

Business Process Re-Engineering of Direct Cash Drug Inventory at Private General Hospital

Azka Yasfa Uga¹ Vicky Dzaky Cahaya Putra²✉

^{1,2} Accounting Study Program, Faculty of Economics and Business, Universitas Jenderal Achmad Yani

Abstract

One of the main components of the health services is the provision of medications. Although the drug procurement procedure at RSU X Bandung is well implemented, certain obstacles remain, such as lengthy and time-consuming processes. This study aims to comprehensively redesign the drug procurement procedure at RSU X Bandung using the BPR method to enhance efficiency. The research was conducted through several stages of BPR implementation. Throughput efficiency was measured using ASME standards in the direct cash drug procurement process. The initial results indicated an efficiency rate of 68.96%. After process improvements and the elimination of non-value-added activities, efficiency rose to 90.50%, demonstrating a significant improvement in both the effectiveness and the speed of the procurement process.

Keywords: *Business Process Reengineering, Medicines Procurement, Throughput Efficiency .*

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✉ Corresponding author :

Email Address: azka.yu804@gmail.com¹

INTRODUCTION

The healthcare industry is experiencing significant growth, with the increasing number of hospitals, both public and private, providing healthcare services to the public. As healthcare providers, hospitals are focused on providing the best possible service to the public, in their capacity as patients. A key component of healthcare services provided by hospitals is the provision and administration of medications appropriate to the patient's clinical condition or following medical prescription guidelines recommended by medical professionals, particularly physicians (R. Yang, 2024).

Given the high use of drugs in hospital healthcare practices, drugs can be classified as one type of supply that has the highest utilization rate or frequency of use in hospital operations (Mesakh & Pane, 2022). One of the main challenges faced by hospitals is the complexity in operational management processes, including drug inventory management (Ebrahimi Rigi et al., 2023). Hospitals, as service entities, face complex and ever-changing operational challenges, ranging from supply management, pharmaceutical distribution, medical and administrative staff involvement, to patient service delivery (Gjellebæk et al., 2020; Javaid et al., 2023). Increasing patient expectations for service quality, demands for cost efficiency, and

rapid advances in medical technology are driving hospitals to continuously innovate and improve their performance. (Nilsen et al., 2020).

Drug procurement is a comprehensive activity regarding drug supplies, starting from planning, ordering, receiving, checking, distributing, to the payment process (S. N. A. Maulana & Hafni, 2021). Specifically, drug procurement in hospitals is an asset and resource stored in anticipation of meeting drug supply needs (George & Elrashid, 2023). In the context of drug procurement in particular, drug procurement procedures are an important part of drug request and supply services with the aim of ensuring drug availability according to needs, which consists of drug needs planning, ordering from suppliers, receiving drugs, and checking the quality and quantity of goods received (Dewi & Putra, 2024).

The implementation of an adequate accounting information system is an important part that can contribute to the progress and improvement of organizational performance (Kustinah et al., 2022). The success of an Accounting Information System can be measured by increasing efficiency, effectiveness, and productivity in company operations (V. D. C. Putra & Wigantini, 2025). A careful and responsible drug management system is absolutely necessary to ensure sufficient drug supplies, prevent shortages that can disrupt service quality, and prevent excesses that cause waste or expired drugs (Busaysi et al., 2023). The drug inventory system plays an important role in determining the effectiveness and quality of hospital services, especially due to the high demand for various pharmaceutical products, medical supplies, and drug sales transactions as a source of hospital finance (D. Maulana & Sudarma, 2021). Without a drug supply that is in accordance with a good management system, hospitals will be faced with the risk of not being able to meet the needs of hospital service users, especially patients (Bekele et al., 2025).

Based on field observations and interviews, Hospital X Bandung, which uses a direct cash ordering system to fulfill its drug needs, still faces obstacles. Common obstacles identified include discrepancies between implementation and planning, stock shortages or stockouts, overstocking, expired drugs, delays in drug supplies, and errors in data recording. Specific obstacles include delays in the payment process and operational system constraints.

To overcome these various obstacles, *the Business Process Re-engineering* (BPR) method is seen as a relevant strategic approach in redesigning accounting business processes so as to produce significant improvements in operational efficiency, service quality, and overall organizational performance. BPR is a strategic approach method for redesigning accounting business processes so as to produce significant improvements in operational efficiency, service quality, and overall organizational performance (J. Yang, 2022).

