Sales Information System: A Case Study at an Indonesian Pharmaceutical Manufacturing

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Sales Information System: A Case Study at an Indonesian Pharmaceutical Manufacturing

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Abstrak

Desain efektif dari sistem informasi memainkan peran penting dalam meningkatkan produktivitas dan efisiensi di berbagai industri, terutama dalam sektor bisnis. Bagi banyak perusahaan, integrasi sistem informasi komprehensif telah menjadi sangat diperlukan, karena secara efektif mengurangi risiko seperti kesalahan manusia, kecurangan, dan ketidakakuratan data. Untuk mengatasi tantangan ini, studi ini menyarankan pengembangan sistem informasi berbasis web, dengan fokus khusus pada optimalisasi proses penjualan. Metodologi Rapid Application Development telah dipilih untuk melakukan desain sistem, dengan menggunakan XAMPP sebagai server web, Visual Studio Code sebagai editor kode, PHP sebagai bahasa pemrograman, CodeIgniter sebagai kerangka kerja, dan MySQL sebagai basis data. Implementasi sistem informasi ini menawarkan beberapa keuntungan bagi organisasi, menangani masalah saat ini, dan meningkatkan operasi. Hal ini akan menyederhanakan pengelolaan data penjualan dengan mengotomatisasi berbagai proses. Selain itu, sistem ini menyederhanakan pembuatan dokumen penting seperti laporan penjualan, faktur, pemilihan komponen, dan pesanan pengiriman. Laporan-laporan ini berfungsi sebagai sumber daya berharga untuk analisis dan pengambilan keputusan, memberdayakan perusahaan untuk merencanakan dan mengembangkan proses bisnis di masa depan dengan efisien. Data menunjukkan skor pengujian penerimaan pengguna rata-rata yang mengesankan sebesar 97,1%, menyoroti kepuasan dan dukungan pengguna yang signifikan.

Kata kunci: desain sistem informasi, peningkatan produktivitas, sistem berbasis web, optimisasi proses penjualan, pengujian penerimaan pengguna.

Abstract

The effective design of information systems plays a crucial role in enhancing productivity and efficiency across various industries, particularly in the business sector. For numerous companies, integrating a comprehensive information system has become indispensable, effectively reducing risks such as human errors, fraud, and data inaccuracies. This study suggests developing a web-based information system specifically optimizing the sales process. The Rapid Application Development methodology has been chosen for system design to achieve this objective. This approach utilizes XAMPP as the web server, Visual Studio Code as the code editor, PHP as the programming language, CodeIgniter as the framework, and MySQL for the database. Implementing this information system offers several advantages for the organization, addressing current issues and enhancing operations. It streamlines the management of sales-related data by automating various processes. Additionally, the system simplifies the generation of crucial documents like sales reports, invoices, component selection, and delivery orders. These reports serve as invaluable resources for analysis and decision-making, empowering the company to plan and develop future business processes efficiently. The data reveals an impressive average user acceptance score of 97.1%, highlighting substantial user satisfaction and endorsement.

Keywords: information systems design, productivity enhancement, web-based system, sales process optimization, user acceptance test.

INTRODUCTION

The advancement of technology in the modern era has opened new opportunities and challenges for companies (Almeida et al., 2020). In this context, information systems become crucial to help overcome the challenges in sales activities. Information systems can enhance the efficiency and effectiveness of sales processes, inventory management, and order tracking (Mehmood, 2021). Technology in information systems helps automate various aspects of sales, including sales automation. Sales automation refers to applying technology to automate processes in a company's sales (Chopra et al., 2022). With sales automation, tasks such as creating sales invoices, selecting components, and generating delivery orders can be automated through the information system (Devina & Ce, 2022). This results in several significant benefits, including improved time efficiency, as sales processes become faster and more organized.

Service speed also improves with sales automation, as time-consuming tasks can be completed more efficiently (Haleem et al., 2021). As a result, more sales can be accommodated within the same time frame, and the sales process becomes smoother. Companies can handle more sales transactions with increased time efficiency and faster service. It can positively impact overall sales growth, as the company can serve more customers better.

