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Determining Job Design in Procurement Teams in the Oil and Gas Industry with Cluster Analysis

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Abstract

Procurement, as an integral part of SCM, represents the final opportunity for integrating business functions through coordination and full control over products, production, and logistics operations. Supply Chain Management (SCM) plays a strategic role in modern business organizations. As a critical component, SCM continuously seeks to improve efficiency and effectiveness. In the current global economy, SCM faces increasing demands to provide added value beyond cost efficiency This research investigates job design strategies in procurement teams within the oil and gas industry, which faces unique complexities due to regulatory constraints, technical challenges, and logistical difficulties. The study employs a mixed-methods approach, incorporating Knowledge Discovery in Databases (KDD) and Cluster Analysis to analyze procurement patterns from historical data. Findings highlight that procurement process can be effectively grouped into two distinct clusters, primarily influenced by the distinctive characteristic of goods and services procurement. The results provide a strategic framework for optimizing procurement teams in the oil and gas sector.

Keywords: Procurement; Job Design; Oil and Gas Industry; Cluster Analysis; Procurement Organization Design

INTRODUCTION

Supply Chain Management (SCM) plays a strategic role in modern business organizations (Barney, 2012; Hayes, 2006; Van Weele & Van Raaij, 2014). As a critical component, SCM continuously seeks to improve efficiency and effectiveness (Bals & Turkulainen, 2017). In the current global economy, SCM faces increasing demands to provide added value beyond cost efficiency (Caniato et al., 2012; Schiele, 2010, 2012; Turkulainen & Swink, 2017). Procurement, as an integral part of SCM, represents the final opportunity for integrating business functions through coordination and full control over products, production, and logistics operations. Traditionally, procurement functioned independently within organizations, focusing on processing purchase requests from internal users and converting them into contracts with suppliers. However, recent trends indicate a shift in procurement's role, evolving from an administrative function to an integrated strategic contributor within organizations (Cavinato, 1991).

The oil and gas industry significantly impacts global and Indonesian economies. As a key natural resource, oil and gas serve not only as energy sources and industrial raw materials but also as a major contributor to national revenue (Puji, 2010). In 2009, upstream oil and gas activities contributed approximately IDR 184.7 trillion (18.7% of total state revenue) (Kementerian ESDM, 2009). To meet future energy demands, the Indonesian government aims to increase crude oil production to 1 million barrels per day by 2030 (Komisi VII DPR RI, 2022). Despite these ambitious targets, oil and gas production in Indonesia faces challenges, with the first semester of 2023 showing only 93% achievement of the projected production target (Setiawan, 2023). SKK Migas continues to push for aggressive drilling activities, planning 991 new wells in 2023 compared to 760 in 2022 (Uly & Diumena, 2023). Achieving these production targets requires strong interdepartmental synergy, particularly in procurement, where the increasing number of drilling projects translates to higher procurement demands.

The oil and gas industry is recognized for its higher level of complexity compared to many other industries. Several key factors contribute to this complexity, including: (i) extreme operational conditions: exploration and production activities are often conducted in challenging environments, such as deep water offshore or remote areas, requiring specialized technology and equipment (Aisyah, A., & Kaur, G., 2023), (ii) price and demand fluctuations: the global oil price and demand for petroleum products are highly volatile, as demonstrated during the COVID-19 pandemic, creating significant uncertainties in industry planning and operations (Alfansyah, 2020), (iii) challenging climate investment: the declining attractiveness of investment in the oil and gas sector, influenced by factors such as unfavorable regulatory frameworks and competition from other energy sectors, affects the sustainability of upstream oil and gas projects (Paramita, 2022), (iv) economic and social impacts: the oil and gas industry has substantial economic and social implications, influencing various economic sectors and contributing to broader macroeconomic stability, adding another layer of complexity in industry management (Asmiani, et al., 2024), (v) dynamic regulatory and fiscal policies: frequent changes in fiscal policies and regulatory frameworks create uncertainty, directly impacting industry profitability, operational efficiency, and long-term strategic planning (Kurniawan & Amir, 2017).

Given these complexities, procurement teams must work efficiently and effectively to meet project demands. However, research on procurement in the oil and gas sector remains scarce compared to procurement in the service industry (Alhammadi et al., 2023). Existing studies primarily focus on sustainable procurement strategies (Anaba et al., 2024; Deshpande et al., 2020), project management procurement (El-Reedy, 2016; Nguyen Hoai & Ramírez D'Avanzo, 2011), supplier relationship strategies (Handfield et al., 2015; Moadmuang, 2014), and digital procurement transformation (Afanasiev et al., 2019; Kannankutty & Menon, 2021). While previous research has examined methods to optimize procurement lead time (Dachyar & Sanjiwo, 2018; Yasmine & Yudoko, 2020), little attention has been given to the division of procurement team roles and job design strategies, despite their significance in operational management (Grant, 2007; Dul et al., 2012).

Since 2017, as a State-Owned Enterprise (SOE) and a leading Indonesian Oil and Gas Company, PT X, through its subsidiaries specializing in oil and gas exploration and exploitation, has acquired numerous Production Sharing Contracts (PSC) in Indonesia whose contracts had expired (Ministry of Energy and Mineral Resources, 2015). As a result of this transition of operational management, organizational changes have become inevitable, including structural adjustments within the procurement function. In such a dynamic and evolving environment, it is crucial to make informed job design decisions within the procurement team, as these decisions directly impact corporate performance and oil production targets. This study focuses on the Supply Chain Management (SCM) function of PT X, analyzing how procurement job design adaptations influence organizational effectiveness in the context of changing industry dynamics.

