Business Process Analysis in Revenue Administration in the Oil and Gas Drilling Services in Indonesia: A Case Study

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Abstract

The oil and gas drilling process in its implementation has a work agreement contract process that will affect activities from drilling services into organizational income. In this paper, the authors conduct research on the business processes that occur in a drilling service organization in the revenue line, such as making billing documents for the work done. We validate the equality of information criteria with experts in the administration of drilling services with information criteria in public administration. Finally, the business processes that occur and the comparison of the duration of the process in the drilling service standard with the realization process are also described to identify the problem and determine the possibility for business processes development with BPR. The information criteria in the revenue administration process in the drilling service sector can be said to be the same as the information criteria in public administration. so that information must be correct, comprehensive, actual, and accessible. for further research, business process reengineering may be needed in the revenue drilling service line. Thus, it can also be concluded that Business process reengineering can be carried out on business processes in this drilling service.

Keywords
Business Process, Administration, Drilling and Information Technology, case study.

1. Introduction
Oil and gas in Indonesia are needed components for the sustainability of the activities of the Indonesian people. The international energy agency predicts that the demand for oil and gas will continue to increase until the middle of the 21st century. Over the past 20 years the demand for oil and gas has grown rapidly, and dependence on oil and gas imports has increased (Li Guoxin et al. 2020). In order to meet this demand, oil and gas drilling service organizations must be prepared to face the increasing demands. Increasing demand forces organizations to innovate continuously in response to changes that occur (Xinbo Sun et al. 2021).

In order to make billing documents in drilling services, the documentation of drilling service is needed for administration process. Based on (Patrik T. et al. 2020), administration is is needed for all industrial activities as a supporting process. It's a process whose purpose is to manage administrative needs.

This research will take a case study at Indonesian oil and gas drilling services organization, there is work to be done and there are wages for work. As a drilling service provider organization that has many customers, it has administration that tends to refer to speed and validity. With the use of technology used in the company for the billing process it is still classified as manual, this cause widespread effects of human error for repetitive activities. Inefficient activities such as making sudden reports by workers who are taking care of administrative activities also occur, one of which is due to incomplete integration in processes that are not visible and influential. For example, such as billing activities to customers which require attaching many minutes, and there may be several amendments or changes to the agreed contract but at that time there is also a request for another report so that many errors are found in the process and cause data processing from a location that produces a value from a work is not right. The drilling service organization currently has business processes that have an impact on the administrative process since the site work is completed and until the billing document is completed. The process that is currently running is a

hard copy document that moves from place to place and causes piles of documents when entering the queue to get payment approval for the work that has been done.

1.1 Objectives

This research was conducted to develop a limited to administrative business process in the oil and gas drilling service in a drilling service organization and has a research scope on the revenue administration workflow of drilling services.

This study aims to identify the problem and determine the possibility for business processes development in the oil and gas drilling service specifically revenue process. For that the authors conducted research at a drilling services organization, which is a drilling service organization in Indonesia. Variables that may affect this research are time process, and the components of other activities that participate in the administrative work process.

2. Literature Review

2.1 Information Exchange in Administration

Administrative activities are driven mainly by information in the form of documents or forms, the form of management and standardization of these activities can provide substantial synergy (Folmer E. et al. 2015). The purpose of administration is to manage administrative needs. This process is needed for all industrial activities as a supporting process (Patrik T. et al. 2020). Based on (Folmer E. et al. 2015) about information criteria in public administration and business are related to their business processes. Therefore, the information provided must be accessible, actual, correct, and understandable.

2.2 Information Technology Support

The information technology industry is one of the fastest growing and dynamic industries in the global economy, it is also undergoing a major transformation in the current Industry 4.0 era (Beier G. et al. 2020). With the evolution of Information Technology, it can provide support for administrative infrastructure, business processes and employee skills (Mohsen A. 2003). For this reason, there is a need for development in terms of business processes, of course, associated with information technology which is developing rapidly to meet customer needs quickly.