Hammer and Champy in 1990 explained that BPR is a managerial approach that focuses on fundamental restructuring and redesigning of business processes as a whole with the aim of achieving significant and dramatic improvements in important aspects such as cost, quality, service, and speed (Fetais et al., 2022). BPR is seen as a closed input-output system that involves various complex performance indicators (Wicaksana Siregar, 2021). The purpose of BPR itself is to detect weaknesses in the flow of the organization's business processes and make improvements to them, thereby enabling the organization to increase the level of operational efficiency, work productivity, and increase the company's competitiveness amidst the ever-changing market dynamics (Romadhana et al., 2024; Hnylianska, 2022). The implementation of

BPR in accounting provides direct benefits in the form of improving the quality of accounting information that supports more accurate management decision-making and increases the company's competitiveness. However, the level of success of BPR implementation is highly dependent on a deep understanding of the multi-dimensional challenges faced, maximum attention and implementation as well as the selection of appropriate methodologies and frameworks according to the specific organizational context (Fetais et al., 2022; Nazaria et al., 2024).

The implementation of BPR in accounting information systems allows hospitals to integrate drug inventory procurement policies into daily operational procedures and provide relevant data for decision-making (Dachyar & Yolanda, 2020). To maximize the impact of such implementation, organizations must design a comprehensive program by considering contextual factors that can influence strategic decisions in management policies (Van Looy, 2021). It is important for an organization to actively involve organizational members in the process of implementing and monitoring the system, because this involvement has a significant influence on their perceptions, motivation, and performance in carrying out the redesigned business processes (Hartikayanti et al., 2023).

Improving operational efficiency through the BPR process has been widely discussed in various previous studies. In a study conducted by Putra and Nuryasin at the General Hospital of the University of Muhammadiyah Malang (RSU UMM), the BPR method was used in the patient reservation process and resulted in the development of a mobile-based application interface. However, the study also emphasized the importance of an in-depth analysis of the potential use of information technology, beginning with the collection of comprehensive data related to the hardware and software infrastructure already available at the hospital. This strategy allows for more precise identification of opportunities in optimizing the use of information technology to support the implementation of redesigned business processes (I. Putra & Nuryasin, 2024).

A similar study was also conducted by Romadhana, Nuryasin, and Suharso by applying BPR to the offline ticket booking process at Lion Air Balikpapan (a subsidiary of PT Lion Group), with a focus on optimizing a system that experienced operational constraints such as data inaccuracy and suboptimal customer experience. The research methodology involved a thorough identification of existing business processes, mapping ASME standards, and eliminating non-value-added processes. The results showed a substantial increase in throughput efficiency from 38.42 to 90.99, with significant improvements in reducing queue time from 60 minutes to 10 minutes and optimizing other process stages, indicating the success of BPR implementation in improving the speed and quality of service to customers (Romadhana et al., 2024).

X General Hospital of Bandung City is one of the General Hospitals located in Bandung, West Java, and is under the management of PT X, a subsidiary of PT Y. This Hospital was inaugurated by General Ahmad Yani in 1965 as an ABRI level IV hospital which is equivalent to a type D general hospital with 100 beds. In 2010, X Hospital began to establish various strategic steps to upgrade its status from type D to type C, in line with efforts to improve the quality of services and capacity of the Hospital.

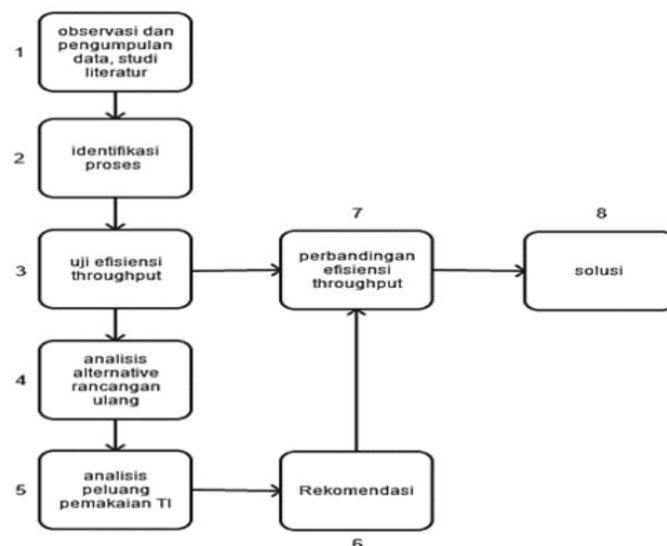
Through the initial analysis, the researchers identified several process activities in the hospital that required comprehensive evaluation in terms of operational efficiency. These processes became the primary focus for reengineering, as

reengineering *can* be implemented through various approaches, depending on the specific needs and objectives of the organization or company in question.

