transaction management remains a major challenge for many Small and Medium-sized Enterprises (SMEs) in Indonesia, including PT XYZ, which still relies on physical receipts and handwritten recapitulation for recording sales transactions. This issue becomes increasingly significant considering that SMEs contribute approximately 61% of Indonesia's Gross Domestic Product (GDP) and absorb more than 97% of the national workforce [1]. Manual transaction recording methods increase the risk of recording errors, data loss, delays in transaction recapitulation, and difficulties in generating structured sales reports. Previous studies also indicate that manual recording processes are less efficient and tend to

reduce data accuracy and reporting quality [2]. Therefore, transaction digitalization has become essential to improve operational efficiency and support more accurate sales data management.

Several previous studies have discussed the implementation of digital systems to support SME operations. Web-based Point of Sale (POS) systems have been proven to improve transaction effectiveness, operational efficiency, and the accuracy of sales reports [3], [4]. In addition, the integration of chatbots with n8n-based workflow automation has been shown to automate data recording and real-time reporting processes [5]. Other studies also reported that digital system implementation could reduce manual recording activities from 80% to 30% and improve financial reporting accuracy from 40% to 75% [6]. However, previous studies mainly focused on recording new transactions and did not address the digitalization of historical transactions stored in physical receipts.

Based on these issues, this study develops a web-based Point of Sale (POS) system integrated with an Artificial Intelligence (AI)-based chatbot via Telegram and n8n workflow automation to support the digitalization of sales transaction records at PT XYZ. The chatbot is used to digitize historical transactions through receipt data extraction and text-based transaction input, while the web-based POS system is utilized to record new sales transactions directly. All transaction data are stored in a centralized database to support integrated sales reporting and management [5].

This study contributes through the integration of AI chatbots, workflow automation, and web-based POS systems within a single digital ecosystem to manage both historical and new sales transactions. The developed system is expected to improve transaction recording efficiency, minimize the risk of data loss, and assist SMEs in managing sales reports in a more structured and accessible manner [3], [6].

2. METHODS

This study applied the Rapid Application Development (RAD) method to develop a web-based Point of Sale (POS) system integrated with an AI chatbot. RAD was selected due to its iterative and flexible approach, enabling faster system development based on user requirements. The development process consisted of four stages: Planning, Design, Development and Implementation, and Testing and Evaluation [7].

2.1 Planning

The planning phase began with requirement identification through observations, interviews, and literature studies. Observations were conducted to analyze the existing sales transaction recording process at PT XYZ, which still relied on physical receipts and handwritten recapitulation. Interviews with the business owner were carried out to identify operational constraints, user requirements, and the need for transaction digitalization. Literature studies were also conducted to support the development of the proposed system, particularly related to Point of Sale (POS) systems, AI chatbots, workflow automation, and sales transaction digitalization for SMEs.

2.2 System Design

The system design stage focused on designing an integrated digital sales transaction management system consisting of a web-based POS system and an AI-based chatbot. System modeling was developed using several Unified Modeling Language (UML) diagrams, including use case diagrams, activity diagrams, sequence diagrams, and class diagrams, to represent system functionality and workflow processes [8]. The chatbot workflow was

designed using n8n automation to process receipt images and text-based transaction inputs sent through Telegram. The extracted transaction data included receipt numbers, transaction dates, customer names, product details, quantities, prices, and transaction totals. All transaction data were designed to be stored in a centralized database to support integrated sales reporting.

2.3 Development and Implementation

The development stage involved implementing the designed system into a functional application environment. The web-based POS system was developed using the Laravel framework to support transaction recording, product management, stock monitoring, and sales report generation. Meanwhile, the chatbot component was integrated with Telegram and n8n workflow automation to digitize historical transaction records through receipt data extraction and text-based transaction processing. Supabase PostgreSQL was used as the centralized database for storing transaction and product data. The implementation process also included interface development, workflow configuration, chatbot conversation logic setup, and integration between all system components to ensure proper communication and data synchronization [9], [10].