Support from Information Technology, which is end-to-end on the object of development, can assist organizations in providing efficient services (Folmer E. et al., 2015). Information systems are used to organize and provide support for business processes and as a framework within each organization. In the writings of Emmanuel A. et al. (2020), Conceptual of information systems by Piccoli (2014) which states that information systems are formal, socio-technical, organizational system designs for collecting, storing and distributing information. There are four components that can be grouped into technical and social sub-systems. Social sub-systems rely on technology and processes, while social sub-systems rely on structures and people. The process component refers to the business process. Structure and people refer to the organizational and individual rules that are part of an information system. And technology refers to software and hardware elements (Emmanuel A. Et al. 2020).

2.3 Business Process

Business process is a combination of procedures or related activities that have been determined to realize a policy goal, usually in the functional structure of the organization and the process can reach different organizations or within one organizational unit (Chinosi M. and Alberto Trombetta A. 2011). The business processes that are run will be related to the scope of administration.

2.4 Business Process Reengineering

To improve or enhance an organization, BPR can be an effective method (Gerhard N. and Andrew U. F. 2004). Business process reengineering or commonly called business process reengineering (BPR) can be classified as a method that can improve systems that were previously considered more conventional or older, as well as BPR that focuses on the scope of business processes within the organization (Nathael A. and M. Dacyar 2020).

Reengineering is can be the first step to improve organization that need an easier flow of business processes. Innovation can also be a thing that needs more attention (Mohsen A. 2003).

Based on previous research (Selma R. M. and M. Dachyar 2020), there are stages in using the BPR method as follows:

1. problem identification.
2. modeling current business processes.
3. process mapping.
4. selection of which process to reengineer.
5. understanding of the selected process.
6. process redesign.
7. implementation of new processes.

2.5 Changes Using Business Process Reengineering

Changes to a business process radically are needed to produce an integrated system quickly in the current era such as the Covid-19 pandemic era. Every organization is forced to uphold efficiency and speed, especially in the service sector. Business process reengineering or so-called business process reengineering (BPR) can be defined as a method that focuses on the analysis of a business process within an organization to improve or replace systems that are considered conventional or older than their successors (Nathael A. and M. Dachyar 2020). Business process reengineering (BPR) can gain significance as a hierarchical driver with different techniques and for cross-organizational coordination. Some reengineering is needed to prepare business processes between work units.
The most popular best practices in BPR best practice (Mansar and Reijers 2007) are considered in this study, as follows:

1. Task Composition:
   combine small tasks into combined tasks and divide large tasks into workable small tasks
2. Task Elimination:
   Eliminate unnecessary tasks in business processes
3. Integral Technology
   Applying new technology to elevate physical constraints in a business process
4. Order assignment
   Let single orders executed by workers do as many steps as possible
5. Empower
   Reduce middle management and give workers authority to most of decision-making
6. Resequencing
   Move tasks to more appropriate places
7. Specialist-generalist
   Consider to make resources more generalist or more specialized
8. Parallelism
   Consider whether tasks can be parallel executed
9. Integration
   Consider integration with business process of the supplier or a customer
10. Numerical involvement
    Minimize number of groups, persons, departements that involved in a business process

3. Methods

The initial stage of this research is to study literature from various journals, studies, and other articles. then determine the formulation of the problem, the object of research, problem boundaries, research topics. after that in the next stage, namely modeling and analysis, at this stage research was carried out on administration in the revenue line in the field of drilling services. To investigate habits in process, can use interviews, observations, trials, and survey and questionnaire methods (Yan Feng et al. 2020). Then, observations and interviews on selected case studies and made an overview of existing business processes, after that validation of the process and information criteria with drilling experts was carried out. Validation of information criteria is carried out because the administration is concerned with the exchange of information. In order to find out more about the information, the Delphi method can be used for modification based on previous works (A.A. Olsen et al. 2021). If the data is valid, then an analysis of the process is carried out with literature such as BPR and BPR best practices. To understand and improve the system, it can be through analyzing its business processes (Dorman C. et al. 2009) The last stage is making conclusions from the analysis (Figure 1).