Research on job design and work structure in procurement departments is closely related to the design and organizational structure of procurement functions. Glock and Hochrein (2011) conducted a literature review spanning 1967–2009 and identified job specialization as one of the key structural variables in procurement organizations. Additionally, they categorized procurement organizations into institutional types, aligning structural parameters with contingency factors (Mintzberg, 1980, 1991). Institutional types represent clusters of organizational strategy attributes, structural variables, and processes (Ketchen et al., 1993). In private-sector organizations, procurement strategies can be categorized into four types: sourcing teams, commodity management, international procurement offices, and cooperative sourcing (Glock & Hochrein, 2011). This study focuses on evaluating job specialization strategies in the oil and gas industry, referencing institutional strategy concepts.

Several studies have examined the relationship between procurement team performance and organizational design. Organizational structure decisions significantly impact multiple aspects of procurement efficiency, both directly and indirectly. Bals & Turkulainen (2017) highlighted that modifying procurement organizational structures can enhance operational efficiency, enabling a shift from transactional purchasing to strategic sourcing and outsourcing. Organizational structure also affects procurement success, influencing cost, quality, time, innovation, market performance, and flexibility (Bals et al., 2013). Case studies by Patrucco et al. (2019) further illustrate the connection between procurement organizational design and performance measurement systems. In project-based organizations, procurement structures align with portfolio management, impacting project success (Petro & Gardiner, 2015). Nene & Pillay (2019) found that organizational structure directly affects employee satisfaction and morale, indirectly influencing organizational performance. Strategic recognition of organizational structure enhances competitive advantage, impacting overall company performance (Claver-Cortés et al., 2012). These findings strengthen the hypothesis that an optimized procurement organizational structure contributes to enhanced procurement team performance.

Specific to job specialization strategies within procurement, institutional procurement design frameworks—such as sourcing teams, commodity management, and cooperative sourcing—have been widely studied. However, most empirical and case studies have focused on the manufacturing and service industries, with limited research on procurement in the oil and gas sector. Unlike other industries, oil and gas procurement is highly complex. Mohammad & Price (2004) emphasized that oil and gas should be considered a distinct industry, where direct application of procurement strategies from construction or other industries may be ineffective due to differences in project lifecycle, operations, and maintenance. Wright (1996) identified oil and gas industry characteristics such as high capital investment, operational uncertainty due to exploration risks, reliance on advanced technology, large-scale operations, multi-disciplinary technical expertise, and strict supply chain timelines.

This study has assumptions and limitations. The study assumes that procurement processes exclude delays caused by external or internal factors beyond standard tender timelines, such as SKK Migas approval delays, legal issues, and safety concerns. The research scope is limited to procurement activities from the assignment of procurement personnel to the issuance of the final contract award. The study analyzes historical procurement data from 2022–2023.

This study contributes to expanding academic literature on job design and procurement team structuring in the oil and gas industry, providing insights for oil and gas companies to optimize procurement team structures and improve procurement efficiency through evidence-based strategies.

RESEARCH METHOD

This study focuses on one of Indonesia's oil and gas exploration and production companies (PT X, anonymized). Since 2017, PT X has acquired multiple expiring Production Sharing Contracts (PSCs), leading to substantial organizational restructuring (Kementerian ESDM, 2015). Given the dynamic nature of PT X's expansion, procurement job design decisions are crucial to ensuring operational efficiency and achieving production targets. Following a major reorganization in 2021, PT X's SCM division was restructured into multiple levels based on decision-making centralization (Johnson and Lenders, 2004; Bals and Turkulainen, 2017) and geographical segmentation, including holding, regional, and zonal levels.

The complexity of procurement processes can be analyzed through historical procurement/tender data. By examining procurement patterns, insights can be drawn to support procurement job design decisions. *KDD* is a method used to extract meaningful knowledge from available databases. In this study, procurement data is sourced from PT X's procurement system, compiled in the form of goods and services procurement reports.

One critical phase of *KDD* is Data Mining, which is employed to derive new knowledge from processed data. Cluster analysis is used to uncover hidden patterns within datasets by grouping objects with similar characteristics. The objectives of cluster analysis in this study are: identifying patterns in procurement processes to determine how procurement categories can be grouped, classifying procurement processes based on specific characteristics, such as tender completion time or procurement type (goods vs. services), and supporting job design analysis by identifying efficiency patterns within procurement teams based on specialization.

This study applies *K-Means Clustering* for data processing, using mixed categorical and numerical clustering through Python or R programming. The *K-Means* method is particularly suitable when (i) the dataset contains a significant number of numerical variables (e.g., tender completion time, cost savings, procurement value), (ii) the targeted clusters exhibit distinct and homogeneous patterns based on selected features, and (iii) the primary goal is to group data based on proximity within a multidimensional space.

Findings from data processing and analysis are expected to address the research problem, providing recommendations for optimizing procurement job design. Further research directions may explore additional aspects of procurement organizational design to enhance procurement team performance in the oil and gas industry.

Data Set Description

The data used in this study was obtained from secondary sources containing information on procurement/tender outcomes processed during the years 2022 and 2023. These years also marked the period when PT X underwent a reorganization, with the centralization levels divided into central, regional, and zone levels. From this dataset, relevant data were selected as indicators for determining the procurement job design process, referred to as variables. These indicators are:

Table 1. Job Design Indicators in Procurement Report Data

Variable (Xi)	Variable Description
Indicator 1 (X1)	Commodity Type #1
Indicator 2 (X2)	Commodity Type #2
Indicator 3 (X3)	Contract Standard
Indicator 4 (X4)	Business Sector
Indicator 5 (X5)	Tender Method
Indicator 6 (X6)	Contract Duration (Days)
Indicator 7 (X7)	Vendor Business Classification
Indicator 8 (X8)	Contract Value (USD)

Indicator 9 (X9)	Domestic Content Commitment (TKDN)%
Indicator 10 (X10)	Lead Time (Working Days)
Indicator 11 (X11)	Savings (USD)
Indicator 12 (X12)	Corporate Scheme
Indicator 12 (X12)	Purchasing Group

K-Medoid Clustering

For this study, the *k*-medoid clustering analysis was used for both numerical and categorical data. The analysis stages include mapping codes for categorical variables, determining the optimal *k* value by calculating the Silhouette Score, final clustering evaluation using the optimal *k* value with Manhattan distance, and then evaluating variables in each cluster.