PT. Mecosin Indonesia, a pharmaceutical manufacturing company, plans to implement a sales system. Given the specialized handling and distribution required in the pharmaceutical industry, there is a significant need for a system to facilitate and simplify the company's business processes. Information systems will help to process and present complete, accurate, and up-to-date data. Integrating all this data into the company's information system is expected to improve efficiency and performance. Additionally, pharmaceutical products require special attention in their distribution, including planning, inventory control, and careful monitoring of product expiration dates, as they are critical for medication.

Based on interviews with the company's management, it was found that the company has not yet implemented a system, resulting in considerable manual work, such as inputting sales invoices, selecting components, and creating delivery orders. These processes take time and often involve multiple Excel documents to complete the sales process. Moreover, errors frequently occur during invoice creation due to the high input volume. Therefore, a system must accommodate all these processes, as the increasing number of transactions will require more sales record-keeping. Thus, selecting a sales module or system is considered necessary to address these challenges. The decision to implement a sales system is driven by the existing weaknesses in creating several supporting sales documents, such as pick components and delivery orders.

Therefore, implementing sales automation through the information system can be a crucial step for PT. Mecosin Indonesia to overcome the challenges in the manual sales process. By improving time efficiency, service speed, and data accuracy, the company's sales are expected to increase, ultimately enhancing overall business performance.

RESEARCH METHODS

Rapid Application Development (RAD) is a software development method that produces products with very short development cycles (Suryasari et al., 2022). It is a sequential linear method with 60 to 90 days of development cycles. This model can adapt to rapid development speeds and adopts a component-based construction approach. This approach is used to expedite development time and achieve optimal results. The RAD method employs incremental techniques and focuses on fast development cycles, resulting in relatively short development time. This method is highly suitable when speed is required for developing an application or system.
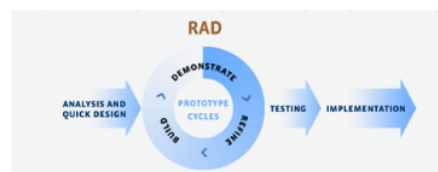

Figure 1. RAD Method Stages (Suryasari et al., 2022)

The research conducted in this context aims to develop a prototype sales system specifically designed to meet the needs of PT Mecosin Indonesia. PT Mecosin Indonesia is a pharmaceutical company that requires a sales

fulfilment system. The RAD method will be used because it is suitable for system development. As can be seen in Figure 1, it consists of analysis and quick design, prototype cycle, testing, and implementation.

A thorough examination of the business processes occurs during the analysis and quick design stage at PT Mecosin Indonesia. This analysis leads to the identification of both Functional Requirements and Non-Functional Requirements. For the design phase, Unified Modeling Language (UML) is employed as a visual modelling language to effectively design, model, and document the software systems (Wiratama & Tobing, 2022). UML allows software developers to create interconnected diagrams, including class, activity, and use case diagrams. The primary purpose of UML is to enhance communication among developers, business analysts, stakeholders, and other parties involved in the software development project.

The prototype cycle stage develops the system using PHP, MySQL, JavaScript, and CodeIgniter. PHP (PHP: Hypertext Preprocessor) is a server-side programming language primarily used for web development (Fadhilah Iskandar et al., 2020). It serves as a request handler from clients, like web browsers, and enables the generation of dynamic or interactive web pages by processing diverse data types. MySQL is a free and open-source relational database management system (RDBMS) widely used worldwide for its data storage, organization, and access capabilities (Trillo-Montero et al., 2023). It utilizes SQL (Structured Query Language) for database management and supports multiple programming languages like PHP, Java, and Python. JavaScript is a high-level programming language to create interactive and dynamic websites (Nixon, 2021). It runs on the client side and controls web page behavior in browsers. CodeIgniter provides many built-in features that facilitate web application development, such as a routing system, database management, and other useful features (Sotnik et al., 2023).

At the testing stage, UAT (User Acceptance Test) is applied. UAT (User Acceptance Test) is one of the final stages of a project and often occurs before the client or customer accepts the new system (Edin & Qorbanzada, 2022). User acceptance testing is successful when the test results are deemed satisfactory in meeting the requirements, indicating the software is ready for further development. The UAT test plan states the sequence of inputs about the desired process and the expected outputs from this process. Test cases generated from the classification approach state the combination of classes in testing.

At the implementation state, the system will be implemented and measured about the business process duration before and after the system.

