Business Process Reengineering of the Procurement Process at PT PAR an Oil and Gas Company

Rhamdalia Fanny Gustaji, S.Tr.T., M.A.B.[1], Azzahra Valiza Gustaji[2]

[1]Universitas Negeri Jakarta

[2]Universitas Logistik dan Bisnis Internasional

ABSTRACT: The procurement sub-department at PT PAR, an Indonesian oil and gas company, faced significant operational inefficiencies, causing project delays and a 10% budget overrun. An analysis of its auction-based workflow revealed that the performance decrease was due to numerous non-value-added activities. This paper details a Business Process Reengineering (BPR) initiative aimed at enhancing service performance. Through modeling and simulation with Bizagi Modeler, and while adhering to company regulations, two critical activities were modified. This targeted redesign successfully increased the procurement success rate by 29% and reduced the maximum processing time by 8.3% working days. The study concludes by recommending the adoption of the new process, supported by four key actions: minimizing waste activities, realigning the organizational structure, integrating software, and establishing a new standard operating procedure (SOP).

KEYWORDS: Business Process Reengineering (BPR), Bizagi Modeler Simulation, Performance and Process Simulation, Procurement, Performance Improvement, Oil and Gas Company.

INTRODUCTION

Exploration and production of crude oil in PT PAR involves the cross-functional department. For instance, the finance department, drilling department, health, and safety department, supply chain department, and many more. The procurement subdepartment is part of the supply chain management department responsible for procuring goods and services for internal users in the company. The internal users are engineers and warehouse employees in PT PAR. Based on the internal company's data, purchasing requests from users is up to 300 requests per year (2021-2022). A user from the drilling department explains that in 2022 drilling site increased to 11 rigs. Therefore, more projects and more purchase requests are planned in the future. Users create project scheduling to monitor their ongoing projects, which include the procurement process. Procurement activity is part of the project which is crucial. Therefore, delayed goods or services impact the project delay and scheduling and increase the cost by 10% of the budget. With a tight budget and schedule, the users expect all procurement processes to be on time.

Users criticised the Supply Chain Management department in May 2022 for decreasing the procurement process's service time performance. Users should wait for the procurement process for more than 120 days. Meanwhile, the procurement process regulation states that the auction process for goods is 60 working days and for services is 120. The author conducts preliminary research. The primary purpose is to analyse the current performance and current business process. The outcomes are: (1) the procurement process performance is unstable and incapable. It is away from the determined target of 90% service level within the standard time based on its PPM and Cpk values, and (2) non-value-added and non-essential activities exist in the current business process.

Based on the preliminary study outcome, the company knows its business process needs to be reviewed and updated. However, the preliminary research does not include the complete cycle of re-engineering, the bottle neck in the current process, and the new design of the business process.

Therefore, this research paper aims to reengineer the procurement business process at the procurement department PT PAR using a business process reengineering approach. The purpose is to find a suitable new business process or To-Be design for the procurement process and recommendation activity to support the new business process. The author conducts a time analysis simulation of As-is and To-Be business process design using Bizagi Modeler software. The idea of simulation is to know the design's impact on the process's time and the number of successful processes. The paper's outline is as follows: section one is the

introduction, section two is the literature review, section three is the research methodology, section four is the results and discussion, and section five is the conclusion and recommendation.

LITERATURE REVIEW

A. Supply Chain Management (SCM) and Procurement Process

According to Simchi-Levi and Kaminsky (2021), Supply chain management is the knowledge that efficiently integrates suppliers, manufacturers, warehouses, and stores. Therefore, the right quantities and qualities of products and services produced could be distributed to suitable locations and at the right time. The SCM department in a company should be efficient and cost-effective across the chain with a systematic approach, considering customer and value requirements. Erdison, et al. (2022) said the business process involved in the supply chain includes procurement, manufacturing, marketing, logistics, and information systems.

According to Lysons and Farrington (2020), procurement is a business management part that identifies, finds sources, gains access, and manages external resources to give the best supply outcome the organisation needs to fulfil its stakeholder's objectives. According to Baily et al., (2008) Procurement is a strategic role that needs specialist understanding and skills — for instance, liaison and collaboration with cross-functional departments like legal, finance, and security. It also requires the skills to manage relationships with key strategic suppliers, negotiate with suppliers, find alternative suppliers, know the goods or services procured, and monitor the lead time.