Data Pre-processing

Before data processing, a data pre-processing step was conducted by mapping codes for categorical variables (non-numeric variables). Mapping codes involve assigning numerical codes to categorical variables to facilitate analysis. There are six categorical variables: commodity type #1, commodity type #2, contract standard, business sector, tender method, vendor business classification, corporate scheme, and purchasing group.

K-means Clustering Implementation

The optimal number of clusters (*k*) was determined using the Silhouette Score method. This score measures how well an object fits within its cluster. The Silhouette Score ranges from -1 to 1, where a higher value indicates that objects are correctly clustered.

RESULT AND DISCUSSION

Determining the Number of Clusters (k)

The clustering analysis conducted with various k values indicates that the optimal number of clusters for this dataset is 2, with the highest Silhouette Score reaching 0.363 at k = 2. This score demonstrates a good separation between data points in two clusters, where members within the same cluster are more similar to each other compared to members in the other cluster.

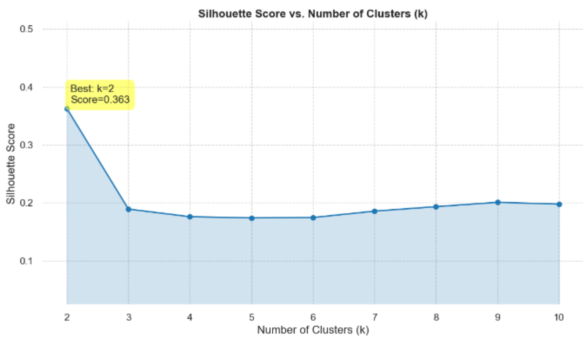

Figure 1. Silhouette Score vs. Number of Cluster

However, as the k value increases from 3 to 10, there is a significant decline in the Silhouette Score, with the lowest value at k = 10 reaching 0.2005. This decline suggests that increasing the number of clusters beyond two results in less distinct clusters, thereby reducing the clustering quality. Therefore, it is recommended to proceed with further analysis using k = 2 to understand the characteristics of each cluster and analyze potential patterns within the data.

Final Clustering Evaluation Using the Optimal k Value

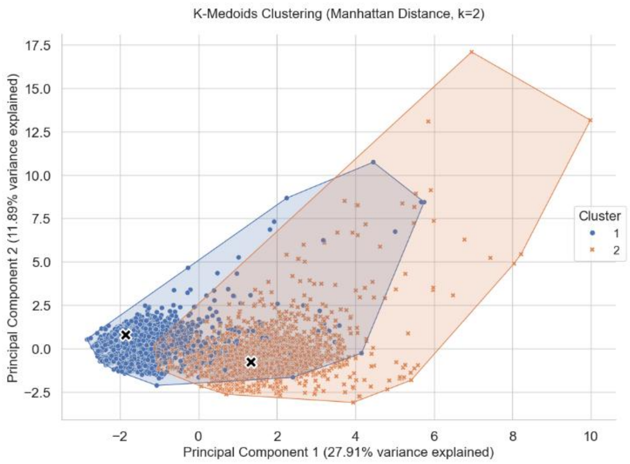

Figure 2. K-Medoid Clustering with k=2

The figure above displays the clustering results using the K-Medoids method with k = 2 and Manhattan distance. This analysis employed two main components derived from Principal Component Analysis (PCA), with each component explaining a percentage of data variance.

Overall, the visualization confirms a strong separation between the two clusters, supporting the previous findings that clustering with k = 2 is the most optimal. Further analysis can be conducted to explore the specific characteristics of each cluster and gain a deeper understanding of the data.

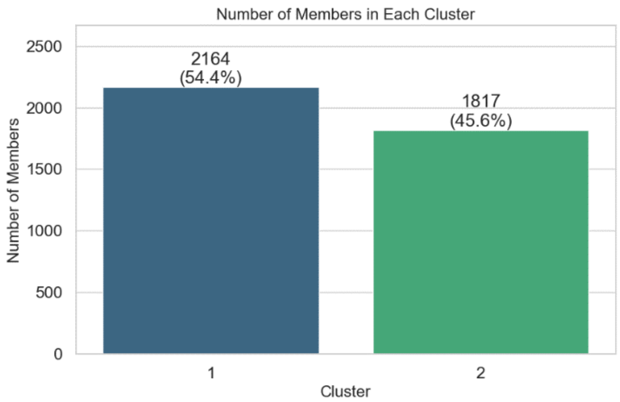

Figure 3. Member Qty of Each Cluster

The figure above presents a bar chart illustrating the number of members in each cluster after the clustering process with k = 2. From the graph, it is evident that the first cluster consists of 2,164 members, accounting for 54.40% of the total dataset. In contrast, the second cluster comprises 1,817 members, representing 45.6% of the total data.

This separation indicates that although the two clusters have relatively close numbers of members, the first cluster is slightly more dominant in terms of membership size. This observation provides additional insights into the data distribution within each cluster, reflecting differences in characteristics or attributes that may exist between them.

With the first cluster having a larger number of members, further analysis can be conducted to understand the underlying reasons for the higher concentration of data points in this cluster. This could also lead to questions about the specific factors or attributes that make this cluster more significant within the dataset, as well as exploring whether differences in membership size impact the overall analysis results.

Overall, this visualization offers a clear depiction of the distribution of members between the two clusters, supporting previous clustering analysis findings regarding the effective separation between the two groups in the dataset.

Cluster Variable Evaluation

The figure below presents a heatmap illustrating the importance of features for each cluster generated from the previous clustering analysis. Each column represents a specific feature/variable, while the rows correspond to the first cluster (Cluster 0) and the second cluster (Cluster 1).