2.4 Testing and Evaluation

System testing was conducted using the black-box testing method to verify whether all system functionalities operated according to user requirements. The testing process covered chatbot command responses, receipt digitization, transaction recording, product management, report generation, and data integration between Telegram, n8n, the POS website, and the database system. In addition, system evaluation involved internal users at PT XYZ through direct observations, interviews, and usability assessments. The evaluation focused on interface clarity, ease of use, processing speed, and system reliability in managing sales transaction data. The testing and evaluation results were then used to refine and improve the developed system before implementation in the operational environment [11].

3. RESULTS AND DISCUSSION

This section presents the implementation and testing results of the developed system. The system consists of a web-based Point of Sale (POS) application integrated with an AI-based Telegram chatbot and n8n workflow automation. The POS website was developed using the Laravel framework and Supabase PostgreSQL database, supporting three user roles: Super Admin (owner), Admin, and Cashier. The implemented features include sales transaction recording, receipt digitization through the chatbot, sales statistics dashboards, and integrated sales report management.

3.1 System Implementation

This section presents the implementation of the developed web-based Point of Sale (POS) system and AI chatbot for sales transaction digitalization at PT XYZ. The web-based POS system was developed using the Laravel framework and PHP programming language by implementing the Model–View–Controller (MVC) architecture to support structured, scalable, and maintainable system development. The system provides several core functionalities, including sales transaction processing, transaction history management, sales reporting, and dashboard-based sales monitoring. In addition, the system integrates a centralized database environment to support integrated transaction data management between the POS website and AI chatbot.

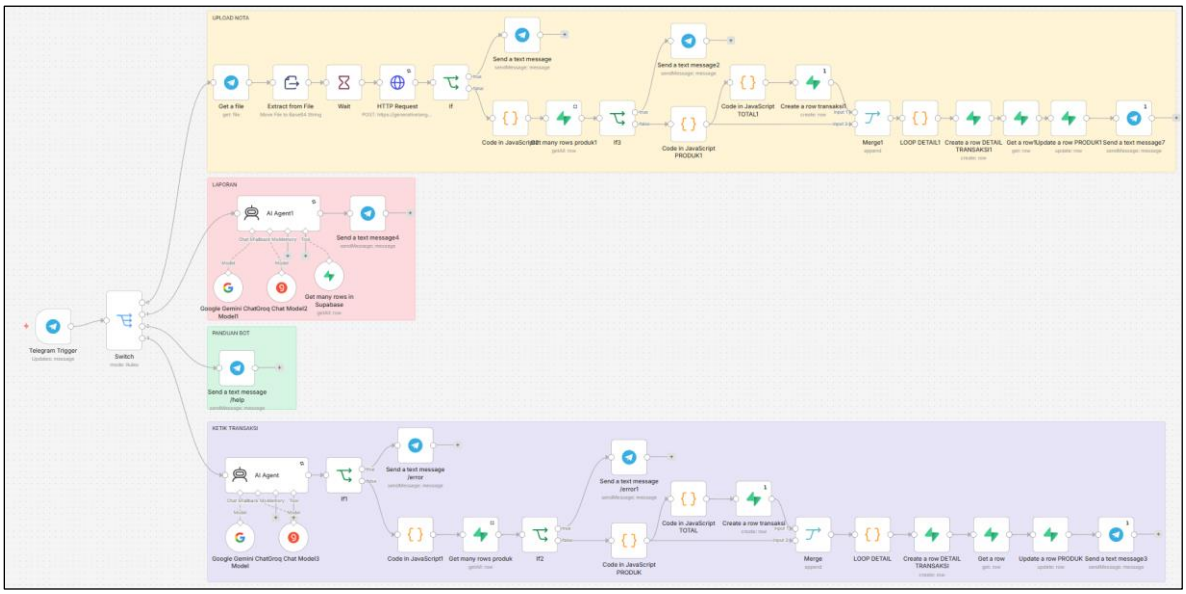

Figure 1. AI Chatbot Workflow Automation Architecture

The AI chatbot implementation utilizes n8n workflow automation to automate transaction data processing and communication through Telegram. As presented in **Figure 1**, the workflow consists of several integrated processes, including receipt image upload, transaction data extraction, text-based transaction input, sales report requests, and database synchronization. The workflow also integrates multiple AI models to support transaction data extraction and fallback processing mechanisms when handling transaction inputs. Furthermore, Supabase is utilized as the centralized database service to store and manage integrated sales transaction data generated from both the website and chatbot systems.

