Journal of Emerging Information Systems and Business Intelligence
ISSN: 2774-3993
Journal homepage: https://ejournal.unesa.ac.id/index.php/JEISBI/

Implementation of Business Process Reengineering for Efficiency of Raw Material Procurement and Inventory Management at CV Jaya Mitra Chemical

Adinda Nabila Firnanda[1], Ghea Sekar Palupi[2]

[1,2]*State University of Surabaya, Surabaya, Indonesia*

adindanabila.21022@mhs.unesa.ac.id, *gheapalupi@unesa.ac.id*

ABSTRACT

CV. Jaya Mitra Chemical is a company engaged in the sale and purchase of chemical products, providing chemicals (chemical maintenance) for industry, shipping, shipbuilding, and offshore oil drilling. The main problem faced is closely related to the length of the cycle time in the business process, particularly in the procurement and management of chemical raw material supplies. This research was conducted to implement Business Process Reengineering at CV Jaya Mitra Chemical to optimize the company's cycle time efficiency by identifying and correcting weaknesses in the business processes of procurement and management of raw material supplies and to determine the percentage increase in the company's cycle time efficiency resulting from the implementation of Business Process Reengineering in the procurement and management of raw material supplies at CV. Jaya Mitra Chemical. The business process reengineering (BPR) process was assisted by BPMN, value-added analysis, and root cause analysis (fishbone diagram), followed by To-Be modelling using a heuristic redesign approach. After implementing BPR in the procurement and management of raw material inventory (using the CV Delivery Section as the collection method), the average business process cycle time decreased from 3 hours 11 minutes 37 seconds to 1 hour 56 minutes 7 seconds, which means that efficiency increased by 39.4% CTE. There was a reduction in time of 1 hour 15 minutes 30 seconds. Then, in the Procurement and Management of Raw Material Inventory Process (using Gosend courier services), the average business process cycle time decreased from 3 hours 9 minutes 11 seconds to 2 hours 18 minutes 42 seconds, which means efficiency increased by 26.7% CTE and experienced a time reduction of 50 minutes 29 seconds.

Keywords: Business Process Reengineering, Procurement and Management of Raw Materials, BPMN, Cycle Time Efficiency.

Article Info:
Article history:
Received December 9, 2025
Revised February 5, 2026
Accepted February 20, 2026

Corresponding Author
Adinda Nabila Firnanda
State University of Surabaya, Surabaya, Indonesia
adindanabila.21022@mhs.unesa.ac.id

1. INTRODUCTION

The chemical industry is a key driver of Indonesia's economic growth. With a population of around 280 million and abundant natural resources, Indonesia has a great opportunity to become a leader in chemical industry development. According to the website deloitte.com [1], digital transformation in the chemical industry opens up great opportunities to increase product and solution innovation. The growth of the chemical industry goes hand in hand with an

increase in demand for quality chemicals. In providing quality chemicals, companies often face inefficient cycle times in the procurement and management of chemical raw materials, which affect their ability to meet customer demand on time. Maintaining a balance between procurement and inventory management of raw materials that have efficient cycle times is a key factor in maintaining stability and fulfilling orders for customers quickly and on time. This improves service and strengthens the trust of customers in the company.

CV. Jaya Mitra Chemical is a company engaged in the sale and purchase of chemical products, providing chemicals (chemical maintenance) for industry, shipping, shipbuilding, and offshore oil drilling. The main problem faced is closely related to the length of the business cycle, particularly in the procurement and management of chemical raw materials. The procurement process is still carried out in an unplanned manner, where decisions on the purchase of raw materials are based on estimates without the support of accurate and real-time data. This causes delays in procurement due to inaccuracies in determining the timing and quantity of raw material purchases. Furthermore, raw material stock reporting is still carried out via WhatsApp, which not only slows down the flow of information between departments but also increases the risk of miscommunication and delays in decision-making. This condition directly causes the company's cycle time to be inefficient, longer than it should be, and potentially disrupts the smooth running of the production process.

Business Process Reengineering (BPR) is a concept for redesigning business processes that have weaknesses in order to improve organisational performance to be more efficient and competitive [2]. With BPMN, stakeholders can easily understand and discuss proposed changes and monitor BPR implementation effectively. By redesigning business processes using the BPR method, the business process of recording and inputting receipt data increased time efficiency by 78.55% [3]. After business process reengineering, the processing time from project order receipt to product delivery was reduced from 51 days to 27 days, or approximately 46% faster [4]. The implementation of reengineering can save time in the procurement process for production preparation materials, which originally took 3 days, 17 hours, and 30 minutes, to 1 day, 11 hours, and 41 minutes [5]. By implementing Business Process Reengineering, companies can reap various benefits, such as increased operational efficiency, reduced costs, improved product quality, increased customer satisfaction, and enhanced competitiveness.

Based on the above explanation, it can be concluded that cycle time efficiency is a key factor in supporting smooth production processes and business continuity. Therefore, researchers are interested in further examining and conducting research on “Implementation of Business Process Reengineering for Efficiency of Raw Material Procurement and Inventory Management at CV Jaya Mitra Chemical”.

2. METHODS

This research was conducted using the Business Process Reengineering (BPR) and Business Process Model and Notation (BPMN) methods. Bizagi Modeler software was used for business process modelling and simulation. Then, for qualitative analysis, this study employed value-added analysis to map value-added and non-value-added activities, as well as root cause analysis using a fishbone diagram to identify the root causes of problems in the current business process (as-is). Next, the business process improvement design (to-be) was carried out by applying the heuristic redesign principle. This aimed to identify and improve weaknesses in the business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical. The research flow of this study is explained in Figure 1.