B. Business Process Reengineering

Business Process Re-engineering is a management approach examining the current business process to seek dramatic performance improvement into specific requirements (Du Plessis in Mohapatra, 2012). Re-engineering is associated with a radical change in business processes (Dumas, et al., 2018) by eliminating unnecessary procedures and simplifying, unifying, and automating processes. (Hammer and Champy, 1993) Collecting information about significant activities of the process is the initial step to understanding the business process. Therefore, constructing the process map or mapping the business process can be more accessible and precise. The mapping effectively illustrates and pictures how a process should perform from beginning to finish. The process map contains the workflow, individuals' duties, and performance indicators (Dumas, et al., 2018). An exact process map minimises repeating or failing a process.

Mohapatra (2012) explains that the reengineering method begins with identifying the current business process and what kind of activity involves in the process. Then, creating the As-Is design or visualisation of the current business process, then reviewing or evaluating whether it needs to be updated and re-engineer. It considers the value of the activity with the value-added analysis. Next, finding the problems or bottlenecks in the process. Finally, create a To-Be design that proposes new business process solutions. Last, testing and implementing the To-Be design to know the impact on the performance. The cycle could be repeated, especially when the company constantly looks for improvement.
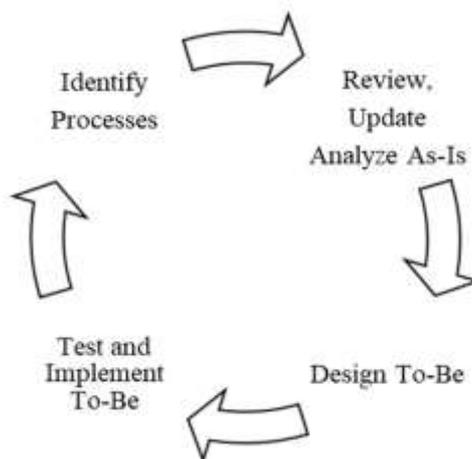

Figure 1. The cycle of business process reengineering

According to Mohapatra (2012), the benefit of reengineering the business process are: (1) Empowering employees, (2) Eliminating waste, unnecessary management overhead, and obsolete or inefficient processes, (3) Significant reductions in cost and cycle times, (4) Enabling revolutionary improvements in many businesses processes, (5) Helping top organisations to become effective competitors.

Hung (2010) confirmed that implementing the new business process should be supported by process alignment between people involvement and organisational performance, which includes Horizontal Structure Alignment, IT Alignment and Strategic Alignment, and People Involvement, which provides for Executive Commitment and Employee Empowerment. According to Semler in Hung (2010), the level of success in implementing a new business process involves executive commitment and empowering employees to perform strategic action under a suitable structure and usage of IT.

C. Bizagi Modeler (Modelling and Simulation)

Bizagi is a Business Process Management solution that enables organisations to design, model, integrate, automate, and monitor their business processes through a graphical environment. It is the quickest and most efficient way to improve processes continuously. (Studer, 2009) Bizagi Modeler is helping in mapping the business process with Business Process Modelling and Notation (BPMN) language standard. BPMN concentrates on describing the operational task to produce the results. It can contain a piece of information (data), an organisation involves (who, where), a behavioural (when, how), and a function focus (what). (Jaklic, et al., 2006). Bizagi Modeler is equipped to model business processes, simulate, analyse diagrams, what-if analysis or create a specific scenario.

According to Khosnevis (1994), a simulation is an experimental approach. The purpose is to generate conditions from an existing model to test or experiment (Dewantari, 2018). Ekoanindiyo (2011) explains that simulation is also a collection of methods and applications created and runs to mimic a system's behaviour, using a computer with software that is as needed. Wainer and Monsterman (2009) illustrate that experiments must be carried out on the system to create the most optimal system. However, doing it directly to the system will be dangerous, costly, and high risk. Therefore, simulation can be the answer to seeing a model's performance without disturbing the current system.