RESULTS AND DISCUSSION
Analysis and Quick Design

In the initial stage, an analysis of the business processes at PT Mecosin Indonesia is conducted. It is performed to identify the needs and issues within the company. User requirements are created to understand the company's problems and needs better. Problem analysis is carried out through interviews with several employees and field observations to clearly understand the business processes and the system's design, ensuring that all required features align with the set objectives.

Figure 2. Ongoing Business Process

The ongoing business process begins with the finance staff receiving customer orders, as shown in Figure 2. Once an order is received and verified, they create an invoice for the products or services requested by the customer. Subsequently, the finance staff prepares a pick component list, outlining the specific components or items required to fulfil the order. This list is then shared with the warehouse staff, who initiate the process of preparing the Shipment by gathering the necessary components from the inventory based on the list provided. Meanwhile, the finance staff creates a delivery order detailing shipping information, delivery method, and specific instructions. When the Shipment is ready, the warehouse staff sends

it out to the customer using the details specified in the delivery order. At PT Mecosin Indonesia, invoices, pick components, and delivery orders for sales are created using Microsoft Excel for each transaction.

Addressing the issues at PT Mecosin Indonesia, the proposed solution is to develop a computerized sales system. This system will automate the creation of invoices, pick components, and delivery orders, reducing the potential for human error and data loss. Employees only need to input simple information, and the system will generate and print the necessary documents as PDF files. Additionally, the system will record all sales transactions in a web-based platform, eliminating the need for manual data entry into Microsoft Excel. Furthermore, the system will enable easy exporting of transaction data into Microsoft Excel format for further analysis and reporting.

Based on the issues, a solution is proposed to develop a web-based sales system for PT Mecosin Indonesia. For creating this system, user requirements are needed. Here are the user requirements for PT Mecosin Indonesia, divided into Functional Requirements and Non-functional Requirements. Functional Requirements consist of Maintaining customer data, maintaining product category data, maintaining product data, managing sales invoices, managing pick components, managing delivery orders, maintaining sales reports, and Maintaining users. Whilst Non-functional Requirements consist of the system prototype should run smoothly for users using a web browser with an internet connection, all transaction documents (invoices, pick components, delivery orders) should be exportable as PDF files, and sales reports should be exportable as XLSX (Microsoft Excel) files. The system data should be integrated and stored in the company's database. The barcode data format for products should follow the MEI/000 format, with a three-digit auto-incremented number at the end. The invoice number format should follow the FPJ/(Year)/(Month)/(Date)/000000 format, with a six-digit auto-incremented number at the end.
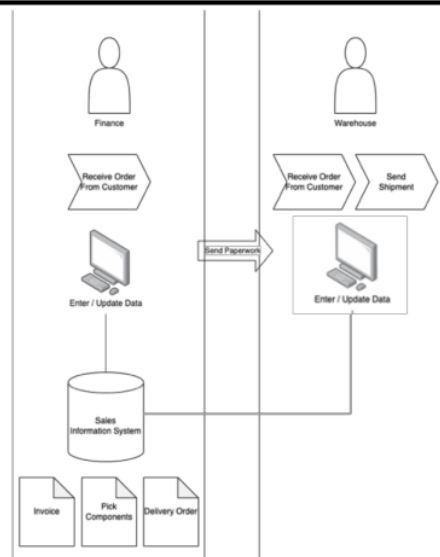

Figure 3. New Business Process Offered

As evident from Figure 3, the business process offered by the computerized sales system represents a substantial improvement compared to the previous workflow. In the past, one transaction was completed and involved three separate processes, each with its own set of inputs and actions. However, with the implementation of the new system, these three processes have been seamlessly consolidated into a single, integrated transaction process. This integration has resulted in a more efficient and cohesive sales workflow, where all relevant steps are interconnected, minimizing delays and enhancing overall productivity. The need for redundant manual inputs has been eliminated, streamlining the entire sales process and reducing the risk of data entry errors. Previously, finance staff had to input data separately for creating invoices, picking components, and delivering orders. These inputs have been consolidated into a single input at the beginning of the sales process. The benefits of this streamlining are manifold. It saves time and effort for the staff involved and ensures data consistency and accuracy throughout the transaction. The risk of discrepancies arising from separate data inputs has been mitigated, promoting a more reliable and robust sales process.