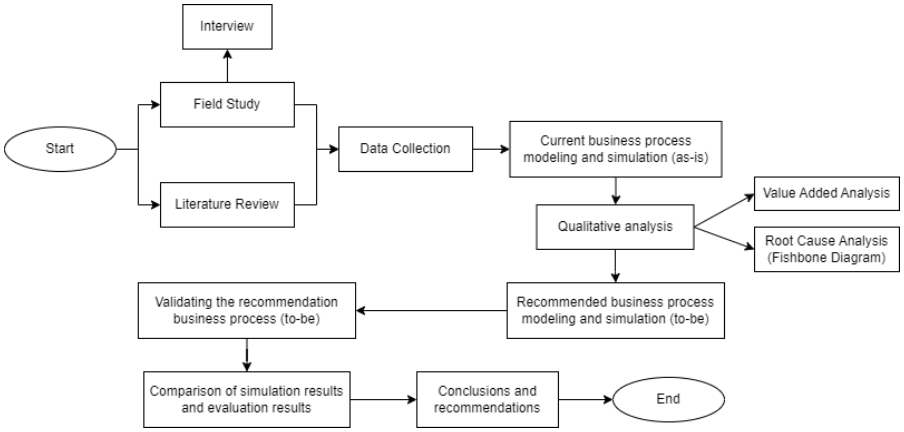

Figure 1. Research Flow

2.1 Field Study

Field studies or identifying problems in this research were conducted by observing and interviewing the owner of CV Jaya Mitra Chemical directly. From the results of this field study, information was obtained regarding the problems or obstacles currently faced in the procurement and management of raw material supplies, which are still inefficient.

2.2 Study Literature

Literature Study by reading and reviewing previous research from various sources, including books, articles, journals, websites, or other literature related to the topics in this study, namely Business Process Reengineering, Business Processes, Raw Material Procurement, Raw Material Inventory Management, BPMN, and Bizagi Modeler.

2.3 Data Collection

Data collection was conducted through interviews and observations with the owner of CV Jaya Mitra Chemical. The data used in this study were on the current business processes for raw material procurement and raw material inventory management at CV Jaya Mitra Chemical.

2.4 Current Business Process Modelling and Simulation (As-Is)

The modelling and simulation of the current business process (As-Is) is carried out to determine in detail how the business process of procurement and management of raw material supplies at CV Jaya Mitra Chemical currently works. This modelling and simulation aims to understand how the actual process takes place in the field, including who is involved, how information and documents flow, and how long each stage takes. The results of interviews and observations can produce an overview of each real process that occurs in the field, which is then visualised using BPMN with the help of Bizagi Modeler software.

2.5 Qualitative Analysis

A qualitative analysis was conducted on the As-Is business process of Procurement and Management of raw material supplies at CV Jaya Mitra Chemical, namely Value Added Analysis and Root Cause Analysis, which can help identify activities that add value and those that do not, find the root causes of inefficiencies or waste in the process, so that the results of this analysis can be used as a basis for designing improvements to the To-Be that are more efficient.

2.6 Recommended Business Process Modelling and Simulation (To-Be)

In the Recommendation Business Process modelling stage, proposals (To-Be) are used to design new business processes that are structured to improve weaknesses found in the As-Is business processes. In this stage, a heuristic approach to business process redesign is used as a guide to design more efficient and effective processes. The heuristic approach used includes various improvement strategies such as activity elimination, contact reduction, activity automation, integration, and other types of heuristics to shorten the process cycle time. By applying these types of heuristics, the designed process is expected to reduce cycle time and speed up the workflow in the procurement and management of raw materials.

2.7 Validating the recommendation Business Process (To-Be)

In the validation stage, the recommended business process (To-Be) in this study was implemented through direct discussions with company owners, who are the primary decision-makers. During the discussion sessions, company owners were asked to provide their opinions (input), views, and considerations regarding whether the proposed process redesign was in line with actual conditions in the field in terms of time efficiency, workflow effectiveness, reduction of non-value-added activities, and improvement of coordination between departments.

2.8 Comparison of Simulation Results and Evaluation Results

Comparing the results of Process Validation, Time Analysis, and Resource Analysis simulations of the As-Is and To-Be business processes obtained from Bizagi Modeler software. Using the Cycle Time Efficiency (CTE) parameter to evaluate and measure the percentage increase in cycle time efficiency from the improvements made [6].

2.9 Conclusions and Recommendations

After comparing the simulation results of the As-Is and To-Be business processes and conducting an evaluation to measure cycle time efficiency, conclusions can be drawn from the research results and relevant suggestions based on the findings obtained. These suggestions may take the form of specific recommendations for improvement, implementation steps, or further research needed.

3. RESULTS AND DISCUSSION

3.1 Data Collection

A. Interviews
   Interviews were conducted directly with the owner of CV Jaya Mitra Chemical with the aim of obtaining information about the profile and business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical.

B. Observations
   Observations were conducted by directly observing the objects to be studied in order to find out how activities or phenomena actually occur in the field. In this study, observations were made to identify the current procurement and management processes for raw material supplies, identify areas for improvement in the procurement and management of raw materials, and identify opportunities to implement business process reengineering in the procurement and management of raw material supplies at CV Jaya Mitra Chemical.

3.2 Current Business Process Modelling and Simulation (As-Is)

At the modelling and simulation stage, an As-Is was carried out to describe the actual conditions of the business processes currently in operation, using Bizagi Modeler software. This is in line with the research conducted by [7], which states that using Bizagi tools to run simulations and prove that the new process design is more time and cost-efficient than the previous process. In the current (As-Is) Raw Material Procurement and Inventory Management business process at CV Jaya Mitra Chemical, the following two delivery methods are used:

A. Business Process Procurement and Inventory Management of As-Is Raw Materials (Order taking method using Delivery Section of CV):