1. Super Admin Dashboard

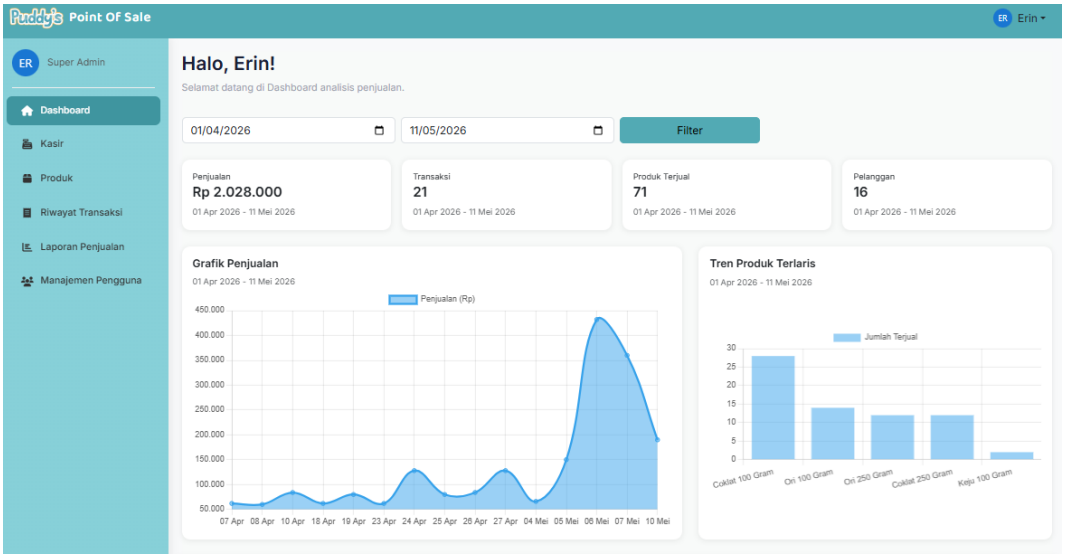

Figure 2. Super Admin Dashboard

The Super Admin dashboard functions as the main interface for monitoring sales activities and business performance within the developed Point of Sale (POS) system. The dashboard provides summarized information related to total sales, number of transactions, products sold, and customer data based on a selected period. In addition, the system

presents sales visualization through sales graphs and best-selling product trends to support business monitoring and decision-making processes. The implementation of this dashboard enables the business owner to access sales information more efficiently and in a more structured manner, as presented in **Figure 2**.