This study aims to gain a deeper understanding of the drug procurement process in a hospital, focusing on initial efficiency measurements using throughput measurement techniques. The authors demonstrate, based on the analysis, that the observed process experiences significant obstacles in terms of efficiency and speed of drug procurement. Based on the initial efficiency measurements, the researchers formulated several recommendations for improvement to enhance operational performance and time efficiency. These recommendations include streamlining the workflow structure and implementing more advanced technology. The primary objective of these recommendations is to maximize service time, thereby contributing to increased hospital efficiency and effectiveness.

METHODOLOGY

This research implements a well-structured procedure in the implementation of Business Process Re-engineering (BPR). The BPR methodology used is a systematic



and structured strategy designed to carry out fundamental transformation and improve the performance of an organization's operational processes (Romadhana et al., 2024). The stages of implementing this method include eight main steps, starting from data collection, process identification, throughput efficiency testing, redesign alternative analysis, IT usage opportunity analysis, recommendation formulation, to comparison of throughput efficiency between the initial process and the improved process, and the final solution.

The stages/methods in Business Process Re-engineering (BPR) include those shown in the following image:

In the throughput efficiency testing and throughput efficiency comparison stages, measurements are made using the following equation:

$$Efisiensi\ Throughput = \frac{\text{Processing time excluding delay}}{\text{Total time in the system}} \times 100\%$$

Throughput efficiency testing is performed by measuring the performance time of business processes based on ASME standards. The results are then compared to

Figure 1. Business Process Reengineering Method

Source: (Romadhana et al., 2024)

assess the difference in efficiency between the original and reengineered business processes (Fetais et al., 2022).

In addition to using the BPR method, this study also applies a qualitative approach using descriptive analysis methods to explore and understand in depth the drug procurement process in hospitals. A qualitative research design was chosen to allow for the collection of rich and contextual data through direct interactions with informants who have in-depth knowledge of the procurement system. The research sample consisted of four key respondents selected based on their roles and involvement in the drug procurement process: one head of procurement, two procurement staff, and one supplier. This sample selection was carried out using a purposive sampling technique, considering that these informants have unique perspectives and valuable information about the operation of the drug procurement system, both from an internal organizational perspective and an external perspective as business partners.

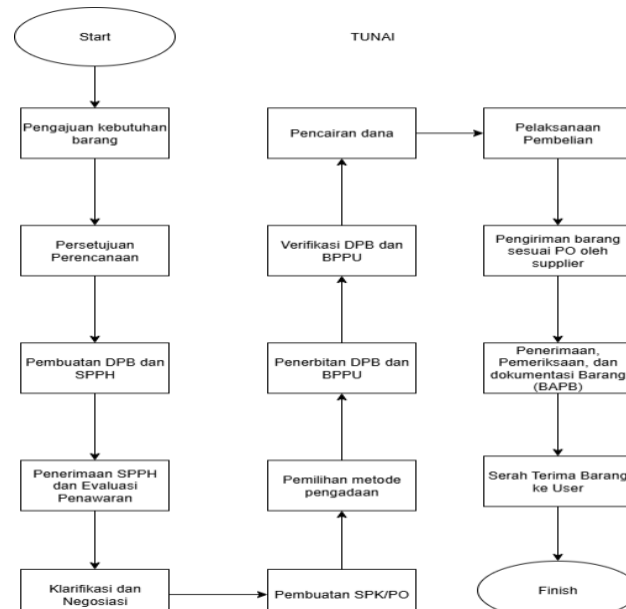
RESULTS AND DISCUSSION

Data collection

This stage is the researcher's initial step in this case study, where the researcher identifies each existing problem and then processes the existing data/documentation collection in the process, which in this case is the drug supply procurement procedure at Hospital X, Bandung City. Data collection is carried out directly by interacting directly with employees and suppliers who are responsible for the procurement procedure. The next step is field observation and direct interviews with stakeholders in the organization, and the final stage is conducting a literature review of books and journals relevant to the concept of Business Process Re-engineering (BPR).