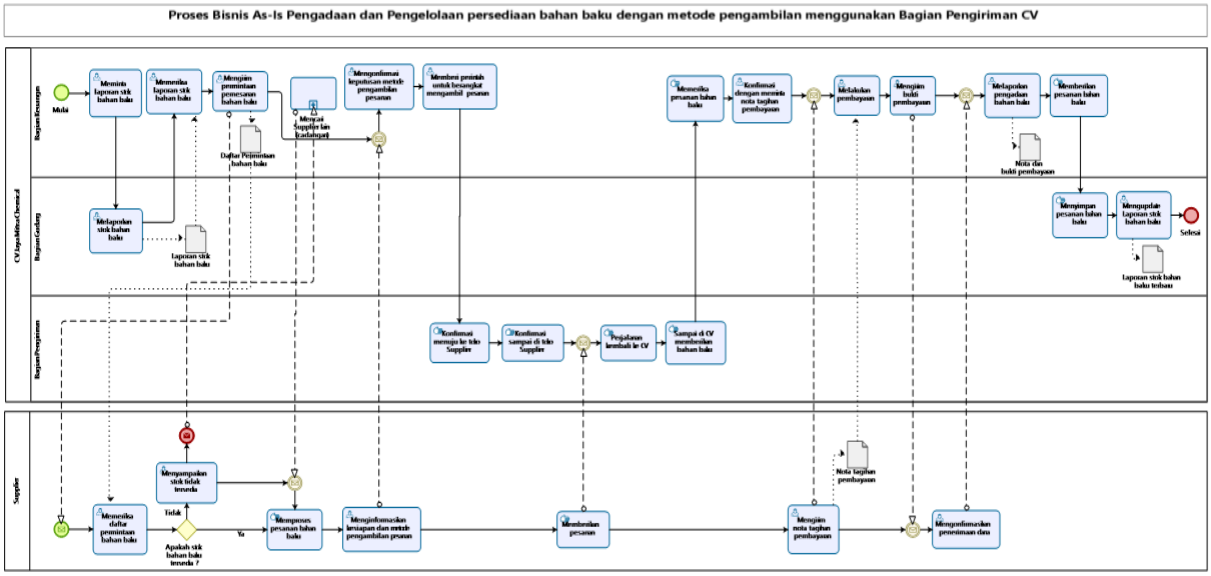

Figure 2. BPMN Procurement & Inventory Management Process of As-Is raw material inventory (Order taking method using Delivery Section of CV)

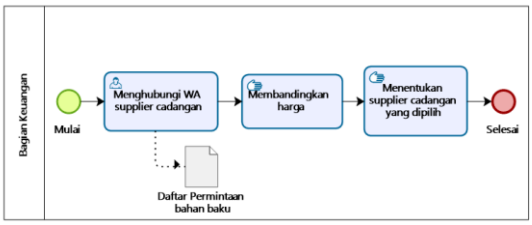

Figure 3. Subprocess of Finding Alternative Suppliers BPMN Procurement and Management of As-Is Raw Material Inventory (Order taking method using Delivery Section of CV)

The following are the simulation results of the Procurement and Management of As-Is Raw Material Inventory business process (Order taking method using Delivery Section of CV):

- **Process Validation:** simulation shows that the process flow has been arranged correctly and can be executed without errors. Every activity in the process is already interconnected, no activity is interrupted or has no continuation direction.
- **Time Analysis:** simulation produces an overview of the time needed to complete the entire process flow from start to finish. From this simulation, it is known that the role of CV Jaya Mitra Chemical (Finance Section, Warehouse Section, Delivery Section) produces a Minimum Time: 1 hour 44 minutes 39 seconds, Maximum Time: 2 hours 4

minutes, Average Time: 1 hour 53 minutes 43 seconds, and Total Time: 1 day 2 hours 15 minutes 24 seconds. As for the Supplier role, it produces Minimum Time: 1 hour 11 minutes 41 seconds, Maximum Time: 1 hour 22 minutes 56 seconds, Average Time: 1 hour 17 minutes 54 seconds, and Total Time: 9 hours 23 minutes 11 seconds.

- **Resource Analysis:** simulation shows human resources and the roles involved during the process. This simulation displays information such as the number of what is percentage utilisation of each role.

B. Business Process Procurement and Inventory Management of As-Is Raw Materials (Order taking method using Gosend Courier Services):

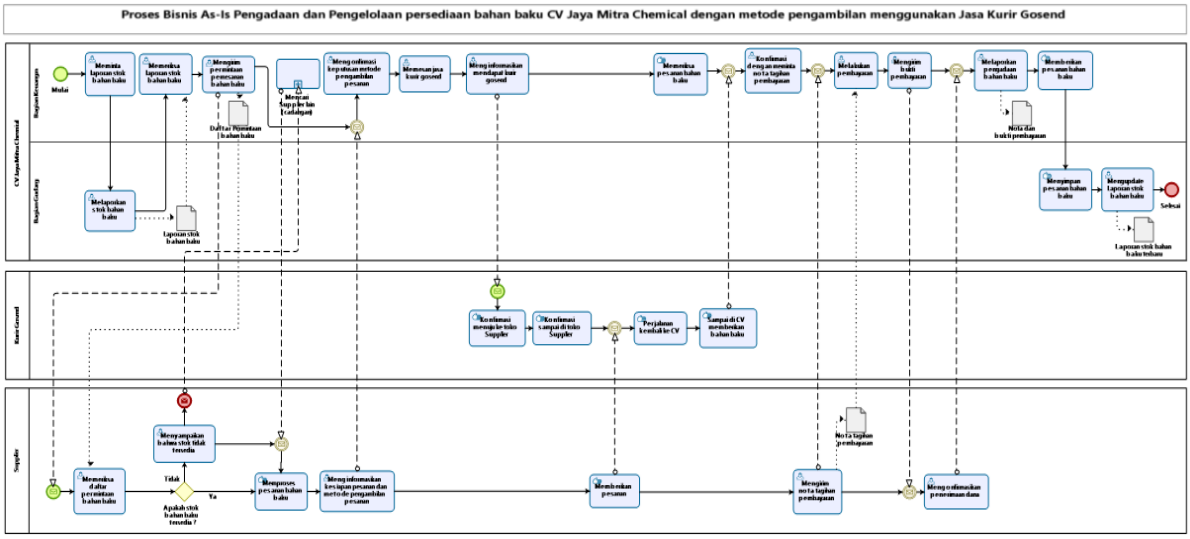

Figure 4. BPMN Process of Procurement and Management of As-Is raw material inventory (Order taking method using Gosend Courier Services)

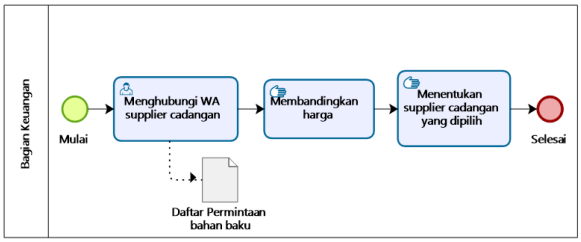

Figure 5. Subprocess of Finding Alternative Suppliers BPMN Procurement and Management of As-Is Raw Material Inventory (Order taking method using Gosend Courier Services)

The following are the simulation results of the Procurement and Management of As-Is Raw Material Inventory business process (Order taking method using Gosend Courier Services):

- **Process Validation:** simulation shows that the process flow has been arranged correctly and can be executed without errors. Every activity in the process is already interconnected, no activity is interrupted or has no continuation direction.
- **Time Analysis:** simulation produces an overview of the time needed to complete the entire process flow from start to finish. From this simulation, it is known that the role of CV Jaya Mitra Chemical (Finance Department, Warehouse Department) produces a Minimum Time: 1 hour 33 minutes 17 seconds, Maximum Time: 1 hour 53 minutes 2 seconds, Average Time: 1 hour 42 minutes 19 seconds, and Total

Time: 8 hours 5 minutes 48 seconds. For the Gosend Courier role, it produces Minimum Time: 17 minutes 11 seconds, Maximum Time: 21 minutes 20 seconds, Average Time: 19 minutes 18 seconds, and Total Time: 2 hours 34 minutes 29 seconds. As for the Supplier role, it produces Minimum Time: 1 hour 2 minutes 44 seconds, Maximum Time: 1 hour 12 minutes 37 seconds, Average Time: 1 hour 7 minutes 34 seconds, and Total Time: 4 hours 38 seconds.