2. Cashier Page

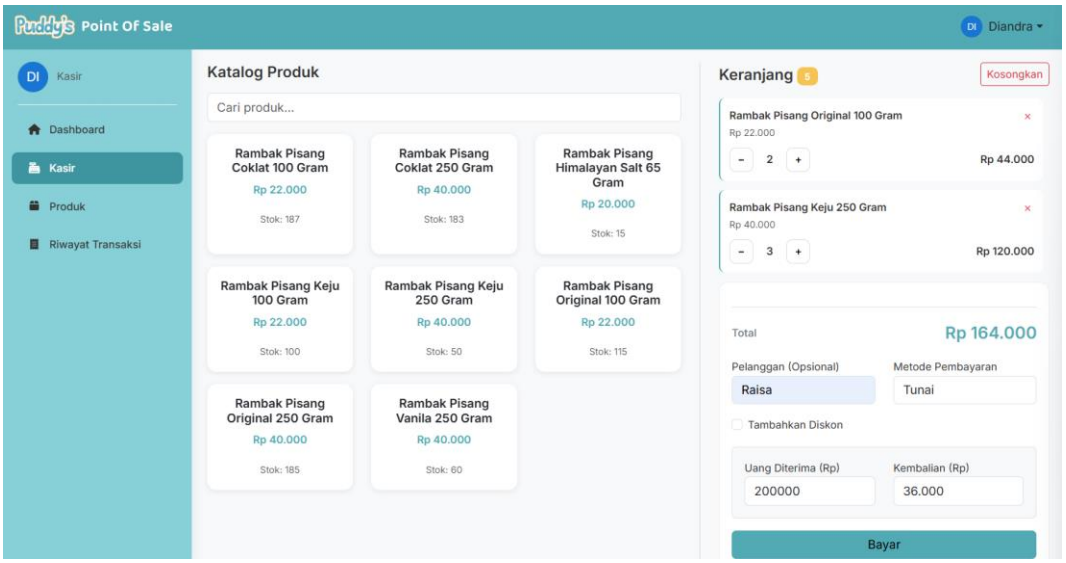

Figure 3. Cashier Page

The cashier page is used by users with the Cashier role to perform direct sales transaction processes. This page provides a product catalog, product search feature, and transaction cart to simplify transaction input and management. The system also supports automatic calculation of total payments, discounts, received payments, and change, enabling transactions to be processed more efficiently and accurately. In addition, the system automatically generates digital receipts after transaction completion. The implementation of this feature improves the efficiency of sales transaction services in store operations, as presented in **Figure 3**.

3. Transaction History Page

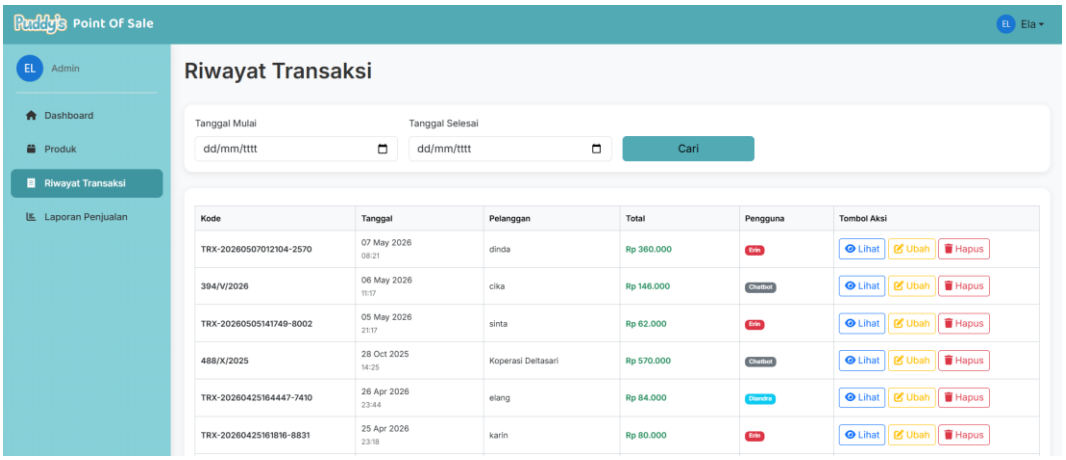

Figure 4. Transaction History Page

The transaction history page is used by the Admin to display and manage integrated sales transaction data generated from both the POS website and AI chatbot. The system provides transaction filtering based on selected periods and displays transaction

information, including transaction codes, transaction dates, customers, transaction totals, and transaction sources. In addition, the system supports view, edit, and delete features to facilitate more structured sales data management, as presented in **Figure 4**.

