© JAN 2018 | IRE Journals | Volume 1 Issue 7 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV1I7-1713119

Framework for Strategic Procurement Optimization in Oil and Gas Operations

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Abstract- ***Procurement functions in oil and gas operations are increasingly recognized as strategic drivers of cost efficiency, operational reliability, and risk management. The sector's inherent complexity characterized by capital-intensive projects, volatile commodity markets, stringent regulatory requirements, and dependence on highly specialized suppliers necessitates a structured and integrated approach to procurement. This abstract presents a framework for strategic procurement optimization designed to enhance value creation across upstream, midstream, and downstream oil and gas activities. The proposed framework is built around five interrelated pillars: governance and policy alignment, demand forecasting and spend analysis, supplier strategy and relationship management, contracting and commercial optimization, and digital enablement. Governance alignment ensures procurement activities are consistent with corporate objectives, regulatory compliance, and health, safety, and environmental standards, thereby strengthening accountability and transparency. Demand forecasting and spend analysis integrate procurement planning with operational schedules, enabling improved cost control, reduced variability, and proactive sourcing decisions. Supplier strategy and relationship management emphasize segmentation based on criticality and risk, promoting long-term partnerships, performance-based contracting, and local supplier development. Contracting and commercial optimization focus on standardized contract structures, balanced risk-sharing mechanisms, and effective contract lifecycle management to enhance predictability and minimize disputes. Digital enablement, through e-procurement platforms, enterprise resource planning systems, and data analytics, supports process automation, real-time visibility, and evidence-based decision-making. The framework also embeds risk management and performance monitoring through defined key performance indicators, continuous feedback loops, and adaptive procurement strategies. By integrating these elements, the framework positions procurement as a strategic, value-generating function rather than a transactional support activity. Adoption of this framework is expected to improve cost efficiency, supply chain resilience, supplier performance, and overall operational sustainability in oil and gas operations, particularly in environments characterized by uncertainty and resource constraints.***

Keywords: ***Strategic Procurement; Oil And Gas Operations; Procurement Optimization; Supply Chain Resilience; Supplier Management; Contract Management; Digital Procurement Systems.***

I. INTRODUCTION

Procurement in the oil and gas industry is inherently complex due to the sector's capital-intensive nature, technological sophistication, and exposure to volatile market and operating conditions (Inubiwon,2017; Gosine and Warrian, 2017). Oil and gas operations rely on extensive and globally distributed supply chains that provide highly specialized equipment, materials, and services, often under strict technical, safety, and regulatory requirements. From drilling rigs and subsea equipment to pipelines, refining units, and maintenance services, procurement activities span multiple asset lifecycles and geographies (Badiru and Osisanya, 2016; Reddy and Swamidas, 2016). This complexity is further amplified by fluctuating commodity prices, geopolitical risks, local content obligations, and increasing expectations around environmental and social performance. As a result, procurement is no longer a purely transactional function but a critical component of operational and strategic decision-making (Ross, 2015; Bruel, 2016).

The strategic importance of procurement in oil and gas operations lies in its direct influence on cost control, operational continuity, and risk management. Procurement-related expenditures typically account for a significant proportion of total operating and capital costs, making effective sourcing and contract

management essential for financial sustainability (Appelt and Galindo-Rueda, 2016; Moretto *et al*., 2017). Beyond cost, procurement decisions affect equipment availability, project timelines, and asset uptime, thereby influencing production efficiency and revenue generation. Inadequate procurement planning or supplier performance failures can lead to operational disruptions, safety incidents, and regulatory non-compliance. Consequently, procurement plays a central role in managing supply risks, ensuring quality and safety standards, and maintaining continuity across critical operations (Hallikas and Lintukangas. 2016; Helmold and Terry, 2016).

Procurement challenges vary across the upstream, midstream, and downstream segments of the oil and gas value chain. Upstream procurement is characterized by high technical uncertainty, long lead times, and dependence on specialized suppliers for drilling, exploration, and production services (Handfield *et al*., 2015; Li *et al*., 2016). Midstream operations face challenges related to logistics coordination, infrastructure integrity, and regulatory compliance in the transportation and storage of hydrocarbons. Downstream procurement, while more standardized, must manage large volumes of materials and services for refining, distribution, and retail operations, often under tight cost and efficiency constraints (Agarwal *et al*., 2016; Joshi *et al*., 2017). These segment-specific challenges necessitate tailored procurement strategies that align with operational realities while maintaining overall organizational coherence.