- **Resource Analysis:** simulation shows human resources and the roles involved during the process. This simulation displays information such as the number of what is the percentage utilisation of each role.

3.3 Qualitative Analysis

A. Value Added Analysis

The first qualitative analysis was conducted on the As-Is business process of Procurement and Management of raw material supplies at CV Jaya Mitra Chemical, namely the Value Added analysis technique. This analysis was used to identify and assess whether each activity in the process provided added value or not.

Activities that are considered Value-Added (VA) are those that directly provide value to customers. These activities do not need to be eliminated, but can be improved to be faster or more efficient. Business Value-Added (BVA) refers to activities that are not directly visible to customers but are still crucial for business operations. These activities should be simplified or automated to minimise the time they consume. Non-Value-Added (NVA) refers to activities that are not beneficial to customers or the company. These activities need to be eliminated because they make the process inefficient. The use of this analysis in previous research conducted by [8] shows that value-added analysis can identify which activities provide added value and which do not. Activities that do not provide added value can be removed or replaced at a later stage. These findings are then used as a basis for redesigning business processes (To-Be) to make them smoother and more efficient.

Table 1. Value Added Analysis As-Is business process Procurement and Management of raw material inventory

No	Process/Activity	Classification	Role
1.	Requesting raw material stock reports to the Warehouse Section via WA	NVA	Finance Section
2.	Reporting the stock of raw materials in the current warehouse via WA	NVA	Warehouse Parts
3.	Checking the raw material stock report sent by the Warehouse Section via WA	BVA	Finance Section
4.	Send a request for raw material order to the Supplier via WA	VA	Finance Section
5.	Check the list of raw material requests from the Finance Department via WA (Is raw material stock available?)	BVA	Supplier
6.	Contacting the Finance Department to inform you that the stock is not available	BVA	Supplier
7.	Contacting the WA supplier backup	BVA	Finance Section
8.	Compare prices	BVA	Finance Section
9.	Determining the selected backup supplier	BVA	Finance Section

No	Process/Activity	Classification	Role
10.	Processing raw material orders according to the raw material request list from the Finance Department	VA	Supplier
11.	Inform order readiness and order collection method (Whether it will be picked up by the Delivery Section from CV or taken using the *gossend* courier services) to the Finance Department via WA	BVA	Supplier
12.	Confirm the decision of the order taking method, i.e. taken by the CV Delivery Section or taken using *Gossend* courier services	NVA	Finance Section
13.	Giving an order to the Delivery Section to depart to pick up the order from the Supplier Store	NVA	Finance Section
14.	Order Gosend *courier services* on the Gojek application to pick up orders at the Supplier's store	VA	Finance Section
15.	Inform about *the Gosend* courier who will take the order to the Supplier	BVA	Finance Section
16.	Confirmation of departure to the Supplier Store	VA	Delivery Section / GoSend Courier
17.	Confirmation arrives at the Supplier Store for raw material collection	VA	Delivery Section / GoSend Courier
18.	Deliver a pre-prepared order	VA	Supplier
19.	Journey back to CV with an order	VA	Delivery Section / GoSend Courier
20.	Arriving at CV to place an order with the Finance Department	BVA	Delivery Section/ GoSend Courier
21.	Checking raw material orders	BVA	Finance Section
22.	Confirm by requesting an order payment bill note to the Supplier via WA	BVA	Finance Section
23.	Send a payment bill note to the Finance Department via WA	BVA	Supplier
24.	Make a payment with a fund transfer	BVA	Finance Section
25.	Send proof of payment to the Supplier via WA	BVA	Finance Section
26.	Confirm receipt of funds	BVA	Supplier
27.	Reporting on the procurement of raw materials by keeping notes and proof of transfer in the form of photos, images/screenshots	BVA	Finance Section
28.	Delivering raw material orders to the Warehouse Section	VA	Finance Section
29.	Storing raw material orders from the Finance Department	BVA	Warehouse Parts
30.	Updating the raw material stock report	NVA	Warehouse Parts

B. Root Cause Analysis

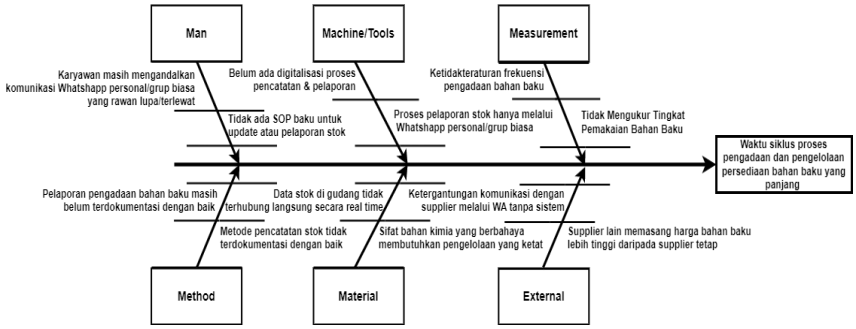

Figure 6. Fish Bone Diagram of Root Cause Analysis

After conducting a root cause analysis using a fishbone diagram, it was identified that the main problem faced was the long procurement cycle time and raw material inventory management. The analysis using the Fishbone Diagram grouped the contributing factors into several categories, namely Man, Method, Material, Machine, Measurement, and External/Environment. Each category contains specific obstacles that contribute to the length of the cycle time, including:

Table 2. Categories, Obstacles, and Risks of Fishbone Diagram Results

Category	Obstacles	Risk
Man	- Employees still rely on Casual WhatsApp communication that is prone to forgetting/missing - No Standard SOP for stock *updates* or reporting	- Slow communication, longer wait time - Forgetting *to update* stock on time so that stock data is inaccurate
Method	- Reporting on the procurement of raw materials is still not well documented - The stock recording method is not Well-documented	*Chat* or WhatsApp conversations are easy to get drowned in among other conversations. If you want to find old conversation history, sometimes you have to search for it one by one
Material	- Harmful chemical properties requires strict management - Stock data in the warehouse is not connected live in real *time*	- Procurement data is difficult to track - Raw material orders can be incorrect due to inaccurate stock data
Machine/ Tools	- Stock reporting process only via WhatsApp personal/regular group - There is no digitalisation of the process yet Recording & Reporting	- Reports are not neatly documented - Data is difficult to access quickly
Measurement	- Frequency irregularities procurement or purchase of raw materials - Not Measuring the Consumption Rate of Raw Materials	Risk of waste of raw materials due to the usage record
External/ Environment	- Communication dependence on supplier through WA without a system - Other suppliers set the price of raw materials higher than regular suppliers	- If the main supplier is slow to respond, procurement is hampered - Purchase costs increase if you have to buy from an alternative supplier suddenly

3.4 Recommended Business Process Modelling and Simulation (To-Be)

In redesigning the to-be business process in the implementation of Business Process Reengineering (BPR), redesign heuristics are used as guidelines for finding solutions. This is in line with the theory [9], which states that Business Process Redesign (BPR) can be implemented more effectively by utilising a set of redesign heuristics that serve as practical rules/guidelines for producing radical, efficient, and measurable process designs. Through heuristic approaches such as control relocation, contact reduction, integration, and automation of activities, each part of the procurement and management process for raw materials is improved according to the company's needs and capabilities.

Table 3. Applications of Heuristic Approach for To-Be Business Processes Procurement and Management of Raw Material Inventory

Business Process *As-Is*	**Role**	**Heuristic Types**	**To-Be *Business Process***	**Argument**
Requesting raw material stock reports to the Warehouse Section via WA	Finance Section	Activity Elimination	-	Avoid repetitive communication and reduce wait times
Reporting the stock of raw materials in the current warehouse via WA	Warehouse Parts	Integration and Automation of Activities	Update stock reports regularly in the "*Update* + material stock production" group in WhatsApp Community	Avoid repetitive communication and reduce wait times
Checking the raw material stock report sent by the Warehouse Section via WA	Finance Section	Integration and Automation of Activities	Check the raw material stock report of the "*Update* + material stock production" group in WhatsApp Community	To improve accuracy, so that raw material stock data can be updated in real *time* without the need to wait
Send a request for raw material order to the Supplier via WA	Finance Section	Activity Composition	Submit booking requests and pickup method decisions	Combine activities to avoid repetitive communication
Inform order readiness and order collection method (Whether it will be picked up by the Delivery Section from CV or taken using *Gossend* courier services) to the Finance Department via WA	Supplier	Activity Composition	Inform order readiness and order payment bill notes via WA	Combine activities to avoid repetitive communication
Confirm the decision of the order taking method, i.e. taken by the CV Delivery Section	Finance Section	Activity Elimination	-	To simplify the communication process and avoid repetitive communication
Giving orders to the Delivery Section to depart to pick up orders to the Supplier Store via WA	Finance Section	Reduce Contact	Call the Delivery Section to depart to pick up the order from the Supplier Store	Switch from WA chat communication media to a live phone to speed up order response and reduce wait times
Confirm by requesting an order payment bill note to the Supplier via WA	Finance Section	Activity Elimination	-	To simplify the communication process and avoid repetitive communication

Send a payment bill note to the Finance Department via WA	Supplier	Activity Elimination	-	To simplify the communication process and avoid repetitive communication
Reporting on the procurement of raw materials by keeping notes and proof of transfer in the form of photos, images/screenshoots	Finance Section	Integration and Automation of Activities	Reporting on the procurement of raw materials by saving notes and proof of transfer in the form of photos/screenshots and uploading them to *Google Drive*	To document in a more organised and searchable way
Updating the raw material stock report	Warehouse Parts	Integration and Automation of Activities	Update stock reports regularly in the "*Update* + material stock production" group in WhatsApp Community	To avoid repetitive communication and reduce wait times

From the table above, there are 11 business processes in the procurement and management of raw material inventory at CV Jaya Mitra Chemical that can be redesigned using a heuristic-type approach. So the following is a redesign or *redesign* of the recommended business process *(To-Be):*

A. Business Process Procurement and Inventory Management of To-Be Raw Materials (Order taking method using Delivery Section of CV):

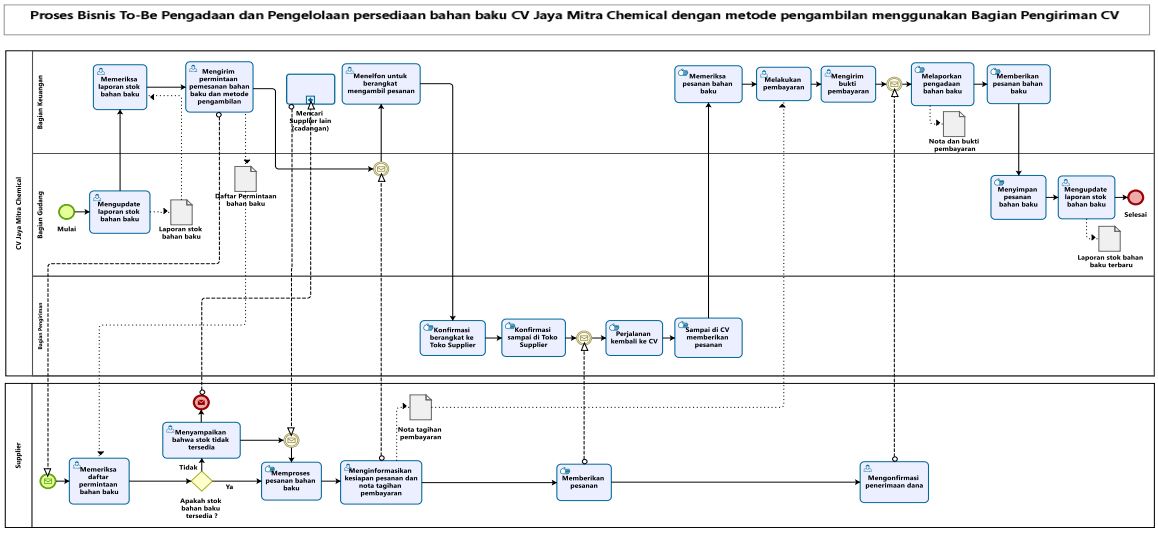

Figure 7. BPMN Procurement and Management Process of To-Be Raw Material Inventory (Order taking method using Delivery Section of CV)