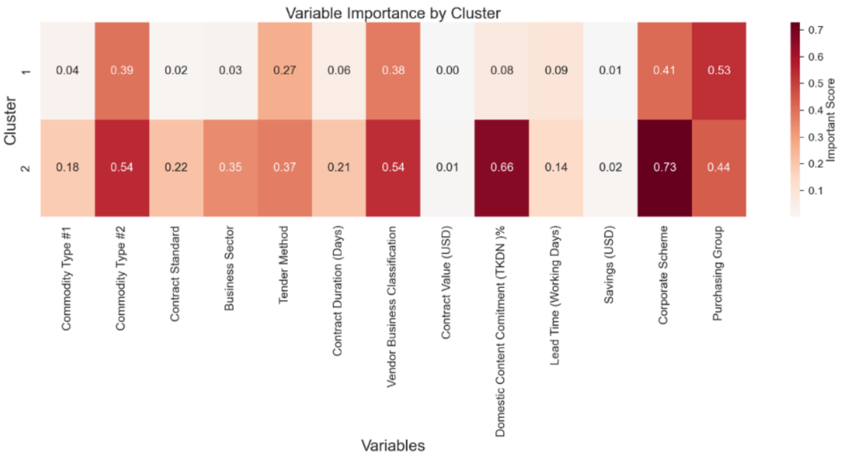

Figure 4. Heatmap of Variable Importance by Cluster

In the first cluster, it is observed that the variables ‘Purchasing Group’, ‘Corporate Scheme’, ‘Vendor Business Classification’, ‘Tender Method’, and ‘Commodity Type #1’, exhibit the highest importance values among all variables, ranging between 0.27 and 0.53.

Conversely, in the second cluster, some variables demonstrate exceptionally high importance levels. For instance, the variable Corporate Scheme reaches a value of 0.73, indicating that this variable is highly significant in defining the characteristics of this cluster. Other variables such as ‘Domestic Content Commitment (TKDN%)’, ‘Vendor Business Classification’ and ‘Commodity Type #2’ also show relatively high importance values, at 0.54 and 0.66, respectively. The 'Purchasing Group' variable is also quite important in Cluster 2, with a value of 0.44, while maintaining relevance in Cluster 1, as previously mentioned. However, in general, several variables dominate in Cluster 2 while having much lower relevance in Cluster 1. This explanation indicates that each cluster possesses unique characteristics based on specific feature variables. Here, we can observe that the variables 'Business Sector' and 'TKDN Commitment (%)' serve as distinguishing factors in the second cluster, as they are predominantly present in this cluster only.

Visualization of Numerical Variables in Each Cluster

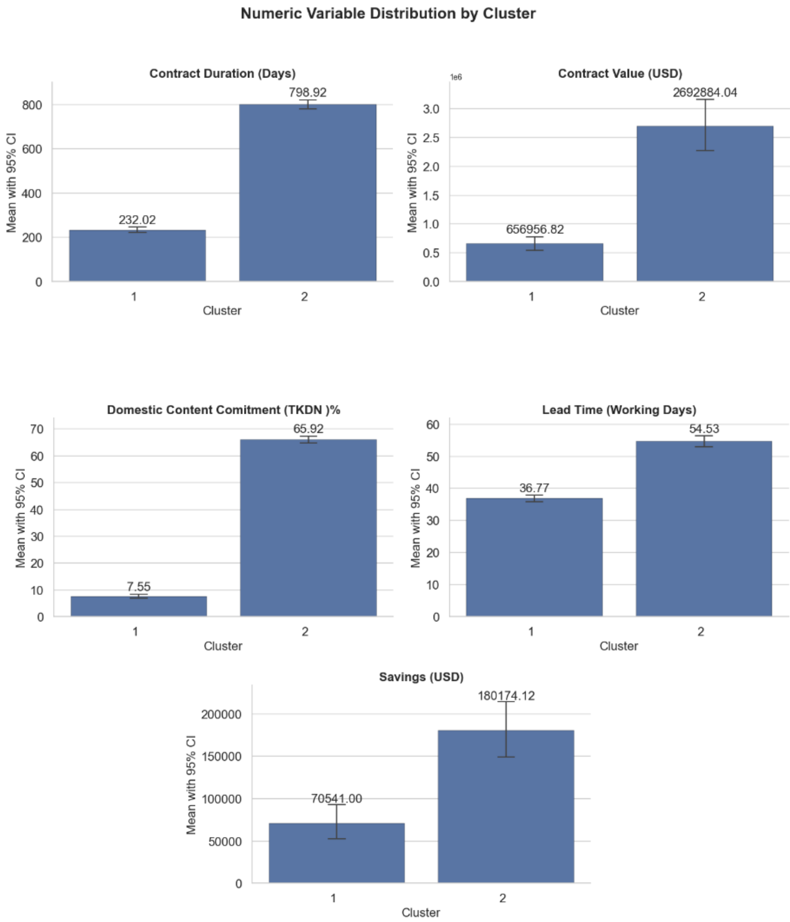

Figure 5. Numerical Variable in Each Cluster

Based on the figure above, it can be observed that Cluster 2 generally has higher average values for variables such as ‘Contract Duration (Days),’ ‘Contract Value (USD),’ ‘Domestic Content Commitment (TKDN%)’, ‘Lead Time (Working Days),’ and ‘Savings (USD)’. In contrast, Cluster 1 has lower average values for these variables.