Process Identification

To achieve the objectives of this analysis, the researcher conducted an evaluation to identify existing business processes and their lack of added value, as well as to determine whether any missing processes actually add value. For greater clarity, the author illustrates the drug inventory procurement procedure using the direct cash selection method, as shown in Figure 2 below:



Gambar 1. Identifikasi Proses Pengadaan Obat Langsung Tunai
 Sumber: Data Penelitian, 2025

Throughput Efficiency Test

At this stage, researchers conducted a throughput efficiency test and process mapping using ASME standards to determine the overall business process time percentage, then the results were compared with the new recommended business process. Table 1 illustrates the drug procurement process mapped using an ASME diagram with recorded time calculated based on the Procurement Department's working hours, namely 1 day equals 8 working hours.

Table 1 ASME Standard Business Process Initial Direct Cash Procurement

| No | Direct Cash Procurement Business Process Flow | ○ | ➡ | □ | ◐ | ▽ | ◻ | Process ing Time (Hours) | Process owner |
|----|---|---|---|---|---|---|---|--------------------------|---|
| 1 | Users submit routine requirements with a Goods Delivery Letter (SPB) which includes specifications and a budget of up to IDR 30 million. | ● | | | | | | 8 Hours | User |
| 2 | The Planning Division approves the SPB directly if the budget is available and approved by the Head of Unit and/or Head of Hospital and issues a Procurement Order (PPB), | | | | ● | | | 8 Hours | Planning Division, Unit Head, Hospital Head |
| 3 | The Procurement Section creates a Procurement List (DPB) and a Request for Price Quotation Letter (SPPH), | ● | | | | | | 4 Hours | Procurement Department |
| 4 | Supplier receives SPPH, prepares price quotation, and submits it on schedule. | | | | | ● | | 24 hours | Supplier |

| No | Direct Cash Procurement Business Process Flow | ○ | ➔ | □ | ◐ | ▽ | ◻ | Processing Time (Hours) | Process owner |
|------------------|---|----|----|----|----|---|---|-------------------------|--|
| 5 | The Procurement Department compares prices, quality, delivery times and payment terms, then negotiates for the best conditions. | ● | | | | | | 16 Hours | Procurement Department |
| 6 | The Procurement Department issues a Work Order (SPK) or <i>Purchase Order</i> (PO) to the selected supplier. | ● | | | | | | 8 Hours | Procurement Department |
| 7 | The Head of Procurement selects the procurement method and carries out Direct Cash Procurement (PLT) or Direct Non-Cash Procurement (PLTT). | | | | ● | | | 4 Hours | Head of Procurement |
| 8 | The Procurement Section issues the DPB and Proof of Submission and Receipt of Money (BPPU) | ● | | | | | | 4 Hours | Procurement Department |
| 9 | The Accounting Division receives the DPB and BPPU and verifies them with the approval of the Head of Finance. | | | | ● | | | 8 Hours | Accounting Division, Head of Finance |
| 10 | The cashier section disburses funds and gives them to the Procurement Division. | ● | | | | | | 4 Hours | Cashier Section |
| 11 | The Procurement Division purchases goods | ● | | | | | | 4 Hours | Procurement Department |
| 12 | Supplier sends goods according to PO | | | ● | | | | 8 Hours | Supplier |
| 13 | The Procurement Section together with the Planning Division checks the quantity and quality of goods, and documents the results in the Goods Receipt Report (BAPB). | | | | ● | | | 8 Hours | Procurement Section, Planning Division |
| 14 | The Planning Division distributes goods to users. | | ● | | | | | 8 Hours | Planning Division |
| Number of Stages | | 7 | 2 | 2 | 3 | 0 | 0 | | |
| Total Time | | 48 | 16 | 16 | 36 | 0 | 0 | 116 Hours | |