PT Mecosin Indonesia has achieved a more seamless and synchronized sales operation

by condensing the three processes into one and optimizing the input mechanism. This improvement will likely lead to faster order processing, reduced turnaround times, and improved customer satisfaction. The system's ability to handle all aspects of a transaction within a unified process brings a new level of efficiency and effectiveness to the company's sales operations. As a result, PT Mecosin Indonesia can expect enhanced performance, increased sales throughput, and improved overall business performance.

Prototype Cycle

Figure 4 shows the product page, where all product-related actions can be performed. This page displays product information in the system, including the product code, product name, product unit, product category, stock quantity, and status. The status of a product determines whether the product can be sold in the system. Master Admin and Admin can add and edit products on this page.
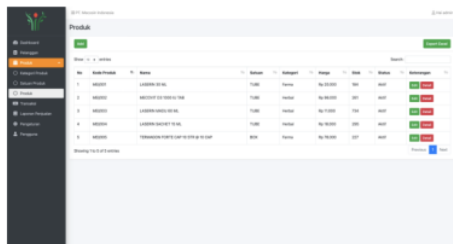

Figure 4. Product

Figure 5 shows the transaction page, where all transaction-related actions can be performed. This page displays information about customers in the system. It provides an interface to perform various transaction processes, from inputting products, viewing the invoice, and finally making payment. Users can input the products in the transaction, generate an invoice, and proceed with the payment process on this page.
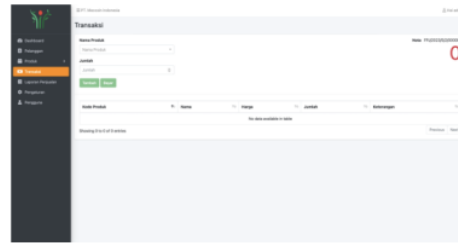

Figure 5. Transaction

In Figure 6, it represents the sales report page of the system that has been created. All the transactions that have been performed will be visible on this page. It also displays the customer name, invoice number, transaction date, product name, product category, quantity, price, total price, and remarks. In the remarks section, there are three buttons: Print for printing the invoice, Pick Components for printing the pick components, and Print DO for printing the delivery order.
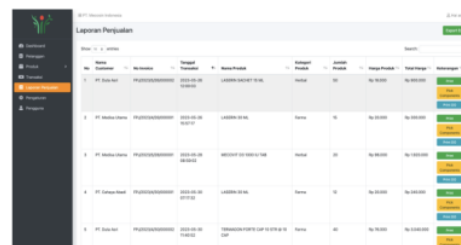

Figure 6. Sales Report

Figures 7, 8, and 9 showcase examples of the invoice, pick components, and delivery order documents generated from the computerized sales system. These documents serve as crucial records for sales transactions and can be effortlessly generated within the system. Once created, they can be promptly distributed to the relevant parties involved in the sales process, ensuring smooth communication and streamlined operations. The system's ability to generate these documents efficiently contributes to a more organized and effective sales workflow at PT Mecosin Indonesia.

Figure 7. Invoice

Figure 8. Pick Components

Figure 9. Delivery Order

Testing

Table 1. Quantitative User Acceptance Test

Features	Acceptance Level			Total Score
	User1	User2	User3	
Manage Product Data	100	100	100	100%
Add Product Stock	80	100	100	93%
Add Transaction	100	100	100	100%
Manage Invoice	100	100	100	100%
Manage Delivery Order	100	100	100	100%
Manage Pick Components	100	100	100	100%
Manage Sales Reports	80	80	100	87%

Table 1 presents the results of a quantitative User Acceptance Test (UAT) to evaluate the acceptance levels of various features within the computerized sales system at PT Mecosin Indonesia. The table shows the number of respondents who fall into different categories of acceptance: "Disagree," "Doubtful," "Agree," and "Strongly Agree." All respondents (100%) strongly agree with the system's capability to manage product data. It indicates that users find the feature effective and satisfactory in handling product-related information. Similarly, most respondents (93%) agree or strongly agree with the capability to add product stock, suggesting that the feature is well-received, with only a few expressing doubts or reservations.