Visualization of Categorical Variables in Each Cluster

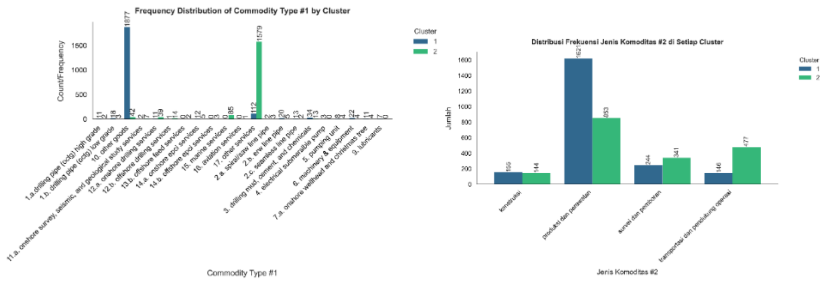

Figure 6. (a) Commodity Type #1; (b) Commodity Type #2

The information presented in the graph highlights a significant distinction between the two clusters based on the variable 'Commodity Type #1'. The first cluster exhibits a higher prevalence of 'Commodity Type #1' in the category of other goods, whereas the second cluster demonstrates a greater concentration in other services. This distinction reflects the unique characteristics of each cluster.

Regarding the variable 'Commodity Type #2', the first cluster predominantly falls within the production and maintenance category, with an exceptionally high number of contracts, totaling 1,621. This makes it the most dominant commodity type within this cluster. But production and maintenance also become as the most dominant 'Commodity Type #2' categories.

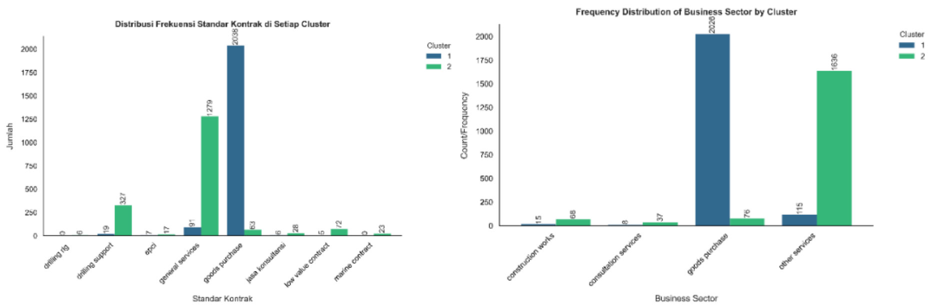

Figure 7. (a) Standard Contract; (b) Business Sector

For the Contract Standard variable, the first cluster predominantly falls within the ‘goods purchase’ category, with a total of 2,038 contracts, making it the most dominant Contract Standard category within this cluster. Other Contract Standard types, such as 'general services' and 'drilling support,' are more prevalent in the second cluster.

Regarding the Business Sector variable, the second cluster exhibits a higher concentration in the 'other services' category, with 1,636 contracts. This suggests that this cluster may be more focused on business sectors beyond goods procurement. This is because the goods procurement category within the Business Sector variable is more dominant in the first cluster.

Overall, this visualization highlights a clear distinction in the types of commodities present in each cluster. The first cluster is primarily composed of goods commodities, while the second cluster has a higher proportion of service commodities.

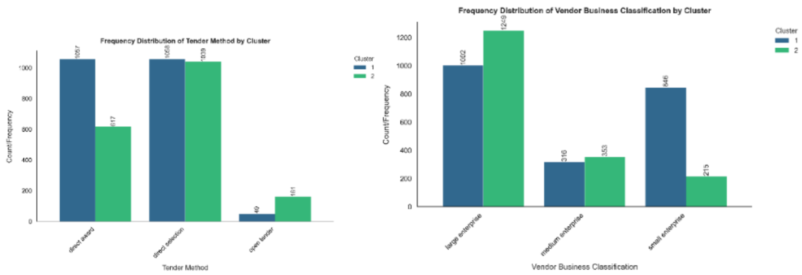

Figure 8. (a) Tender Method; (b) Business Sector; (c) Vendor Business Classification

The information presented in the graph below highlights a clear distinction between the two clusters based on the tender execution method variable. The first cluster predominantly consists of direct appointment contracts, whereas the second cluster has a higher concentration of open tender contracts. This distinction reflects the differing characteristics of each cluster.

Furthermore, the distribution of the vendor business classification variable across the two clusters, as derived from the clustering analysis, shows that the first cluster is more dominant in the UK (Small Business) category. In contrast, the second cluster is more dominant in the UB (Large Business) category. Meanwhile, the UM (Medium Business) category shows no significant difference between the two clusters.

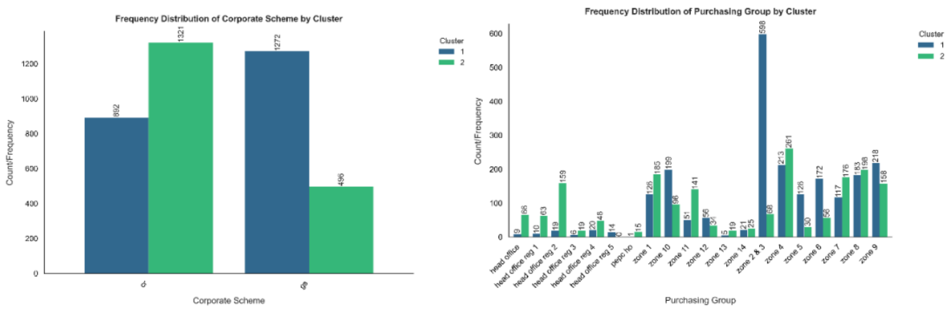

Figure 9. (a) Corporate Scheme; (b) Purchasing Group

The figure below illustrates the distribution of schemes between the two clusters derived from the clustering analysis. The first cluster exhibits a higher dominance in the GS scheme compared to the second cluster. Conversely, the CR scheme is more prevalent in the second cluster than in the first.

Regarding the Purchasing Group variable, the second cluster is predominantly associated with the Head Office category, including Head Office Reg 1 through Head Office Reg 4. Additionally, Zone 1 and Zone 11 are also more dominant in the second cluster. Meanwhile, the first cluster has a higher concentration of purchasing groups in Zone 2 & 3, Zone 5, Zone 6, and Zone 10. The remaining purchasing groups are relatively evenly distributed between the two clusters.