Source: Research Data, 2025

Table 1 shows the ASME standard map for the procurement procedure for pharmaceutical supplies using the direct cash procurement method, which begins with the User submitting a routine requirement with a Delivery Letter. The process owners in this table are the User, Planning Division, Procurement Department, Supplier, Head of Procurement, Accounting Division, and Cashier Department. The next step is to calculate throughput efficiency by measuring the total service time as follows:

$$\begin{aligned}
 \text{Efisiensi Throughput} &= \frac{\text{Waktu proses bukan tunda}}{\text{Total waktu dalam sistem}} \times 100\% \\
 &= \frac{80}{116} \times 100\% \\
 &= 68.96\%
 \end{aligned}$$

Based on the results of the throughput efficiency test, a value of 68.96% was obtained. Table 1 shows that there are 3 stages of the waiting process with a total time of 36 hours, so the time used for the non-waiting process is 80 hours. Thus, the non-waiting process time of 80 hours divided by the total time of the entire process, which is 116 hours, then multiplied by 100%, obtained the final throughput efficiency result of 68.96%.

Redesign Alternative Analysis

Table 2 Analysis of Alternative Redesign of Direct Cash Drug Procurement Procedures

| No. | Business Process | Refinement Steps |
|-----|---|--|
| 1. | Users submit routine requirements with a Goods Delivery Letter (SPB) which includes specifications and a budget of up to IDR 30 million. | Automate - Implementation of a web/mobile based e-procurement system |
| 2. | The Planning Division approves the SPB directly if the budget is available and approved by the Head of Unit and/or Head of Hospital and issues a Procurement Order (PPB), | Simplify - <i>Multi-level approval workflow</i> automated based on SAP |
| 3. | The Procurement Section creates a Procurement List (DPB) and a Request for Price Quotation Letter (SPPH), | Automate - Automatically generate from the system based on the approved SPB |
| 4. | Supplier receives SPPH, prepares price quotation, and submits it on schedule. | There isn't any |
| 5. | The Procurement Department compares prices, quality, delivery times and payment terms, then negotiates for the best conditions. | There isn't any |
| 6. | The Procurement Department issues a Work Order (SPK) or <i>Purchase Order (PO)</i> to the selected supplier. | There isn't any |
| 7. | The Head of Procurement selects the procurement method and carries out Direct | Eliminate and Automate - Automatic selection |

| No. | Business Process | Refinement Steps |
|-----|---|--|
| | Cash Procurement (PLT) or Direct Non-Cash Procurement (PLTT). | based on a predetermined <i>threshold value</i> (<i>Rule-based automation</i>) |
| 8. | The Procurement Section issues the DPB and Proof of Submission and Receipt of Money (BPPU) | Integrate - Integration with accounting system (SAP FI) |
| 9. | The Accounting Division receives the DPB and BPPU and verifies them with the approval of the Head of Finance. | Automate - <i>Automatic verification</i> based on <i>rule engine</i> |
| 10. | The cashier section disburses funds and gives them to the Procurement Division. | There isn't any |
| 11. | The Procurement Division purchases goods | Eliminate and Automate - PO is sent directly by the system to the supplier |
| 12. | Supplier sends goods according to PO | There isn't any |
| 13. | The Procurement Section together with the Planning Division checks the quantity and quality of goods, and documents the results in the Goods Receipt Report (BAPB). | Simplify - <i>Barcode scanning</i> and digital photos for documentation |
| 14. | The Planning Division distributes goods to users. | There isn't any |

Source: Research Data, 2025

An analysis of redesign alternatives is conducted to identify weaknesses in the initial business process. This stage includes process simplification, process time reduction, error reduction, and standardization and automation.