In this context, the purpose of the proposed strategic procurement optimization framework is to provide a structured and integrated approach that aligns procurement activities with organizational objectives, operational needs, and risk management priorities across the oil and gas value chain. The scope of the framework encompasses governance, demand planning, supplier and contract management, digital enablement, and performance monitoring. By adopting a strategic and systematic perspective, the framework seeks to transform procurement into a value-generating function that enhances efficiency, resilience, and sustainability in oil and gas operations (Sparrow and Makram, 2015; Papadopoulos *et al*., 2016).

II. METHODOLOGY

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology was applied to systematically identify, screen, and synthesize existing evidence relevant to the development of a Framework for Strategic Procurement Optimization in Oil and Gas Operations. This methodological approach was selected to ensure transparency, reproducibility, and rigor in consolidating diverse academic and industry-based knowledge on procurement strategies, supply chain management, and operational performance within the oil and gas sector.

A comprehensive literature search was conducted across multiple academic databases and reputable industry sources to capture peer-reviewed journal articles, conference proceedings, policy reports, and professional publications. The search strategy employed a combination of keywords and Boolean operators related to strategic procurement, supply chain optimization, oil and gas operations, supplier management, contract management, and digital procurement systems. Studies published within a defined time frame were prioritized to ensure relevance to current industry practices, particularly those reflecting recent technological and regulatory developments.

Following identification, records were screened to remove duplicates and assess relevance based on titles and abstracts. Inclusion criteria focused on studies that explicitly addressed procurement strategies, frameworks, or optimization approaches within oil and gas or comparable capital-intensive industries. Exclusion criteria eliminated studies that were purely descriptive without strategic relevance, lacked methodological clarity, or focused on unrelated sectors without transferable insights. Full-text assessments were then conducted to ensure alignment with the framework's objectives, including cost control, operational continuity, risk management, and governance integration.

Data extraction involved systematically capturing key themes, methodologies, outcomes, and contextual

factors from the selected studies. Particular attention was given to governance structures, supplier relationship management models, contracting strategies, risk mitigation approaches, and the role of digital technologies in procurement optimization. The extracted evidence was synthesized qualitatively to identify recurring patterns, best practices, and gaps in existing literature.

The final synthesis informed the development of an integrated strategic procurement optimization framework tailored to upstream, midstream, and downstream oil and gas operations. By applying the PRISMA methodology, the framework is grounded in systematically reviewed evidence, enhancing its credibility, applicability, and relevance for both academic analysis and practical implementation in complex oil and gas procurement environments.

2.1 Conceptual Foundations of Strategic Procurement

Strategic procurement has emerged as a critical managerial function in complex, capital-intensive industries such as oil and gas, where procurement decisions have far-reaching implications for cost efficiency, operational reliability, and risk exposure (Teece *et al*., 2016; Wicken, 2016). Unlike traditional purchasing approaches that focus primarily on short-term price considerations, strategic procurement adopts a holistic, long-term perspective that integrates sourcing decisions with organizational strategy, asset management, and operational performance. Understanding its conceptual foundations is essential for designing procurement frameworks that deliver sustained value across the oil and gas value chain.

Strategic procurement can be defined as the systematic planning, execution, and management of sourcing activities to achieve organizational objectives beyond immediate cost savings. Its core objectives include total cost optimization, supply assurance, risk mitigation, value creation through supplier collaboration, and support for long-term operational and sustainability goals. In oil and gas operations, strategic procurement seeks to ensure the timely availability of technically compliant goods and services while balancing cost, quality, safety, and reliability under uncertain market and operating conditions.