Based on the clustering work, we have been able to obtain the pattern from the procurement activity variable in oil and gas, such as the distinct procurement patters, while Cluster 1 is predominantly associated with goods procurement, characterized by lower contract values, shorter lead times, and a higher concentration of small business (UK) vendors. In contrast, Cluster 2 is dominated by services procurement, which exhibits higher contract values, longer contract durations, and more transactions with large business (UB) vendors.

Variables such as Purchasing Group, Corporate Scheme (Cost Recovery vs. Gross Split), Vendor Business Classification and Commodity Type #2 significantly impact cluster formation. Notably, Corporate Scheme (Cost Recovery vs. Gross Split) emerged as the most critical factor, with an importance score of 0.73, indicating its dominant role in procurement classification.

The clustering results suggest that job specialization in procurement teams should align with the nature of procurement. Assigning procurement personnel based on specialization in goods vs. services procurement can enhance efficiency and improve procurement performance. The data also shown that quantity of cluster 1 is higher than cluster 2, indicated the needs of personal assignment in different job specialization should concern the quantity of procurement.

Cluster 2, which primarily handles service procurement, tends to have longer lead times and higher procurement costs, suggesting the need for improved process optimization and supplier management strategies. In contrary, Cluster 1, dominantly by goods purchase, have shorter lead time but a lot of procurement number, suggesting the need of demand aggregation in the goods procurement to reduce the number of similar item therefore can add value creation in process efficiency.

CONCLUSION

This study explored job design strategies in procurement teams within the oil and gas industry using a mixed-methods approach, incorporating *Knowledge Discovery in Databases* (KDD) and Cluster Analysis to analyze procurement patterns from historical data. The *K-Medoid Clustering* method identified two distinct procurement clusters: one focusing on goods procurement with simpler contracts, and the other emphasizing more complex service procurement, characterized by higher contract values, longer durations, and higher lead times, savings, and *TKDN* commitments. The first cluster is predominantly composed of small vendors (*UK*), while the second consists of larger vendors (*UB*), reflecting distinct procurement approaches between the two. The findings suggest that job specialization by dividing procurement teams into goods and services sub-teams aligns with the differing characteristics of procurement in the oil and gas sector. To optimize procurement efficiency, enhanced decision-making is required, utilizing clustering insights for better resource allocation, vendor selection, and procurement cycle management. Suggestions for future research include expanding clustering analysis by integrating supplier performance data and procurement risk factors, as well as exploring machine learning techniques to improve predictive analytics for procurement performance, which could lead to more efficient and cost-effective procurement strategies.

REFERENCES

Afanasiev, M., Rachenko, I., & Arbuzov, M. (2019, March). Role and significance of mobile technologies in digitalization of procurement systems in oil and gas companies. In *IOP Conference Series: Materials Science and Engineering* (Vol. 497, No. 1, p. 012021). IOP Publishing.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211.

Alhammadi, A., Soar, J., Yusaf, T., Ali, B. M., & Kadirgama, K. (2023). Redefining procurement paradigms: A critical review of buyer-supplier dynamics in the global petroleum and natural gas industry. *The Extractive Industries and Society*, *16*, 101351.

Alhammadi, A., Yusaf, T., Soar, J., Ali, B. M., Kadirgama, K., & Yousif, B. F. (2024). Revolutionizing procurement: Unveiling next-gen supplier strategies in UAE's oil & gas sector. *The Extractive Industries and Society*, *17*, 101428.

Amiri Ara, R., Paardenkooper, K., & van Duin, R. (2022). A new blockchain system design to improve the supply chain of engineering, procurement and construction (EPC) companies–a case study in the oil and gas sector. *Journal of Engineering, Design and Technology*, *20*(4), 887-913.

Anaba, D. C., Kess-Momoh, A. J., & Ayodeji, S. A. (2024). Sustainable procurement in the oil and gas industry: Challenges, innovations, and future directions. *International Journal of Management & Entrepreneurship Research*, *6*(7), 2162-2172.

Aroba, O. J., & Prinavin, G. (2023). Improving supply chain management processes through digital transformation of ERP systems in the oil and gas industry. *Interdisciplinary Journal of Economics and Business Law; Vol. 12, Issue 3*.

Bals, L., & Turkulainen, V. (2017). Achieving efficiency and effectiveness in Purchasing and Supply Management: Organization design and outsourcing. *Journal of Purchasing and Supply Management*, *23*(4), 256-267.

Bals, L., Kneis, K. C., Lemke, C., & Pedersen, T. (2013). Toward a flexible breathing organization: r&d outsourcing at bayer. *The Offshoring Challenge: Strategic Design and Innovation for Tomorrow's Organization*, 211-226.

Bals, L., Laine, J., & Mugurusi, G. (2015). *Evolving procurement organizations: A contingency model for structural alternatives*(No. 1/2015). UASM Discussion Paper Series.

Barney, J. B. (2012). Purchasing, supply chain management and sustained competitive advantage: The relevance of resource-based theory. *Journal of supply chain management*, *48*(2), 3-6.

Bhagat, R. S., McQuaid, S. J., Lindholm, H., & Segovis, J. (1985). Total life stress: A multimethod validation of the construct and its effects on organizationally valued outcomes and withdrawal behaviors. *Journal of applied psychology*, *70*(1), 202.

Bruggen, A. (2015). An empirical investigation of the relationship between workload and performance. *Management Decision*, *53*(10), 2377-2389.

Caniato, F., Caridi, M., Crippa, L., & Moretto, A. (2012). Environmental sustainability in fashion supply chains: An exploratory case based research. *International journal of production economics*, *135*(2), 659-670.

Cavinato, J. L. (1992). Evolving procurement organizations: logistics implications. *Journal of business logistics*, *13*(1), 27.