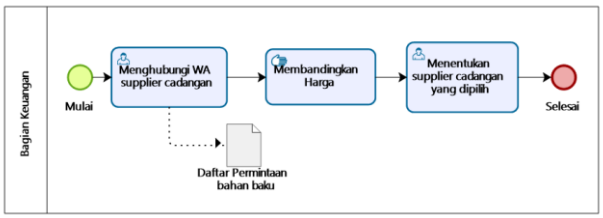

Figure 8. Subprocess of Finding Alternative Suppliers BPMN Procurement and Management of To-Be Raw Material Inventory (Order taking method using Delivery Section of CV)

The following are the simulation results of the Procurement and Management of To-Be Raw Material Inventory business process (Order taking method using Delivery Section of CV):

- **Process Validation:** simulation shows that the process flow has been arranged correctly and can be executed without errors. Every activity in the process is already interconnected, no activity is interrupted or has no continuation direction.
- **Time Analysis:** simulation produces an overview of the time needed to complete the entire process flow from start to finish. From this simulation, it is known that the role of CV Jaya Mitra Chemical (Finance Department, Warehouse Section, Delivery Section) produces a Minimum Time: 1 hour 21 minutes 24 seconds, Maximum Time: 1 hour 33 minutes 14 seconds, Average Time: 1 hour 28 minutes 38 seconds, and Total Time: 17 hours 47 minutes 18 seconds. As for the Supplier role, it produces Minimum Time: 23 minutes 33 seconds, Maximum Time: 32 minutes 31 seconds, Average Time: 27 minutes 29 seconds, and Total Time: 7 hours 38 minutes 47 seconds.
- **Resource Analysis:** simulation shows human resources and the roles involved during the process. This simulation displays information such as the number of what is percentage utilization of each role.

B. Business Process Procurement and Inventory Management of To-Be Raw Materials (Order taking method using Gosend Courier Services):

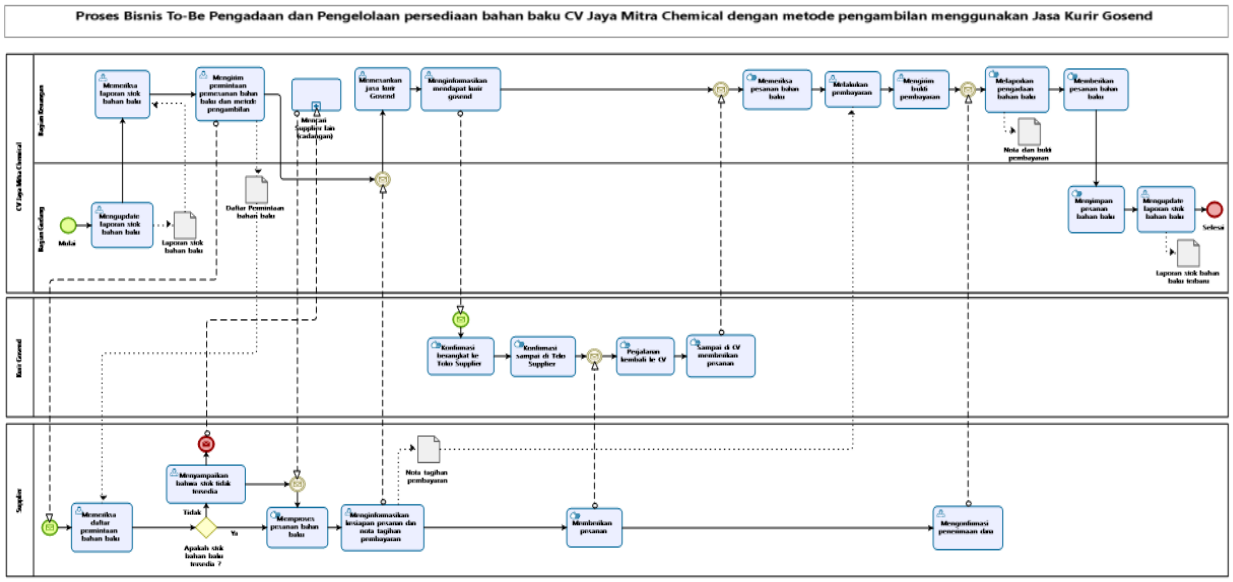

Figure 9. BPMN Procurement and Management Process of To-Be Raw Material Inventory (Order taking method using Gosend Courier Services)

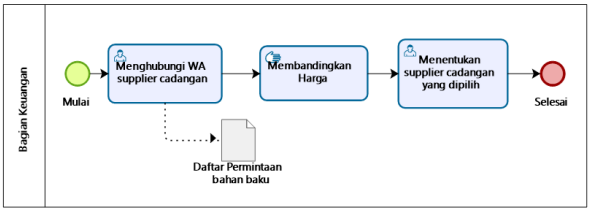

Figure 10. Subprocess of Finding Alternative Suppliers BPMN Procurement and Management of To-Be Raw Material Inventory (Order taking method using Gosend Courier Services)

The following are the simulation results of the Procurement and Management of To-Be Raw Material Inventory business process (Order taking method using Gosend Courier Services):

- **Process Validation:** simulation shows that the process flow has been arranged correctly and can be executed without errors. Every activity in the process is already interconnected, no activity is interrupted or has no continuation direction.
- **Time Analysis:** simulation produces an overview of the time needed to complete the entire process flow from start to finish. From this simulation, it is known that the role of CV Jaya Mitra Chemical (Finance Department, Warehouse Department) produces a Minimum Time: 1 hour 24 minutes 35 seconds, Maximum Time: 1 hour 34 minutes 37 seconds, Average Time: 1 hour 29 minutes 22 seconds, and Total Time: 5 hours 52 minutes 48 seconds. For the Gosend Courier role, it produces Minimum Time: 17 minutes 45 seconds, Maximum Time: 21 minutes 38 seconds, Average Time: 20 minutes, and Total Time: 2 hours 40 minutes 6 seconds. As for the Supplier role, it produces Minimum Time: 25 minutes 45 seconds, Maximum Time: 32 minutes 7 seconds, Average Time: 29 minutes 20 seconds, and Total Time: 3 hours 54 minutes 44 seconds.
- **Resource Analysis:** simulation shows human resources and the roles involved during the process. This simulation displays information such as the number of what is the percentage utilization of each role.