4. Sales Report Page

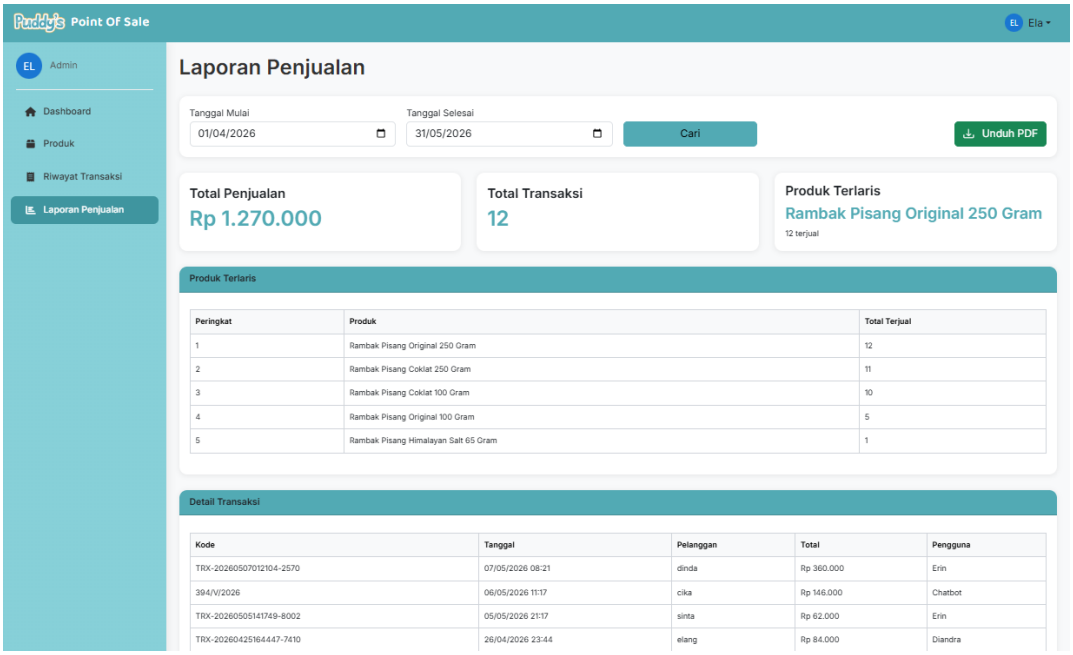

Figure 5. Sales Report Page

The sales report page is used by the Admin to monitor and manage integrated sales transaction data based on a selected period. The system provides sales summaries, total transactions, best-selling products, and detailed sales transaction data in tabular form. The date filtering feature enables users to monitor and analyze sales data more efficiently and systematically, as presented in **Figure 5**.

PT. XYZ
Delta Sari Indah BR-08
Sidoarjo, Jawa Timur, 6125

LAPORAN PENJUALAN

Periode: 01 May 2026 - 31 May 2026

No	Tanggal	Kode Transaksi	Pelanggan	Produk	Pembayaran	Jumlah	Total
1	07/05/2026	TRX-20260507012104-2570	dinda	Rambak Pisang Original 250 Gram	Cash	9	Rp 360.000
2	06/05/2026	658/V/2026	reni	Rambak Pisang Coklat 100 Gram	Cash	3	Rp 66.000
3	06/05/2026	394/V/2026	cika	Rambak Pisang Original 100 Gram	Cash	1	Rp 146.000
				Rambak Pisang Coklat 100 Gram		2	
				Rambak Pisang Coklat 250 Gram		2	
4	06/05/2026	759/X/2026	Bu Maya	Rambak Pisang Coklat 100 Gram	Cash	10	Rp 220.000
5	05/05/2026	TRX-20260505141749-8002	sinta	Rambak Pisang Original 100 Gram	Qris	1	Rp 62.000
				Rambak Pisang Coklat 250 Gram		1	
6	05/05/2026	318/V/2026	Tina	Rambak Pisang Original 100 Gram	Cash	2	Rp 44.000
7	05/05/2026	120/V/2026	andika	Rambak Pisang Original 100 Gram	Cash	2	Rp 44.000
8	04/05/2026	914/V/2026	siska	Rambak Pisang Original 100 Gram	Cash	3	Rp 66.000
					TOTAL PENJUALAN	**36**	**Rp 1.008.000**

Figure 6. Sales Report Output

The system supports exporting sales reports into PDF format to facilitate report documentation and distribution. The generated report contains structured sales transaction information, including transaction dates, transaction codes, customers, products, payment methods, product quantities, and total sales. This feature helps users store and print sales reports more practically, as shown in **Figure 6**.

5. Chatbot Command and Usage Interface

Figure 7. AI Chatbot Menu and Usage Interface

The AI chatbot provides a command-based interaction interface to assist users in accessing transaction recording and sales reporting features. The chatbot includes usage guidance, receipt upload instructions, text-based transaction input examples, and report

request commands to simplify user interaction through the Telegram platform, as presented in **Figure 7**.