IT Usage Opportunity Analysis

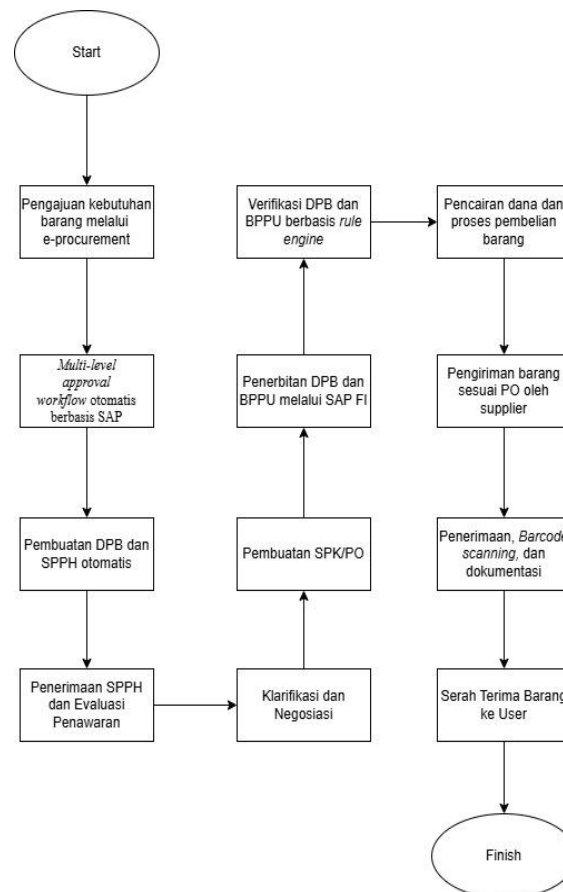
Based on the analysis of the procurement business process redesign, seven key IT components were identified as necessary, including: a web-based and mobile-based E-Procurement System to automate requirement submissions; *Enterprise Resource*

Planning (SAP) for the integration of all business processes; *a Multi-Level Approval Workflow System* to accelerate approvals; *a Rule-Based Automation Engine* for automated decision-making; *a Barcode & QR Code Scanning System* for goods documentation; *Digital Documentation & Image Capture* for electronic documentation; and *a Three-Way Matching System* for automated document verification.

By establishing these components, it is hoped that the redesign using the Business Process Re-engineering (BPR) method can run optimally and more perfectly.

Recommendation


In the previous drug procurement procedure using the direct cash method, an analysis of alternative redesigns was conducted using the Automate (process automation), Simplify (simplification), Eliminate (activity elimination), and Integrate (system integration) strategies. Furthermore, an analysis of opportunities for using information technology was conducted to obtain recommendations for the latest processes.



Gambar 2. Proses Bisnis Pengadaan Persediaan Obat Langsung Tunai Rekomendasi
Sumber: Data Penelitian, 2025

Figure 3 illustrates the new business process resulting from the previous stage. Next, the process was mapped using ASME standards and throughput calculations were performed to evaluate the performance of the new business process.

Table 3 Standard Business Process Direct Cash Procurement Recommendations

| No | Direct Cash Procurement Business Process Flow |  | Processing Time (Hours) | Process owner |
|------------------|---|--|-------------------------|--|
| 1 | Users submit routine requirements through a web-based or mobile <i>e-procurement system</i> . | ● | 0.8 Hours | User |
| 2 | The Planning Division allocates approvals to Planning Divisions, Unit Heads, or Hospital Heads based on configured business rules through an SAP-based <i>multi-level approval workflow</i> . | ● | 2.4 Hours | Planning Division, Head of Unit/Hospital |
| 3 | The Procurement Section creates a Procurement List (DPB) and a Request for Price Quotation Letter (SPPH), | ● | 0.8 Hours | Procurement Department |
| 4 | Supplier receives SPPH, prepares price quotation, and submits it on schedule. | ● | 4 Hours | Supplier |
| 5 | The Procurement Department compares prices, quality, delivery times and payment terms, then negotiates for the best conditions. | ● | 4 Hours | Procurement Department |
| 6 | The Procurement Department issues a Work Order (SPK) or <i>Purchase Order (PO)</i> to the selected supplier. | ● | 0.8 Hours | Procurement Department |
| 7 | The Procurement Section issues DPB and Proof of Submission and Receipt of Money (BPPU) which are fully integrated with SAP Financial (SAP FI), | ● | 0.8 Hours | Procurement Department |
| 8 | The Accounting Division verifies DPB and BPPU by performing <i>automatic verification</i> based on <i>rule engines</i> in real-time, | ● | 0.8 Hours | Accounting Division |
| 9 | The cashier section disburses funds and the Procurement Division purchases goods in cash from suppliers. | ● | 4 Hours | Cashier Section |
| 10 | Supplier sends goods according to PO | ● | 16 Hours | Supplier |
| 11 | The Procurement Section together with the Planning Division checks the quantity and quality of goods, and documents the results in the Goods Receipt Report (BAPB). | ● | 4 Hours | Procurement and Planning Division |
| 12 | The Planning Division distributes goods to users. | ● | 4 Hours | Planning Division |
| Number of Stages | | 6 2 3 1 0 0 | | |

| No | Direct Cash Procurement Business Process Flow |  |  |  |  |  |  | Processing Time (Hours) | Process owner |
|----|---|---|---|---|---|---|---|-------------------------|---------------|
| | Total Time | 11.2 | 20 | 7.2 | 4 | 0 | 0 | 42.4 Hours | |