RESEARCH METHODOLOGY

The author conducts preliminary research. The procurement sub-departments current performance and business process using statistical process control and a business process management approach. The outcomes are: (1) the procurement process performance is unstable and incapable. It is away from the determined target of 90% service level within the standard time based on its PPM and Cpk values, and (2) non-value-added and non-essential activities exist in the current business process.

Therefore, the preliminary research's outcomes underlying this paper.

This research is conducted with primary data through a qualitative approach: interviews and discussions with Supply Chain Managers Mr. AFY and procurement employees Mr. FGP and Mr. AR. The purpose is to collect data, information, and understanding about the procurement department and auction process from their perspective. Then, construct the business process modelling and notation using the Bizagi Modeler in the form of As-is and To-Be design. Afterwards, verify the AsIs design and To-Be design to the company. After the designs are approved, the author can move to another process. Next, collecting data through time analysis simulation of As-Is and To-Be design of procurement business process using Bizagi Modeler. The simulation result is underlying to create recommendation activities for supporting the new business processes. The flowchart of the research methodology is shown in Figure 3.
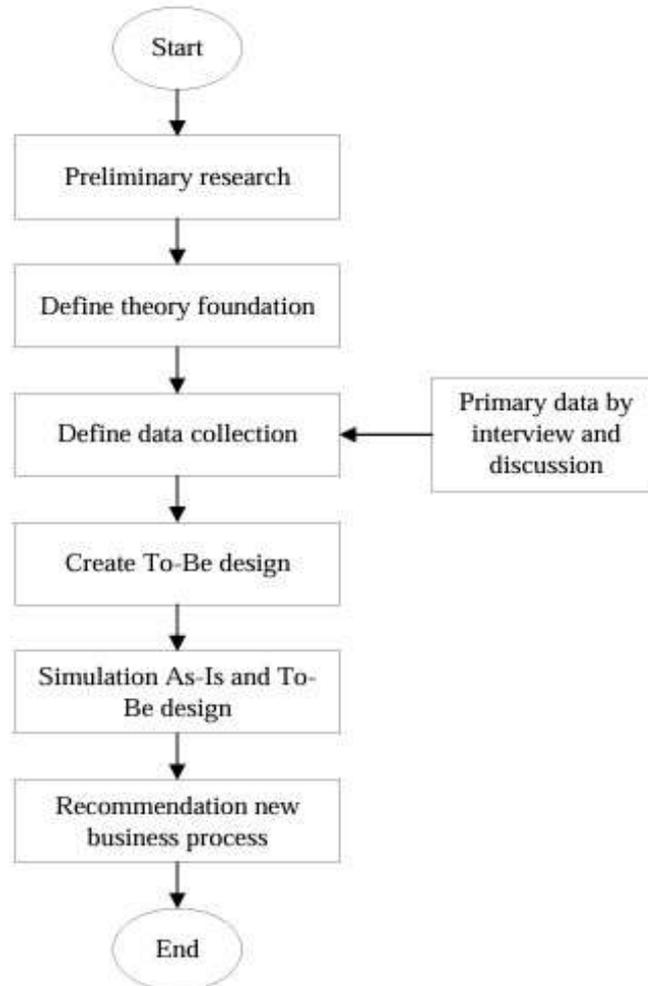
Figure 3. Flowchart of Research

RESULTS AND DISCUSSION

A. The As-Is Design

The author constructs the current business process model or As-Is design to understand the procurement process better. The author visualised the As-Is model using the Bizagi Modeler tool with the BPMN language standard. The stakeholders involved in the procurement process are the SCM manager, assistant procurement manager, procurement analyst, and vendors. In summary, the procurement process is sequentially the pre-qualification process, auction process, determining the winner, and lastly, creating purchasing order.

In the As-Is design, all the documents are in hard copy form. Therefore, relatively takes more time to check and revise. The current software is only integrated with some procurement processes. In the preliminary research, the As-Is-design was evaluated using value-added analysis. The judgement about the value of each activity is based on a discussion between the author and the supply chain management department employees. To distinguish between each activity value, the author applies a colour representing the result of the value-added analysis. The yellow represents a value-added and essential activity, the blue represents a non-value-added but essential activity, the red represents a non-value-added and non-essential activity, and the green represents the explanation of the gateway activity. Figure 4 shows the As-Is design.