3.5 Validating the recommendation Business Process (To-Be)

This validation process aims to ensure that the proposed improvements are truly in line with the actual conditions of the company. The process, which takes place internally, allows for a more effective business evaluation [5]. In this process, owners will be asked to provide their opinions on each proposed improvement (redesign) using a heuristic approach.

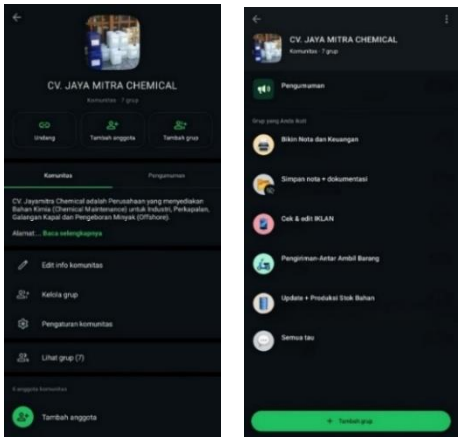

Figure 11. Creation of WA Community for CV Jaya Mitra Chemical

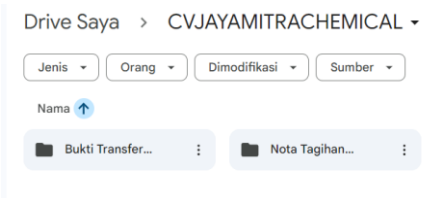

Figure 12. Creation of Google Drive for storing notes and transferring receipts

The results of the discussion by asking for opinions from the CV Owner became the basis for the implementation of 11 redesigns with a heuristic approach in the business process of procurement and management of raw material inventory, so that the improvements made were truly directed, acceptable, easy to run by the company and so that they had the greatest impact on the cycle time and process efficiency. This validation process is also the basis for the new business process to be run and supported by the owner and all employees in the company.

3.6 Comparison of Simulation Results and Evaluation Results

At this stage, a comparison and evaluation of the results of the As-Is and To-Be business process simulations is carried out. A comparison of the results of the time analysis and resource analysis simulations is carried out to see the difference in performance between the business process before improvement (As-Is) and after improvement (To-Be). Time analysis is used to measure how long it takes to carry out each activity or process in the business process, while resource analysis looks at how resources such as labor, departmental roles, and workloads are utilized during the process. Through this simulation, it can be seen whether there has been a significant reduction in time and workload after the redesign process.

Percentage increase in cycle time efficiency from improvements made to the business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical (Order taking method using Delivery Section of CV):

Table 4. Comparison of the results of the Time Analysis simulation of the Procurement Process and management of raw material inventory (Order taking method using Delivery Section of CV) As-Is and To-Be

Time	As-Is *Business Process*	To-Be Business Process	CTE (%)
Min *Time*	2 hours 56 minutes 20 seconds	1 hour 44 minutes 57 seconds	40.5%
Max *Time*	3 hours 26 minutes 56 seconds	2 hours 5 minutes 45 seconds	39.2%
Avg *Time*	3 hours 11 minutes 37 seconds	1 hour 56 minutes 7 seconds	39.4%
Total Time	1 day 11 hours 38 minutes 35 seconds	25 hours 26 minutes 5 seconds	28.7%

The comparison shows a reduction in cycle time, reflecting improvements in processes/activities. The minimum time shows a reduction of 1 hour 11 minutes 23 seconds, the maximum time shows a reduction of 1 hour 21 minutes 11 seconds, the average time shows a reduction of 1 hour 15 minutes 30 seconds, and the total time shows a reduction of 10 hours 12 minutes 30 seconds. These figures show that after implementing BPR, business processes run faster and more efficiently, with shorter cycle times.

Resource	Utilization
Bagian Keuangan	77.00 %
Bagian Gudang	25.44 %
Bagian Pengiriman	45.68 %
Supplier	52.85 %

Resource	Utilization
Bagian Keuangan	57.85 %
Bagian Gudang	27.66 %
Supplier	61.18 %
Bagian Pengiriman	58.91 %

Figure 13. Comparison of Resource Analysis simulation results from As-Is and To-Be business processes Procurement and management of raw material inventory at CV Jaya Mitra Chemical (Order taking method using Delivery Section of CV)

So, based on the image above, it can be concluded that the comparison of resource analysis simulations shows utilization (use of human resources) in the business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical (Order

taking method using Delivery Section of CV). Utilization of the Finance Department (from 77.00% to 57.85%) decreased due to improvements made in the process, such as the integration and automation of activities, the merging of similar activities, and the reduction of contact or repetitive activities, thereby lightening the workload of the Finance Department and Warehouse Department and making them more efficient. This decrease in utilization indicates that the implemented process improvements have successfully optimized resource allocation, minimized manual work, and enhanced the overall efficiency of business processes. Meanwhile, utilization in the Warehouse Department (from 25.44% to 27.66%), Suppliers (from 52.85% to 61.18%), and the Delivery Section (from 45.68% to 58.91%) increased due to adjustments in workflows and roles and responsibilities to support a more efficient distribution flow.

Percentage increase in cycle time efficiency from improvements made to the business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical (Order taking method using Gosend Courier Services):

Table 5. Comparison of the results of the simulation of Time Analysis of the Procurement Process and management of raw material inventory (Order taking method using Gosend Courier Services) As-Is and To-Be

Time	As-Is *Business Process*	To-Be Business Process	CTE (%)
Min *Time*	2 hours 53 minutes 12 seconds	2 hours 8 minutes 5 seconds	26%
Max *Time*	3 hours 26 minutes 59 seconds	2 hours 28 minutes 42 seconds	28.2%
Avg *Time*	3 hours 9 minutes 11 seconds	2 hours 18 minutes 42 seconds	26.7%
Total Time	14 hours 40 minutes 55 seconds	12 hours 27 minutes 38 seconds	15.1%

The comparison shows a reduction in cycle time, reflecting improvements in processes/activities. The minimum time shows a reduction of 45 minutes and 7 seconds, the maximum time shows a reduction of 58 minutes and 17 seconds, the average time shows a reduction of 50 minutes and 29 seconds, and the total time shows a reduction of 2 hours, 13 minutes, and 17 seconds. These figures show that after implementing BPR, business processes run faster and more efficiently, with shorter cycle times.