Regarding transaction management, all respondents (100%) strongly agree with the system's ability to add transactions. It indicates that users find the feature efficient and successful in recording business transactions. Managing invoices and delivery orders also receives unanimous approval, with all respondents (100%) strongly agreeing with the system's capability in these areas. It suggests that both features effectively handle invoice creation, delivery order processing, and management, meeting user expectations. Likewise, all respondents (100%) strongly agree with the system's capability to manage pick components, indicating that the feature efficiently handles gathering required components for sales orders. However, the sales reports feature receives mixed feedback. While most respondents (87%) agree or strongly agree with the system's ability to manage sales reports, 13% express doubts or reservations about this feature. While most users find the sales reporting satisfactory, a few have concerns or uncertainties.

Implementation

Table 2 provides a comprehensive breakdown of the ongoing business process duration, measured in minutes, for five key activities: Receive Orders, Create Invoices, Prepare Shipments, Create Delivery Order, and Send Shipment. Each activity includes the minimum, maximum, and average time taken. For example, "Receive Order" ranges from 12 to 15 minutes, averaging approximately 10.63 minutes. "Create Invoice" takes 10 to 25 minutes, averaging about 17.27 minutes. "Prepare Shipment" ranges from 16 to 25 minutes, with an average of around 17.07 minutes. "Create Delivery Order" varies from 5 to 15 minutes, with an average of approximately 9.90 minutes. Lastly, "Send Shipment" takes 5 to 14 minutes, averaging about 9.50 minutes. From receiving the order to sending out the Shipment, the total process duration ranges from 45 to 81 minutes, with an average of approximately 64.37 minutes.

Table 2. Going Business Process Duration

Measurement	Min	Max	Average
Receive Order	12	15	10.63
Create Invoice	10	25	17.27
Prepare Shipment	16	25	17.07
Create Delivery Order	5	15	9.90
Send Shipment	5	14	9.50
Total	45	81	64.37

Table 3 shows the time analysis of business processes after implementing the computerized sales system at PT Mecosin Indonesia. The system has led to notable improvements in efficiency, reducing processing times for managing invoices, delivery orders, and picking components. The total process duration has significantly decreased, resulting in a more streamlined sales process overall. For "Manage Invoice," the minimum time taken is 1 minute, the maximum is 2 minutes, and the average is 1.37 minutes. Similarly, for both "Manage Delivery Order" and "Manage Pick Components," the minimum time taken is 1 minute, and the maximum is 2 minutes, with an average of 1.5 minutes for both. The "Total" process duration, which includes all three business processes, ranges from a minimum of 3 minutes to a maximum of 6 minutes, with an average of 4.37 minutes.

Table 3. Time Analysis After System

Business Process	Min	Max	Average
Manage Invoice	1	2	1.37
Manage Delivery Order	1	2	1.5
Manage Pick Components	1	2	1.5
Total	3	6	4.37

Before the implementation of the system, all sales processes at PT. Mecosin Indonesia was done manually using Microsoft Excel. Firstly, the invoice was created in Excel, followed by printing the invoice. Then, pick components were prepared by inputting data in Excel again. Lastly, the delivery order was generated using Excel input. In this manual process, three separate instances of data entry in Excel were required to complete a single transaction. After the implementation of the system, all data input is consolidated within the transaction menu. Creating an invoice is streamlined, allowing direct printing from the web interface.

Similarly, pick components can be printed by clicking the "pick components" button. For delivery purposes, a delivery order can be generated and printed instantly by clicking the "print DO" button. The system eliminates the need for separate Excel inputs and simplifies the overall sales process, providing convenience and efficiency in generating invoices, picking components, and delivering orders.

CONCLUSION

The research conducted at PT. Mecosin Indonesia has resulted in the design of a web-based sales information system aimed at improving the efficiency of the company's business processes, particularly in the sales domain. The implemented information system design using RAD addresses existing issues by incorporating features for product and inventory data management, customer management, user management, and sales transactions. It enables recording and tracking product details, customer information, and sales activities, streamlining business processes and improving overall operations.

User testing using the acceptance test method confirmed all features functioned as intended, passing the evaluation process. The system has achieved an outstanding average user acceptance score of 97.1%. The system has notably improved efficiency by reducing the

average duration per customer order from 64.37 to just 4.37 minutes. It represents a significant enhancement in processing times for the sales process.

Future development of the information system can focus on improving its design, adding new features like employee attendance management, supplier data for purchasing, and online sales with integrated website payment. It will result in a more automated and fully integrated system.

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