A key distinction exists between strategic procurement and transactional purchasing. Transactional purchasing is primarily operational and reactive, emphasizing order placement, price negotiation, and short-term fulfillment of immediate needs. While necessary for day-to-day operations, this approach often lacks integration with broader business objectives and provides limited visibility into long-term risks and opportunities. Strategic procurement, by contrast, is proactive and analytical. It focuses on category management, supplier segmentation, long-term contracting, and performance management, enabling organizations to anticipate demand, manage supply risks, and leverage procurement as a competitive advantage (Plugge *et al*., 2016; Lorino *et al*., 2017).

Alignment with corporate strategy, asset lifecycle, and operational efficiency is central to strategic procurement. Procurement strategies must reflect corporate priorities such as cost leadership, operational excellence, local content development, or sustainability performance. In oil and gas operations, assets such as wells, pipelines, refineries, and processing facilities have long lifecycles, each with distinct procurement requirements during development, operation, maintenance, and decommissioning phases. Strategic procurement ensures that sourcing decisions support asset reliability, minimize lifecycle costs, and enhance operational efficiency by coordinating procurement planning with production schedules, maintenance strategies, and capital investment plans.

The procurement value chain in oil and gas encompasses a sequence of interrelated activities that collectively determine procurement effectiveness and value delivery. The first stage is demand planning and specification development. Accurate demand planning relies on close collaboration between procurement, engineering, operations, and maintenance teams to forecast material and service requirements based on drilling programs, production forecasts, and asset maintenance plans. Well-defined technical specifications are essential to ensure safety, regulatory compliance, and operational performance, while avoiding over-specification that can unnecessarily increase costs or limit supplier competition (Pepper *et al*., 2015; Olejnik *et al*., 2017).

The second stage involves supplier sourcing and qualification. Given the technical complexity and safety-critical nature of oil and gas operations, supplier selection extends beyond price considerations to include technical capability, quality assurance systems, financial stability, and health, safety, and environmental performance. Strategic procurement emphasizes supplier segmentation, distinguishing between strategic, critical, and transactional suppliers. This enables tailored sourcing strategies, such as long-term partnerships with critical suppliers, competitive bidding for standardized goods, and supplier development initiatives to enhance local capacity and resilience.

Contracting and execution constitute the third stage of the procurement value chain. Effective contracting translates sourcing strategies into clear commercial and legal agreements that define scope, pricing mechanisms, risk allocation, and performance expectations. In oil and gas operations, contracts often involve complex risk profiles, long durations, and high financial exposure. Strategic procurement promotes standardized contract templates, appropriate incentive structures, and robust contract management processes to ensure compliance, manage variations, and minimize disputes during execution.

The final stage is performance monitoring and continuous improvement. Strategic procurement relies on systematic performance measurement using key performance indicators related to cost, delivery, quality, safety, and supplier responsiveness. Regular performance reviews and audits provide feedback to both internal stakeholders and suppliers, supporting corrective actions and continuous improvement initiatives. Lessons learned are fed back into demand planning, sourcing strategies, and contract design, creating a closed-loop system that enhances procurement maturity over time.

The conceptual foundations of strategic procurement rest on a shift from transactional purchasing to an integrated, value-oriented approach aligned with corporate strategy, asset lifecycles, and operational efficiency. By managing the full procurement value chain from demand planning to continuous improvement strategic procurement enables oil and gas organizations to optimize costs, reduce risks, and strengthen operational resilience in an increasingly complex and uncertain environment (Ahmad *et al*., 2016; Martek and Chen, 2016).

2.2 Key Drivers for Procurement Optimization in Oil and Gas

Procurement optimization has become a strategic imperative in the oil and gas industry due to the sector's exposure to economic volatility, operational complexity, and increasing regulatory and societal expectations. Unlike many other industries, oil and gas operations are characterized by high capital intensity, long project cycles, and dependence on globally dispersed and highly specialized supply chains. These conditions amplify the impact of procurement decisions on financial performance, operational continuity, and long-term sustainability. Several interrelated drivers underscore the need for optimized and strategically aligned procurement systems in oil and gas operations.

Cost volatility is one of the most significant drivers of procurement optimization in the oil and gas sector. Fluctuations in crude oil and gas prices directly affect revenue streams and investment decisions, creating pressure to control both capital expenditures and operating costs. Procurement accounts for a substantial share of total project and operational spending, including drilling services, equipment, engineering, logistics, and maintenance. Inefficient sourcing, poor contract structures, or fragmented purchasing practices can lead to cost overruns that significantly undermine project viability. Optimized procurement enables organizations to manage total cost of ownership, leverage economies of scale, and implement long-term contracting strategies that reduce exposure to market fluctuations while supporting financial resilience (Jensen, 2017; Provines, 2017).