6. Receipt Digitalization using AI Chatbot

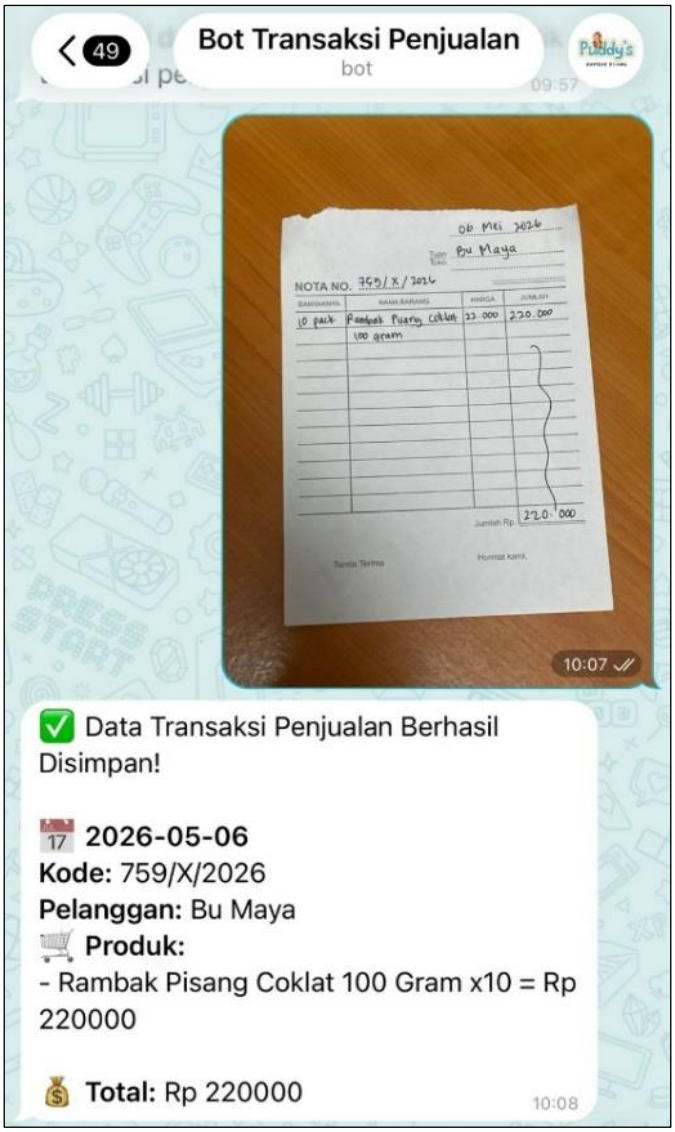

Figure 8. Receipt Digitalization using AI Chatbot

The chatbot feature is used by the Cashier to digitize historical sales transactions through receipt image submission via Telegram. The system utilizes Artificial Intelligence (AI) and n8n workflow automation to extract transaction information from receipt images, including transaction codes, transaction dates, customer names, product details, product quantities, and total sales. After the extraction process is completed, the transaction data are automatically stored in a centralized database and displayed on the transaction history page of the POS website. The system then displays a confirmation message indicating successful data storage, as shown in **Figure 8**.

7. Transaction Input using AI Chatbot

Figure 9. Transaction Input using AI Chatbot

The chatbot feature is used by the Cashier to record sales transactions through direct text-based input using Telegram. Users can submit transaction details using simple conversational text, and the system automatically processes and converts the information into structured transaction data. After the transaction data are successfully processed, the system displays a confirmation message and stores the data in a centralized database integrated with the POS website, as shown in **Figure 9**.

3.2 System Testing

System testing was conducted using the Black-Box Testing method to ensure that all system functionalities operated according to user requirements. The testing process covered both the web-based Point of Sale (POS) system and the AI chatbot features, including authentication, transaction processing, product management, report generation, receipt digitization, and chatbot interaction processes. The testing results indicate that all implemented features functioned properly and produced outputs consistent with the expected system behavior.