Figure 4. As-Is Design of Procurement Process

B. The To-Be Design

The author tries to create the To-Be design based on the value-added of the activity, the company's regulation, and the capability of the company to adapt. Then, validating the model with procurement employees. Figure 5 shows the visualisation of the To-Be design using Bizagi Modeler.

Figure 5. To-Be Design of Procurement Process

The To-Be design modifies two activities in the process: "overview by SCM manager" and "disposition of purchase request." The author can not change the rest of the process due to company regulations. The process "overview by SCM manager" has a gate of decision "pass or not" in As-Is design. In the To-Be design, the decision gate is deleted. To support this, the author suggests the company have a document check list before users submit their purchases request. In future practice, the company suggests integrating its new software called GEP SMART, which supports the procurement process. Therefore, the company could use the software to help the SCM Manager check the purchase request document faster, send approval in real-time, and eliminate incomplete purchases requests. The assistant manager does the "disposition of purchase request" process. In As-Is-design, the process has a gate of the decision whether the purchase request is categorised as subsurface or surface work. Then, the assistant manager distributes to the surface or subsurface procurement analyst. In the To-Be design, the author deleted the decision gate due to the re-organization of the procurement sub-department organisation structure plan in December 2022. The procurement sub-department does not categorise its procurement analyst and purchase request by surface or subsurface. Every analyst expected can work on any purchase request. This cut off the decision time for assistant managers.

C. Simulation of As-Is and To-Be design using Bizagi Modeler The simulation might be different from the actual situation due to limited resources. The simulation's purpose is to illustrate that the To-Be design could positively impact the current business process – increasing the performance of the procurement process based on time process and increasing resource output.

Bizagi Modeler cannot compare two designs in one run simulation for the disclaimer. Therefore, the author makes the same scenario for each design. Another limitation, the gateway form cannot add the duration of the gateway activity. Thus, the author adds another task form to explain the gateway activity and duration. The scenario for simulation is as follows: (1) Purchase requests as input resources are 300 based on the workload of procurement employees per year, (2) The duration of the procurement process is 365 days or a year, (3) Base time unit in days, (4) The simulation carried out is a time analysis.

In the As-Is design, 50 purchased request documents are instantly returned to the users due to the decision gate of checking documents by the SCM manager. Currently, users can send incomplete purchase request requirements with the intention to be processed immediately. However, the vague and unclear requirements will be returned to users under the SCM manager's judgment. The SCM manager needs more time to check the document in hardcopy form and sign it manually. Therefore, in the simulation, the author set the probability of the decision gateway of "checking purchase requirement document pass or not" as 80% passed and 20% returned to users. In the As-is design, the probability of the decision gateway "check for the announcement" of the pre-qualification result is 60% of the vendor passing to the next auction stage, and 40% is rejected. Currently, vendors' documents are in hardcopy form, and often unqualified vendors are trying to submit the auction process. Meanwhile, the To-Be design changes the probability to 80% passed and 20% rejected. The author suggests that the company be supported with integrated software for the procurement process, which will eliminate unqualified vendors faster at the beginning of registration. The As-Is and To-Be design simulation shows a looping document due to the process of "aanwidjzing", i.e. the activity of explanation of the expected and required goods or services that are procured. In the As-Is design, the "aanwidjzing" process has a low probability of success – 60% is passed, and 40% is rejected. Therefore, more looping documents happened in the process, which is 381 documents.

The "aanwidjzing" process involves three stakeholders: procurement analysts, users, and vendors and the process is categorised as a value-added and essential activity. Due to the complexity of the product or services requested, unclear requirement, or incomplete document from user request, "aanwidjzing" does not enough on one occasion. Consequently, the stakeholders involved need more time for the activity. In the To-Be design, the author changes the probability to high to success – 70% is passed, and 30% is rejected. Thus, the looping is lower, with only 274 documents. To support the To-Be design, the company should improve its information system. It can use its procurement software GEP SMART to integrate the procurement process end-to-end, eliminate incomplete and unclear purchase requests from users, stop unqualified vendors, and create the vendor database to select the compliant vendor easier. The results of the simulation are summarised in Table 1.