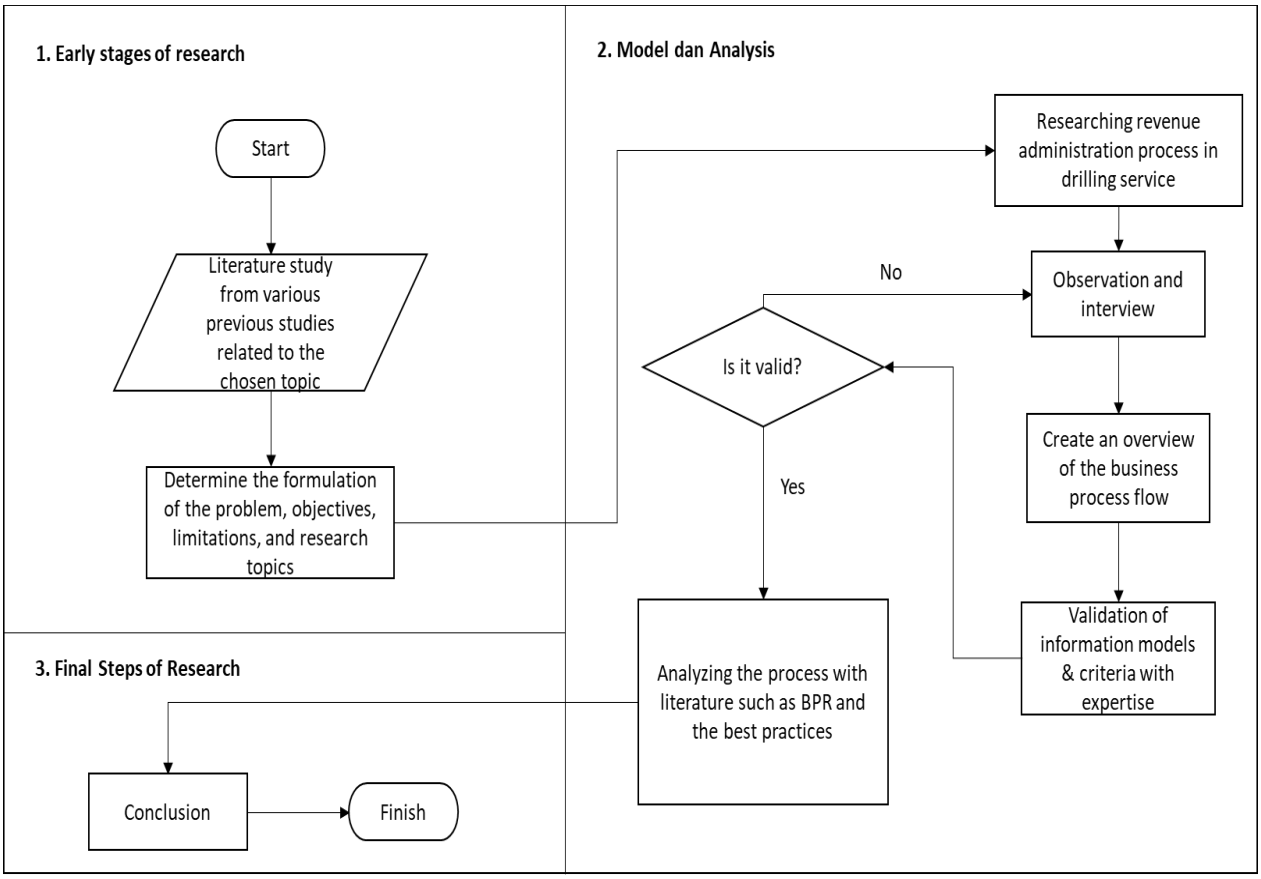

Figure 1. Research Methodology

The administrative-related data is not general data, so the authors conducted internal interviews with the company's expertise. In this case, it is necessary to observe the system that the author wants to identify and it is necessary to conduct interviews with the actors or managers of the oil and gas drilling service sector. Data in the implementation of business processes at the drilling services will be needed to become the basis for comparison and development of business processes.

This study also uses a systematic literature review to identify and assess case studies with previous research. Opinions from drilling services experts using the Delphi method to find out how influential these criteria are in their business processes, then validation is carried out with a survey on information criteria with levels using a Likert scale. The Delphi method allows researchers and educators to answer research questions (A.A. Olsen et al. 2021). This method uses questions based on previous research.

4. Data Collection

To measure the weighting of the criteria carried out in the case study site, in this study a geomean >3.5 = accept was used, so the information criteria were considered acceptable in the drilling service sector in Indonesia. The following is a table 1 of results from a survey to the drilling services organization experts based on information criteria selected from the paper about public administration by Folmer E. et al. (2015).