Source: Research Data, 2025

$$\begin{aligned}
 \text{Efisiensi Throuhput} &= \frac{\text{Waktu proses bukan tunda}}{\text{Total waktu dalam sistem}} \times 100\% \\
 &= \frac{38,4}{42,4} \times 100\% \\
 &= 90.5\%
 \end{aligned}$$

Thus, the results of the throughput efficiency test on the recommendation business process yielded a significant percentage change of 90.5%. This was due to significant changes in eliminating, replacing, and automating several long delays with a more efficient system.

Throughput Efficiency Comparison

The next step is to compare the total time required from the initial process to the final process of direct cash drug procurement between the old and new/recommended methods as a whole. This evaluation not only shows the increased time efficiency of the process but also can demonstrate its impact on costs and service quality. Table 4 presents a comparison between the initial business process and the recommended direct cash drug procurement process at Hospital X.

Table 4 Analysis of Advantages and Disadvantages

| No | Business Process | Throughput Efficiency | | Total Process Speed | |
|----|---|-----------------------|----------------|---------------------|----------------|
| | | Beginning | Recommendation | Beginning | Recommendation |
| 1 | Procurement Process Cash-on-Demand Medicine | 68.96% | 90.50% | 116 Hours | 42.4 Hours |

Source: Research Data, 2025

Table 4 shows that the throughput efficiency between the initial business process and the recommendation results reached 90.50%. Furthermore, the speed of the initial business process and the recommendation also showed a significant decrease from 116 hours to 42.4 hours.

Solution

Based on the test results above and related to the problems faced by the Procurement Department regarding the implementation of the drug supply procurement procedure system, the researcher took several solutions, namely redesigning the drug procurement process by implementing four strategies: Automate (automation of repetitive activities), Simplify (procedure simplification), Eliminate (elimination of unproductive activities), and Integrate (integration of cross-department systems). Where the result is a reduction in process stages that do not impact added value and optimization of each procurement step.

Policy updates such as changes to Standard Operating Procedures (SOPs) for each stage of the process, clear approval authority policies based on procurement value and type, price negotiation guidelines with suppliers, and standardized guidelines for checking the quality and quantity of goods need to be implemented.

In addition, the implementation of the seven information technology components such as web and mobile-based *E-Procurement System*, *SAP ERP for integration of all business processes*, *Multi-Level Approval Workflow* for approval automation, *Rule-Based Automation Engine* for automated decision making, *Barcode and QR Code Scanning* for goods documentation, *Digital Documentation and Image Capture*, and *Three-Way Matching System* for automatic document verification between *Purchase Order*, *Goods Receipt*, and *Invoice* must be integrated.

CONCLUSION

After the researcher described the descriptive implementation of the drug inventory procurement procedure through *the Business Process Re-engineering* (BPR) method, and explained it systematically, the direct cash drug inventory procurement process which had been calculated for efficiency using ASME standards and throughput efficiency showed an efficiency result of 68.96%. After conducting *business process reengineering*, efficiency increased to 90.50%. Thus, it can be concluded that *business process reengineering* succeeded in increasing efficiency by 21.54%. From several solutions described, it also resulted in a reduction in process time reaching 72 hours or more than 63%, increased data accuracy through automation and elimination of manual entry, and operational costs decreased by about 30%.

For further research, it is recommended to conduct a post-implementation satisfaction evaluation of the system changes. This evaluation aims to ensure that the modifications meet expectations and needs. Furthermore, the research can be expanded to include other procurement methods to compare the effectiveness and mechanisms of drug supply procurement. By implementing these recommendations, future research is expected to make a more significant contribution to analyzing and optimizing the drug supply procurement system.

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