Global oil and gas supply chains are highly vulnerable to disruptions arising from geopolitical tensions, trade restrictions, sanctions, pandemics, and natural disasters. Many critical components and services are sourced from a limited number of international suppliers, increasing the risk of delays, shortages, and price spikes. Procurement optimization addresses these challenges by improving supply chain visibility, diversifying supplier bases, and strengthening risk assessment and mitigation strategies. Strategic

sourcing and inventory planning help ensure continuity of operations, particularly for safety-critical and long-lead-time items. In this context, procurement functions play a central role in enhancing supply chain resilience and business continuity planning.

The oil and gas industry operates within a highly regulated environment, with procurement activities subject to extensive legal, safety, and environmental requirements. In many producing countries, local content policies mandate the participation of domestic suppliers and workforce development as a condition for operating licenses. Non-compliance can result in penalties, project delays, or reputational damage. Procurement optimization supports compliance by embedding regulatory and local content requirements into sourcing strategies, supplier evaluation criteria, and contract management processes. By systematically integrating compliance considerations, organizations can reduce regulatory risk while contributing to national economic development objectives (Rebelo *et al*., 2016; Stein and Wiedemann, 2016).

Technological advancement is a defining feature of modern oil and gas operations, particularly in deepwater, unconventional, and high-pressure/high-temperature environments. These operations require highly specialized equipment and services, often provided by a small number of technologically advanced vendors. Dependence on such suppliers increases procurement risk, including price leverage, limited competition, and potential supply bottlenecks. Optimized procurement strategies emphasize early supplier engagement, long-term partnerships, and collaborative innovation to manage these dependencies. By aligning procurement planning with technology roadmaps and asset strategies, organizations can secure critical capabilities while reducing technical and commercial risks.

Sustainability and environmental, social, and governance (ESG) considerations have become increasingly influential drivers of procurement optimization. Stakeholders, including regulators, investors, and communities, expect oil and gas companies to demonstrate responsible sourcing, environmental stewardship, and ethical business practices. Procurement functions are central to translating these expectations into operational reality by incorporating ESG criteria into supplier selection, performance evaluation, and contract requirements. Optimized procurement enables organizations to reduce environmental impacts, promote safe and fair labor practices, and enhance transparency across the supply chain. This not only supports corporate sustainability goals but also strengthens social license to operate and long-term value creation.

Procurement optimization in oil and gas is driven by a convergence of financial, operational, regulatory, technological, and sustainability pressures. Addressing these drivers through strategic procurement frameworks enables organizations to enhance cost efficiency, manage risk, ensure compliance, and meet evolving ESG expectations in an increasingly complex global operating environment.

2.3 Framework Structure for Strategic Procurement Optimization

A robust framework for strategic procurement optimization in oil and gas operations must be structured around integrated and mutually reinforcing components that address governance, planning, supplier engagement, commercial management, and digital enablement. Given the sector's complexity, capital intensity, and risk exposure, the effectiveness of procurement depends not only on individual processes but also on the coherence of the overall framework and its alignment with organizational strategy and operational requirements.

Governance and policy alignment form the foundation of the procurement optimization framework. Effective procurement governance models clearly define decision authority, roles, and accountability across corporate, asset, and project levels. This clarity is essential in oil and gas organizations, where procurement decisions often involve high-value contracts, technical risk, and long-term commitments. Governance structures must also ensure segregation of duties, transparency, and oversight to reduce the risk of fraud, non-compliance, and suboptimal decision-making (Cui, 2015; Arlen and Kahan, 2017).

Alignment with corporate risk management, compliance, and health, safety, and environmental

(HSE) policies is critical. Procurement activities directly influence operational safety and regulatory compliance through supplier selection, material quality, and service performance. Integrating procurement policies with enterprise risk management and HSE frameworks ensures that sourcing decisions systematically address safety-critical requirements and regulatory obligations. Furthermore, integration with project management and asset management frameworks enables procurement planning to align with project milestones, asset lifecycle stages, and operational priorities, thereby enhancing efficiency and reducing delays.