Table 1. Likert Scale of Criteria Information

No.	Factor	Likert Scale with Drilling Expert Respondent	Geomean	Result

		SM	UMM	DS	MARH	RF	WFS	D		
1	Are the "must be correct" information criteria important in the Business Administration Process Reengineering?	5	5	5	5	5	5	5	5.00	Accept
2	Are the criteria for "must be comprehensible" information important in the development of administrative business processes?	5	5	5	5	5	4	5	4.84	Accept
3	Are the criteria for "must be actual" information important in the development of administrative business processes?	5	5	5	5	5	5	5	5.00	Accept
4	Are the criteria for "must be accessible" information important in developing administrative business processes?	5	5	5	5	4	4	5	4.69	Accept
5	Can the completeness of the information be categorized into the "must be correct" criteria for information?	5	5	5	5	5	5	5	5.00	Accept

The assessment of information criteria by these experts is related to the standards set for the length of time for administrative business processes related to billing documents that require quite intense information exchange with each related function (table 2, figure 2).

Table 2. Collection Period as Indicator

Performance Indicator - Collection Period			
Year	Target (Day)	Realization (Day)	Unit Data
2018	90	89	936
2019	89	104	1330
2020	90	136	1640

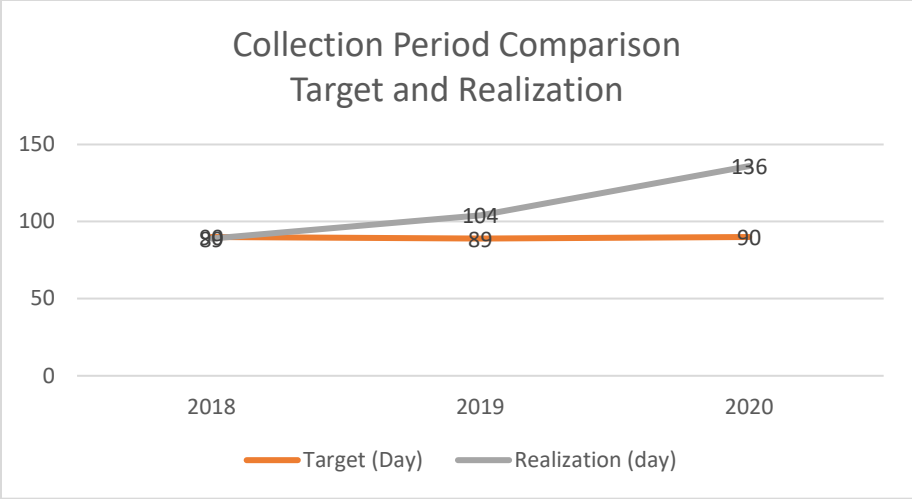

Figure. 2. Collection Period Comparison

Performance indicators are seen from the collection period target, which is compare the realization day with the target day. Secondary data obtained from the drilling services as Table 2 that shows in 2018, 89 realization day with 936 units data processed, 104 realization day with 1330 units data processed, and in 90 realization day with 1640 units data processed. It can be interpreted that the day of the realization process is getting higher depending on the amount of data processed. It can also be seen in chart 1 that every year the day of realization continues to increase due to the data being processed continues to increase.

Secondary data from the drilling services related to administration for the cause of the realization day exceeding the target day was also obtained as follows (figure 3):

1. Physical approval of data causes documents to be long delivered, especially when the relevant officials are carrying out work from home because covid-19 situation.
2. Speed of preparing location information which is used as raw material for billing services
3. Customer's Budget Exceeded