Table 1. Summary of Black Box Testing Results

No	Test Scenario	Module	Expected Result	Status
1	Login Authentication	System	User successfully accesses the dashboard according to the assigned role.	Valid
2	Super Admin Dashboard	Super Admin	Sales statistics and dashboard visualizations displayed correctly.	Valid
3	User Management	Super Admin	User data successfully managed according to system access rights.	Valid
4	Cashier Dashboard	Cashier	Dashboard displayed correctly for Cashier role.	Valid
5	Sales Transaction	Cashier	Sales transactions processed and stored successfully.	Valid
6	Receipt Generation	Cashier	Transaction receipt displayed and printed correctly.	Valid
7	Admin Dashboard	Admin	Dashboard displayed correctly for Admin role.	Valid
8	Product Management	Admin	Product data successfully added, updated, searched, and deleted.	Valid
9	Transaction History Management	Admin	Transaction history displayed, filtered, updated, and deleted successfully.	Valid
10	Sales Report Management	Admin	Sales reports displayed and exported into PDF format successfully.	Valid
11	Profile Management	System	User profile and password updated successfully.	Valid
12	Chatbot Menu	AI Chatbot	Chatbot menu displayed successfully.	Valid
13	Chatbot Help Command	AI Chatbot	Usage guidance displayed successfully.	Valid
14	Receipt Image Processing	AI Chatbot	Receipt data extracted and stored successfully from uploaded images.	Valid
15	Text-Based Transaction Input	AI Chatbot	Transaction data processed and stored successfully from chat input.	Valid
16	Sales Report Request via Chatbot	AI Chatbot	Chatbot successfully displayed sales reports based on requested periods.	Valid
17	Invalid Input Validation	AI Chatbot	Validation and error messages displayed correctly.	Valid
18	Logout	System	User session terminated and redirected to login page.	Valid

3.3 Discussion

The implementation of the developed system provides several improvements to the sales transaction management process at PT XYZ compared to the previous manual recording method.

1. Transaction Digitalization and Efficiency

   The integration of the web-based *Point of Sale* (POS) system and AI chatbot successfully digitizes both historical and new sales transactions within a centralized database environment. Previously, transaction data were recorded manually using physical receipts and handwritten recapitulation, which increased the risk of recording errors and delayed data processing. The developed system enables faster transaction recording, automated receipt digitization, and more organized sales data management. This finding is consistent with previous studies showing that digital transaction systems can improve operational efficiency and reporting accuracy [3], [6].

2. Integrated Data Management and Monitoring

   The developed system allows transaction data generated from the POS website and AI chatbot to be stored and managed in an integrated manner. Features such as transaction history, sales reports, and dashboard visualizations provide users with easier access to sales information and transaction monitoring. This centralized approach reduces data redundancy and simplifies sales data management processes compared to conventional manual methods [4], [5].

3. Business Reporting and Decision Support

   The implementation of dashboard statistics and sales reporting features supports business monitoring and decision-making activities more effectively. Users can monitor sales performance, transaction trends, and best-selling products through graphical visualizations and automated reports generated by the system. In addition, the availability of integrated sales data helps business owners obtain more structured and accessible information for evaluating business performance and supporting operational decisions.

CONCLUSION

Based on the research and system implementation conducted, it can be concluded that the web-based Point of Sale (POS) system integrated with an Artificial Intelligence (AI)-based chatbot has been successfully developed to support the digitalization of sales transaction records at PT XYZ. The developed system integrates sales transaction processing, receipt digitization, chatbot-based transaction input, and sales reporting within a centralized database environment. This integration addresses the issues of manual transaction recording, scattered data storage, and difficulties in generating structured sales reports.

The Black-Box Testing results demonstrate that all major system features operated according to user requirements without significant errors. The implementation of the system improves transaction recording efficiency, minimizes the risk of data loss, and provides more structured and accessible sales data. In addition, the integration of chatbot automation and sales analytics dashboards supports business monitoring and decision-making processes more effectively. For future development, it is recommended to improve the adaptability of receipt recognition capabilities and develop more advanced sales analytics and mobile-based system features to further enhance operational flexibility and system usability.

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