Table 1. Summarise simulation results

Diagram	Max. time (days)	Average time (days)	Purchase request, which instantly returned	Looping documents	Total Success Procurement Process
As-is diagram	96.55	47.37	50	381	115
To-be diagram	88.46	60.38	0	274	162

CONCLUSION

Based on the results of the research can be concluded that the As-Is design should be reengineered to gain better performance. The author proposed to-be design as a business solution. The to-be design modifies two activities regarding "overview by SCM manager", "disposition of purchase request", and the probability of three checking activities. To-Be design can reduce the procurement process time by 8.3% and increase the process's success by 29% compared to As-Is design. The simulation proved that the To-Be design is beneficial to be implemented in the company. Four recommended activities for supporting the company in the new procurement sub-department business process are: (1) Minimise the duration of the nonvalue added andnon-essential activities, (2) Alignment of organisational structure with new business processes, (3) Integrating the current software, and (4) Creating standard operational procedures (SOP) for applying new business processes.

This research completes the cycle of business process reengineering with a proposed new business process model to rid the process bottleneck. Being equipped with recommendation activities can help the company to implement the new business process in the procurement process. Simulating two designs can save money and decrease the risk of failure in making the decision.

Based on the result of the research, one future research recommendation is to extend monitoring and documenting the new business process implementation in the company and seek continuous improvement.

RECOMMENDATION

The supply chain is a part that exists in every industry and plays a strategic role.The company should apply continuous improvement to keep competitive in the industry. The improvement could be achieved with the new business process.
Supporting the new business process, the author recommends the company to considerate:

A.   Minimise the duration of the non-value added and non-essential activities

The duration of the process "receive pra- qualification announcement" and "receive elimination announcement by vendors" can be minimised due to non-value-added and non- essential processes. The author recommends making a public announcement. Therefore, the vendor can self-check the result. Another option is blasting announcement emails to all registered vendors. It is more efficient time than making personal announcements one by one.

The company should look at continuous improvement to minimise non-value-added activities by doing the business process management cycle.

B.   Alignment of organisational structure with new business processes

Empirical studies by Hung (2006) describe the alignment of the organisation with new business processes as the key to success. In December 2022, the SCM department prepared to reorganise the organisation horizontally to remove the title procurement analyst with surface or subsurface specialisation. Therefore, each analyst expected can work on any purchase request. To support this, it is recommended to build knowledge-sharing systems between analysts and get proper training regarding supply chain management, procurement, and logistics certified by professional independent certification companies such as BNSP and LSP Migas.

More decisive leadership and commitment from SCM managers and top management towards managing core business process processes and giving more authority to employees to manage their work. It tends to achieve better organisational performance (Hung, 2006).

The author recommends doing a workload analysis. Based on the interview with analysts, they are commenting on the unbalanced workload between analysts. With a defined workload analysis, the SCM department can choose the processing time to match the number of human resources (analysts) needed in procurement activity to pursue the target that the SCM department has defined. C. Integrating the current software

The existing software mySAP, PIS, and GEP SMART did not integrate. The software in essence, is easier for procurement analysts in procurement activity. GEP SMART is the newest developing software in the company. The author saw that GEP SMART has the potential to integrate and accommodate all the procurement processes end-toend. During the design and installation of software, Short and Venkrataman (1992) recommend to involves the business process point of view to reduce the integration problem and increase the success rate. Also enhance the performance of the cross-functional department, cross-divisional, and even cross-company processes.

Therefore, it is necessary to integrate GEP SMART based on the new business process. In future practice, the users can submit the complete purchase request through the software. Accessible tools for checking and approval for SCM managers. Monitoring, creating dashboards, and process tracing are developed as an alert system for every activity carried out so that every activity delay can be monitored and followed up quickly. The SCM managers could give autonomy to the procurement analyst's progress while monitoring the software.

D. Creates Standard Operational Procedure (SOP) for applying new business process

Supporting the new business process needs a new end-to-end SOP regarding the procurement process. The author recommends that the company create a new SOP – defining the duration of each activity, who is doing what, and what the activity flow is.

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