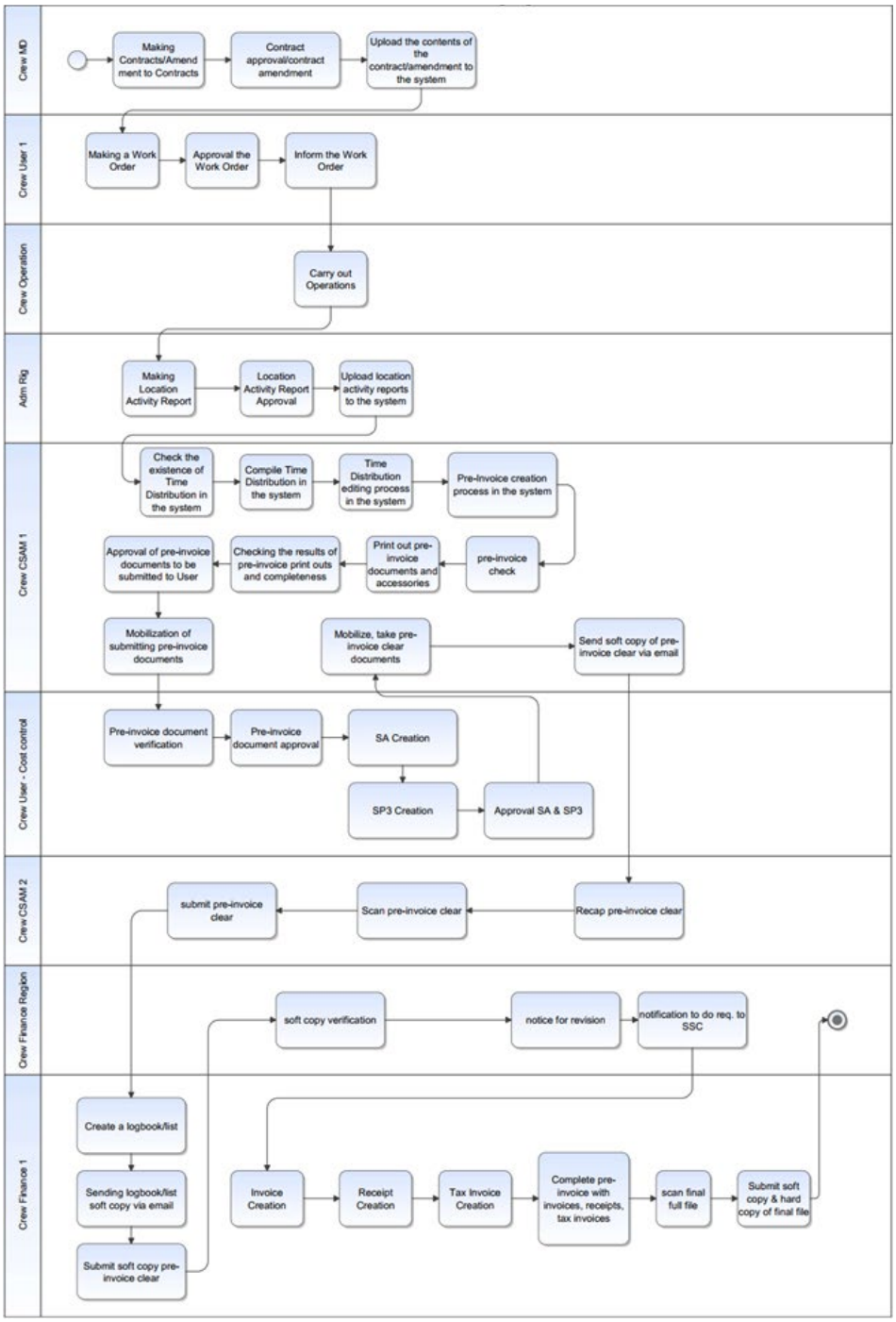

Figure 3. Revenue Line Administration Process in the Drilling Service

The problems identification obtained from the results of interviews with experts can be summarized as follows (table 3)

Table 3. Revenue Line Administration Process in the Drilling Service

No	Type	Recommendation	Information
1	long bureaucracy	shorten bureaucracy	Billing is done directly by the operating party, because they know better what they are doing and what they are getting. If you move divisions, there will be lack of time and miss info.
2	administrative interest	That administrative interests are taken into account. responsibility returned to the data or information source. Currently CSAM is to accommodate info.	need concern for administrative interests
3	Budgeting system	anticipate the system so that the budget has been prepared	there is a customer budget exceeded
4	supporting documents	only important documents are supported	too many supporting documents requested
5	individual	make management more strictly for individual	still following people's culture, not following management

5. Results and Discussion

The results of the validation between the information criteria in public administration can be said to be the same as the revenue administration process in the Likert scale (1-5), with the results of 7 expertise in the drilling service field almost all being scored 5. The current process shows that long-running physical documents are subject to verification several times. The physical approval needed also has several obstacles, such as documents that require approval from the relevant officials cannot be completed quickly because officials are working from home. preparation in preparing the minutes of documents and other documents for billing support documents also affects the speed of billing settlement.