Resource	Utilization
Bagian Keuangan	87.52 %
Bagian Gudang	24.93 %
Supplier	53.37 %
Kurir Gosend	33.36 %

Resource	Utilization
Bagian Keuangan	68.04 %
Bagian Gudang	27.30 %
Kurir Gosend	43.27 %
Supplier	63.44 %

Figure 14. Comparison of Resource Analysis Simulation Results from As-Is and To-Be business processes Procurement and management of raw material inventory at CV Jaya Mitra Chemical (Order taking method using Gosend Courier Services)

So, based on the image above, it can be concluded that the comparison of resource analysis simulations shows utilization (use of human resources) in the business processes of procurement and management of raw material supplies at CV Jaya Mitra Chemical (using Gosend courier services). The utilization of the Finance Department (from 87.52% to 68.04%) has decreased due to improvements made in the process, such as the integration and automation of activities, the merging of similar activities, and the reduction of contact or repetitive activities, so that the workload in the Finance Department has become lighter and more efficient. This decrease in utilization indicates that the implemented process improvements have successfully optimized resource allocation, minimized manual work, and enhanced the overall efficiency of business processes. Meanwhile, utilization in the Warehouse Department (from 24.93% to 27.30%), Suppliers (from 53.37% to 63.44%), and Gosend Couriers (from

33.36% to 43.27%) increased due to adjustments in workflows and roles and responsibilities to support a more efficient distribution flow.

CONCLUSION

Based on the results of previous research, this study focuses on the application of Business Process Reengineering (BPR) in the procurement and management of raw material supplies, with a focus on optimizing cycle time efficiency. The application of Business Process Reengineering (BPR) combined with BPMN, followed by value-added analysis and root cause analysis (fishbone diagram), and then To-Be modelling using a heuristic redesign approach, successfully helped identify various weaknesses in the current business process (As-Is), such as the long cycle time of the procurement and management of raw material inventory due to slow employee responses to messages via WhatsApp, stock recording methods that still use WhatsApp and are not well documented, procurement decisions based solely on estimates, and others. Through the BPR approach, business processes (To-Be) were redesigned with a focus on optimizing cycle time efficiency. The results show improved coordination between departments, reduced task duplication, process consolidation, and accelerated decision-making and process implementation. Based on the results of the analysis and simulations that have been carried out, in the Procurement and Management Process of raw material supplies (using the CV Delivery Section for collection), the average business process cycle time decreased from 3 hours 11 minutes 37 seconds to 1 hour 56 minutes 7 seconds, which means that efficiency increased by 39.4% CTE and there was a reduction in time of 1 hour 15 minutes 30 seconds. Then, in the Procurement and Management of Raw Material Inventory Process (using Gosend courier services), the average business process cycle time decreased from 3 hours 9 minutes 11 seconds to 2 hours 18 minutes 42 seconds, which means efficiency increased by 26.7% CTE and experienced a time reduction of 50 minutes 29 seconds. This shows that the BPR successfully simplified the process flow and improved the cycle time efficiency of the procurement and management of raw material inventory.

Recommendations for CV Jaya Mitra Chemical are to consider implementing BPR in the procurement and management of raw material supplies through the elimination of activities, composition of activities, integration and automation of activities, reduction of contact, and the addition of resources to support smooth business processes and optimize the company's cycle time efficiency. For further research, the focus should be expanded beyond the procurement and inventory management processes to include other business processes. It is also recommended that future research not only measure efficiency in terms of cycle time, but also consider the cost-benefit analysis of implementing BPR.

REFERENCES

[1] "The future of digitalization in the chemical industry Digital transformation in chemicals," *deloitte*, 2019. https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/future-of-digitalization-in-the-chemical-industry.html

[2] D. A. Pradhipta, W. Suharso, and M. S.Kom., M.kom, "Business process reengineering pada kejaksaan negeri Batu," *J. Repos.*, vol. 1, no. 2, p. 159, 2020, doi: 10.22219/repositor.v1i2.255.

[3] O. Karina, N. Amalia, T. A. Nugrahani, D. A. Retnani, and A. Y. Ariyanto, "Rancang Ulang Proses Bisnis Pada Usaha Dibidang Direct Selling Pada Cv Xyz," *Cetak) J. Innov. Res. Knowl.*, vol. 3, no. 12, pp. 2367–2382, 2024.

[4] R. Nurcahyo, Z. Z. Z. Indramawan, Z. Z. Z. Yadrifil, M. Habiburrahman, and N. Wibowo, “Business process re-engineering for reducing time of procurement and inventory process in telecommunication tower company,” *Proc. Int. Conf. Ind. Eng. Oper. Manag.*, vol. 0, no. March, pp. 2460–2469, 2020.

[5] D. T. Saputro, “PEMBUATAN PROSES BISNIS PERSIAPAN MATERIAL UNTUK PRODUKSI DENGAN BUSINESS PROCESS MODELLING NOTATION (BPMN) DI PABRIK GENERATOR SETS (GENSET) PT ABC,” vol. 2, no. 1, p. 6, 2021.

[6] I. Asfy Fakhry Anto, “Rekayasa Proses Bisnis Sistem Surveilans Penyakit Tidak Menular berbasis IoT,” *J. Nas. Tek. Elektro dan Teknol. Inf.*, vol. 9, no. 4, pp. 336–342, 2020, doi: 10.22146/jnteti.v9i4.671.

[7] F. Fitria, N. R. Feta, and D. Satria, “Procurement Business Process Reengineering in Manufacturing Companies Using Business Process Analysis Methods,” *J. Pilar Nusa Mandiri*, vol. 18, no. 2, pp. 139–144, 2022, doi: 10.33480/pilar.v18i2.3481.

[8] W. J. Raharjo, W. Sil, and S. Widodo, “Rekayasa Ulang Proses Bisnis Layanan Data Pada Institusi Manajemen Aset,” *J. Ilm. Komputasi*, vol. 21, no. 4, pp. 617–628, 2022, doi: 10.32409/jikstik.21.4.3205.

[9] H. A. Reijers and S. Liman Mansar, “Best practices in business process redesign: An overview and qualitative evaluation of successful redesign heuristics,” *Omega*, vol. 33, no. 4, pp. 283–306, 2005, doi: 10.1016/j.omega.2004.04.012.