Dachyar, M., & Sanjiwo, Z. (2018). Business process Re-engineering of engineering procurement construction (EPC) project in oil and gas industry in Indonesia. *Indian Journal of Science and Technology*, *11*(9), 1-8.

Deshpande, S., Roy, H., Dhingra, T., & Gupta, S. (2020). Sustainable procurement for improving project performance for oil and gas projects. *International Journal of Procurement Management*, *13*(2), 143-179.

Ebrahimi, S. M., Koh, S. C. L., Genovese, A., & Kumar, N. (2018). Structure-integration relationships in oil and gas supply chains. *International Journal of Operations & Production Management*, *38*(2), 424-445.

El-Reedy, M. A. (2016). *Project management in the oil and gas industry*. John Wiley & Sons.

Emeka-Okoli, S., Nwankwo, T. C., Otonnah, C. A., & Nwankwo, E. E. (2024). Effective stakeholder relationship management in the oil & gas sector: A conceptual and review perspective. *Finance & Accounting Research Journal*, *6*(3), 372-383.

Englyst, L., Jørgensen, F., Johansen, J., & Mikkelsen, O. S. (2008). Commodity team motivation and performance. *Journal of Purchasing and Supply Management*, *14*(1), 15-27.

Gidiagba, J., Tartibu, L., & Okwu, M. (2023). Sustainable supplier selection in the oil and gas industry: An integrated multi-criteria decision making approach. *Procedia Computer Science*, *217*, 1243-1255.

GREEN, P. T., & Ogan, H. I. Supplier Collaboration And Operational Efficiency Of Oil And Gas Firms In Port Harcourt.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational behavior and human performance*, *16*(2), 250-279.

Handfield, R. B., Primo, M., & Oliveira, M. P. V. D. (2015). The role of effective relationship management in successful large oil and gas projects: Insights from procurement executives. *Journal of Strategic Contracting and Negotiation*, *1*(1), 15-41.

Harrison, T. P., Lee, H. L., Neale, J. J., Pyke, D. F., & Johnson, M. E. (2004). *Sourcing strategy and supplier relationships: alliances versus eProcurement* (pp. 77-89). Springer US.

Hasan, N., & Pujawan, I. I. N. (2018, August). *Supply Chain Lead Time Analysis For Possible Reduction: Case Study In An Oil And Gas Company In Indonesia*.

Hashmi, M. H. A., Khan, M., & Ajmal, M. M. (2020). The impact of internal and external factors on sustainable procurement: a case study of oil and gas companies. *International Journal of Procurement Management*, *13*(1), 42-62.

Hayes, R. (2006). Operations, strategy, and technology: pursuing the competitive edge. *Strategic Direction*, *22*(7).

Johnson, P. F., Leenders, M. R., & Fearon, H. E. (2006). Supply's growing status and influence: a sixteen-year perspective. *Journal of Supply Chain Management*, *42*(2), 33-43.

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of management journal*, *33*(4), 692-724.

Kannankutty, M., & Manoj Menon, A. (2021, December). Implementing Cognitive Procurement and its Influence on Supply Chain During the Era of Digital Transformation in Oil and Gas Industry 4.0. In *Abu Dhabi International Petroleum Exhibition and Conference* (p. D042S290R002). SPE.

Keen, P., & Machin, P. (2020, May). Use of digital methods to improve standardization of procurement specifications. In *Offshore Technology Conference* (p. D021S027R002). OTC.

Komala, M., Modana, I. G. K., Le Hello, Y., & Naibaho, S. (2005, April). Sibling Rivalry: Competitive Tendering vs. Direct Selection-A Debate of Suitable Procurement Method on the Achievement of Supply Chain Objective in the Oil and Gas Operator Industry. In *SPE Asia Pacific Oil and Gas Conference and Exhibition* (pp. SPE-93276). SPE.

Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences OF INDIVIDUALS'FIT at work: A meta-analysis OF person–job, person–organization, person–group, and person–supervisor fit. *Personnel psychology*, *58*(2), 281-342.

Long, B. C., Kahn, S. E., & Schutz, R. W. (1992). Causal model of stress and coping: Women in management. *Journal of Counseling Psychology*, *39*(2), 227.

Moadmuang, N. (2014). Transaction Cost Economics, Firm Power, and Negotiation Strategies: An Empirical Study of Buyer-Supplier Relationships in the Oil and Gas Industry.

Mohammad, M. F., & Price, A. D. F. (2004). Challenges on procurement in the oil and gas industry: developing new strategies. *Globalisation and Construction*, 771.

Mohebbi, A. H., & Bislimi, N. (2013). Project Risk Management: Methodology Development for Engineering, Procurement and Construction Projects-A Case Study in the Oil and Gas Industry.

Murungi, G. B., & Senelwa, W. A. (2019). Determinants of implementation of sustainable procurement practices in oil and gas sector in Kenya.(A case of Kenya pipeline). *International Journal of Recent Research in Commerce Economics and Management*, *6*(4), 185-191.

Nene, S. W., & Pillay, A. S. (2019). An investigation of the impact of organisational structure on organisational performance. *Financial Risk and Management Reviews*, *5*(1), 10-24.

Nguyen Hoai, T., & Ramírez D'Avanzo, D. (2011). The Integration of Corporate Social Responsibility (environmenta aspect) into Project Procurement Management; A Study of the Oil & Gas Industry.

NWANKITI, C. O. (2023). Role of negotiation in buyer supplier relationship in the Nigerian oil and gas industry. *Nigerian Journal of Management Sciences Vol*, *24*(1a).

O. Omoregbe, M. O. Olufolahan, And J. Azage, "Electronic Procurement Practices And Sustainable Organizational Competitive Advantage Of The Upstream Sector Of The Oil And Gas Firms In Nigeria.," *Journal of academic research in economics*, vol. 14, no. 1, 2022.