The revenue line administration process of this case study can be seen in Figure 2, with the process carried out by some actors. The following is a breakdown of the process from the related actors:

1. The MD crew carries out the process from contract making and then continues with contract approval activities and uploads them into the contract database.
2. Crew User 1 can issue work orders to services that are processed from making work orders, approval of work orders, informing work orders to services.
3. Service Operations Crew carries out operational activities from a work order
4. After that, the rig admin makes activity reports at the site, then submits activity report approval, then uploads location activity reports to the system
5. Crew CSAM 1 checks the state of the daily activity reports in the form of time sharing in the system, then compiles the time distribution, continues with the edit time distribution process in the system, then proceeds to the process of making pre-invoices in the system, and checks the pre-invoices that have been made, then the pre-invoice and supporting documents are printed out and checked from the print out, then approval is done to ensure the pre-invoice is eligible to be submitted, then the pre-invoice document is sent to the crew user

6. Crew User - cost control acts as a verifier to ensure the correctness of pre-invoice documents, then pre-invoice approval is carried out, and continues to produce service acceptance (SA) and payment processing orders (SP3), after which the SA & SP3 approval is carried out.
7. Crew CSAM 1 then retrieves the physical pre-invoice document and scans the document after that sends it via email to Crew CSAM 2
8. Crew CSAM 2 recaps data from clear pre-invoices, and scans pre-invoices for submitting clear pre-invoice soft files to crew finance 1
9. Crew finance 1 makes a logbook/list for a clear pre-invoice and sends a logbook/list soft copy via email, after that submits a clear soft file pre-invoice which was previously sent by crew csam 2 to the crew finance region owned by the user
10. The crew finance region user verifies the soft copy and makes a notification for revision for lack of documents, after that a notification is made to the drilling service to make a request to the SSC (central finance belongs to the organization)
11. The next process, the process of making invoices, receipts, tax invoices is carried out when a notification has been received from the crew finance region user, and after that completes the physical pre-invoice document with invoices, receipts, tax invoices that have been made, then scans the complete file and submits it back soft copy and hard copy.

6. Conclusion

Refer to the data, specifically to Figure 3 and table 3, it can be concluded that for the processes that occur in the drilling service organization, it can be related to some of the most popular best practices from business process reengineering. It can be seen that several revisions occur, it can be related to task elimination, where revisions are possible only once. For processes related to task composition, several processes can be combined, such as combining the documents needed for verification at certain stages. integrally technology and integration of these best practices, it can be concluded that the work between the user and the drilling service can be done by integrating between organizations with the use of technology to reduce the limitations that occur because previously it was done physically in the business process. In the performance indicator table, it can be seen in Table 2 that every year there is an increase in billing data units. This indicates that every year there is an increase in demand for drilling services.

The information criteria in the revenue administration process in the drilling service sector can be said to be the same as the information criteria in public administration. so that information must be correct, comprehensive, actual, and accessible. for further research, business process reengineering may be needed in the revenue drilling service line. Thus, it can also be concluded that Business process reengineering can be carried out on business processes in this drilling service.

References

Antonius, N. and Dachyar, M., The Internet of Things (IoT) Design for Cardiac Remote Patient Monitoring using Business Process Re-Engineering, 2020.

Mahardini, S. R. and Dachyar, M., The Critical Improvement of Hospital Claim Fulfillment towards Public Insurance, using BPR and MIS Approach, 2020.

Attaran, M., Information technology and business-process redesign, *Business Process Management Journal*, Vol. 9, no. 4, pp. 440-458, 2003.

Guoxin, L., Kai, L. and Deqin, S., Key technologies, engineering management and important suggestions of shale oil/gas development: Case study of a Duvernay shale project in Western Canada Sedimentary Basin. *Petrolium Exploration and Development*, Vol. 47, no. 4, pp. 791-802, 2020.

Sun, X., Zhao, D., Zhang, D. and Tian, F., Entrepreneurship and sustainable innovation capabilities in platform enterprises: the mediating role of knowledge integration, *Chinese Management Studies*, 2021.

Afshan, N., Mandal, P., Gunasekaran, A. and Motwani, J., Mediating role of immediate performance outcomes between supply chain integration and firm performance. *Asia Pacific Journal of Marketing and Logistics*, pp. 1355-5855, 2021.

Muijeen, K., Kongvattananon, P. and Somprasert, C., The key success factors in focus group discussions with the elderly for novice researchers: a review, *Journal of Health Research*, Vol. 34, no. 4, pp. 359-371, 2020.

Lellis, A. D., Leva, A. D. and Sulis E., Simulation for change management: an industrial application. *Procedia Computer Science*, Vol. 138, pp. 533-540, 2018.

Vidgen, R., Rose, J., Wood, B. and Wood-Harper, T., Business process reengineering: the need for a methodology to re-vision the organization, 1994.
ARISE, O. and Adegbie, F. F., Business Process Reengineering and Financial stability of listed oil and gas companies in nigeria, 2021.
Chinosi, M. and Trombetta, A., BPMN: An introduction to the standard, Vol. 34, pp. 124-134, 2011.
Thollander, P., Karlsson, M., Rohdin, P., Johan, W. and Rosenqvist, J., Introduction to Industrial Energy Efficiency, pp. 229, 2020.
Ghandi, A. and Lin, C. –Y, C., Oil and gas service contracts around the world: A review, Vol. 3, pp. 63-71, 2014.
Feng, Y., Duives, D., Daamen, W. and Hoogendoorn, S., Data collection methods for studying pedestrian behaviour: A systematic review, *Building and Environment*, Vol. 187, 2021.
Yan, Z., Dijkman, R. and Grefen, P., Business process model repositories-framework and survey, *Information and Software Technology*, Vol. 54, 2011.
Taymouri, F., La Rosa, M., Dumas, M. and Maggi, F. M., Business process variant analysis: Survei and classification, *Knowledge-Based Systems*, Vol. 211, 2020.
Ahoa, E., Kassahun, A. and Tekinerdogan, B., Business processes and information systems in the Ghana cocoa supply chain: A survey study, Vol. 92, 2020.
Chimhamhiwa, D., van der Molen, P., Mutanga, O. and Rugege, D., Towards a framework for measuring end to end performance of land administration business processes – A case study, Vol. 33, no. 4, pp. 293-301, 2009.
Farmer, R. D., Harris, C. M., Murphy, F. H. and Damuth, R. J., The outer continental shelf oil and gas supply model of the energy information administration, Vol. 18, pp. 184-197, 1983.
Navratil, G. and Frank, A. U., Processes in a cadaster, Vol. 28, pp. 471-486, 2004.
Olsen, A. A., Wolcott, M., Haines, Stuart T., and Janke, K., How to use the Delphi method to aid in decision making and build consensus in pharmacy education, Vol. 13, 2021.
Beier, G., Ullrich, A., Niehoff, Silke., Reißig, M. and Habich, M., Industry 4.0: How it is defined from a sociotechnical perspective and how much sustainability it includes – A literature review, Vol. 259, 2020.
Ngoasong M., How international oil and gas companies respond to local content policies in petroleum-producing developing countries: A narrative enquiry, 2014.
Kazzazi, A. and Nouri, B., A conceptual model for local content development in petroleum industry, 2012.
Cahyono, A. and Hartijasti, Y., Conflict approaches of Effective project manager in the upstream sector of Indonesian oil & gas Industry, *The South East Asian Journal of Management*, Vol. 6, no. 2, pp. 65-80, 2012.
Ablo, A. D., Local content and participation in Ghana's oil and gas industry: Can enterprise development make a difference?, *The Extractive Industries and Society*, Vol. 2, pp. 320-327, 2015.
Daryanto, W. M. and Nurfadilah, D., Financial Performance Analysis Before and After the Decline in Oil Production: Case Study in Indonesian Oil and Gas Industry, *International Journal of Engineering and Technology*, 2018.
Mansar, S. L. and Reijers, H. A., Best practices in business process redesign: use and impact, 2007.

Biographies

Naldo Badriansyah is a M.Eng students of Industrial Engineering of the Universitas Indonesia. His main aim in this research was to highlight the business process model with Indonesia Oil and Gas Company study case in order to find most possible business process in Indonesia Oil and Gas Company.

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