O. Omorodion And A. Joseph, "Critical Success Factors And Management Implementation Of Electronic Procurement Initiative Of The Upstream Sector Of The Nigerian Oil And Gas Firms.," *Journal of Academic Research in Economics*, vol. 16, no. 1, 2024.

Ogbu, A. D., Eyo-Udo, N. L., Adeyinka, M. A., Ozowe, W., & Ikevuje, A. H. (2023). A conceptual procurement model for sustainability and climate change mitigation in the oil, gas, and energy sectors. *World Journal of Advanced Research and Reviews*, *20*(3), 1935-1952.

Ogbu, A. D., Ozowe, W., & Ikevuje, A. H. (2024). Solving procurement inefficiencies: Innovative approaches to sap Ariba implementation in oil and gas industry logistics. *GSC Advanced Research and Reviews*, *20*(1), 176-187.

Olsen, B. E., Haugland, S. A., Karlsen, E., & Husøy, G. J. (2005). Governance of complex procurements in the oil and gas industry. *Journal of Purchasing and Supply management*, *11*(1), 1-13.

Onumajuru, C. C., Chioma, P., & Poi, E. L. (2024). The Moderating Role Of Competitive Pressure On The Relationship Between E-Procurement And Supply Chain Sustainability Of The Oil And Gas Industry In Rivers State. *BW Academic Journal*.

Patrucco, A. S., Walker, H., Luzzini, D., & Ronchi, S. (2019). Which shape fits best? Designing the organizational form of local government procurement. *Journal of Purchasing and Supply Management*, *25*(3), 100504.

Petro, Y., & Gardiner, P. (2015). An investigation of the influence of organizational design on project portfolio success, effectiveness and business efficiency for project-based organizations. *International Journal of Project Management*, *33*(8), 1717-1729.

Postema, A., & Wish, D. (2019, April). Standardization of procurement equipment specifications: A step change in facility cost and schedule reduction. In *Offshore Technology Conference*(p. D041S055R001). OTC.

Postema, A., Harris, D., & Berry, D. (2022, April). Standardization of Procurement Equipment Specifications: Establishing a Strong Foundation for Oil & Gas Capital Project

Development and Delivery. In *Offshore Technology Conference*(p. D011S002R001). OTC.

Rentizelas, A., de Sousa Jabbour, A. B. L., Al Balushi, A. D., & Tuni, A. (2020). Social sustainability in the oil and gas industry: institutional pressure and the management of sustainable supply chains. *Annals of Operations Research*, *290*, 279-300.

Retegi Albisua, J., & Igartua, J. I. (2018). Company maturity models: Application to supplier development program in oil & gas sector. *Journal of Industrial Engineering and Management (JIEM)*, *11*(2), 187-195.

Ribeiro, C. G., Inacio Junior, E., Li, Y., Furtado, A., & Gardim, N. (2020). The influence of user-supplier relationship on innovation dynamics of Oil & Gas industry. *Technology Analysis & Strategic Management*, *32*(2), 119-132.

Salama, M., El Hamid, M. A., & Keogh, B. (2008, September). Investigating the causes of delay within oil and gas projects in the UAE. In *24th annual ARCOM conference* (pp. 1-3).

Salvatore, L., Thomé, A. M. T., & Leiras, A. Strategic Guidelines for sustainable procurement of infrastructure capital projects in the oil and gas industry.

Schiele, H. (2010). Early supplier integration: the dual role of purchasing in new product development. *R&d Management*, *40*(2), 138-153.

Schiele, H. (2012). Accessing supplier innovation by being their preferred customer. *Research-Technology Management*, *55*(1), 44-50.

Sepehri, M. (2013). Strategic selection and empowerment of supplier portfolios case: oil and gas industries in Iran. *Procedia-Social and Behavioral Sciences*, *74*, 51-60.

Siu, O. L. (2003). Job stress and job performance among employees in Hong Kong: The role of Chinese work values and organizational commitment. *International journal of psychology*, *38*(6), 337-347.

Stanley, L. L. (1993). Linking purchasing department structure and performance—toward a contingency model. *Journal of Strategic Marketing*, *1*(3), 211-219.

Suprayitno, G., & Stendel, A. P. (2020). Designing a Sustainable Procurement System Model SNI ISO 20400: 2017 In SKK Migas. *Systematic Reviews in Pharmacy*, *11*(2), 895-900.

Tantoush, J. O., Lettice, F., & Chan, H. K. (2009). The impact of sanctions on buyer-supplier relationship within the Libyan oil industry. *International journal of Energy sector management*, *3*(2), 171-186.

Tie, T. H., & Cheng, S. (2015, October). Supply chain integration of procurement and logistics operation for enhancing operational competencies: a case study of Malaysia's oil and gas company. In *Paper presented at the AeU International Research Conference* (pp. 1-11). AeU.

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & organization studies*, *2*(4), 419-427.

Turkulainen, V., & Swink, M. L. (2017). Supply chain personnel as knowledge resources for innovation—a contingency view. *Journal of Supply Chain Management*, *53*(3), 41-59.

Van Weele, A. J., & Van Raaij, E. M. (2014). The future of purchasing and supply management research: About relevance and rigor. *Journal of Supply Chain Management*, *50*(1), 56-72.

Vinokur-Kaplan, D. (1991). Job satisfaction among social workers in public and voluntary child welfare agencies. *Child Welfare*, 81-91.

Westman, M., & Eden, D. (1991). Implicit stress theory: The spurious effects of stress on performance ratings. *Journal of Social Behavior and Personality*, *6*(7), 127.

Westman, M., & Eden, D. (1996). The inverted-U relationship between stress and performance: A field study. *Work & Stress*, *10*(2), 165-173.
Yasmine, N., & Yudoko, G. (2020). *Proposed Improvement of the Contract Award Process in Contracting and Procurement using Lean Six Sigma Methodology (A Case Study of an Oil and Gas Company in Indonesia)*.