Accurate demand forecasting and comprehensive spend analysis are central to optimizing procurement outcomes. Standardization of technical specifications reduces unnecessary complexity, improves interoperability, and enhances supplier competition without compromising safety or performance. In oil and gas operations, excessive customization can inflate costs and extend lead times; standardization supports cost efficiency and supply chain resilience.

Category management and spend visibility allow organizations to aggregate demand across assets and projects, identify cost drivers, and prioritize strategic sourcing initiatives. Advanced spend analytics provide insights into purchasing patterns, supplier concentration, and opportunities for consolidation. Forecasting linked to drilling programs, production schedules, and maintenance plans enables proactive procurement planning, minimizing emergency purchases and optimizing inventory levels.

Supplier strategy and relationship management represent a shift from adversarial, price-focused sourcing to collaborative, value-based engagement. Supplier segmentation classifying suppliers as strategic, critical, or transactional enables differentiated management approaches based on risk and value contribution. Strategic and critical suppliers often require long-term partnerships and framework agreements to ensure supply continuity, technical collaboration, and cost predictability (Cerruti *et al*., 2016; Ali *et al*., 2017).

Local supplier development and capacity building are particularly important in oil and gas-producing regions with local content requirements. Strategic procurement frameworks incorporate supplier development initiatives, including training, joint ventures, and performance improvement programs, to enhance local capabilities while reducing dependency on international suppliers. Performance-based contracting approaches further align supplier incentives with operational outcomes, rewarding reliability, safety, and efficiency rather than volume alone.

Contracting and commercial optimization translate procurement strategies into enforceable agreements that balance risk, cost, and performance. Contract standardization and lifecycle management improve efficiency, reduce legal complexity, and enhance compliance. Standard templates and clauses also support consistency across projects and assets, facilitating better contract governance.

Risk-sharing and incentive-based pricing models, such as target cost or performance-linked fees, encourage collaboration and innovation while aligning supplier behavior with organizational objectives. Effective management of claims, variations, and contract compliance is essential in oil and gas projects, where scope changes and uncertainties are common. Robust contract management processes and clear escalation mechanisms help mitigate disputes and protect value.

Digital enablement underpins the effectiveness of the entire procurement optimization framework. E-procurement systems integrated with enterprise resource planning (ERP) platforms enhance process efficiency, data accuracy, and transparency. Automation of requisitioning, approval workflows, and purchase order management reduces cycle times and administrative burden.

The use of analytics supports evidence-based decision-making by providing real-time insights into costs, lead times, and supplier performance. Data integration across procurement, operations, and finance enables end-to-end visibility and continuous improvement (Sithole *et al*., 2016; Blundell, 2017). Overall, digital tools transform procurement into a data-driven, transparent, and strategically aligned function.

The framework structure for strategic procurement optimization integrates governance, planning, supplier

management, commercial discipline, and digital capabilities. Together, these components enable oil and gas organizations to enhance cost efficiency, manage risk, and build resilient and sustainable supply chains.

2.4 Risk Management and Resilience

Risk management and resilience are central components of strategic procurement in oil and gas operations, where supply disruptions, technical failures, and external shocks can have severe financial, safety, and environmental consequences. The industry's reliance on complex, global supply chains and highly specialized equipment exposes procurement systems to a wide range of risks, including supplier failure, logistical delays, geopolitical instability, and market volatility. A structured approach to risk management within procurement is therefore essential to ensure operational continuity, protect asset integrity, and sustain long-term performance.

A foundational element of procurement risk management is supply risk identification and mitigation. This involves systematically assessing risks across the supply base, including supplier financial stability, capacity constraints, quality performance, regulatory compliance, and exposure to geopolitical or environmental disruptions. Risk mapping and segmentation tools enable procurement teams to categorize suppliers and materials based on criticality and vulnerability. Mitigation strategies may include supplier diversification, dual sourcing, strategic stockholding, and the use of long-term contracts to secure capacity and stabilize pricing (Brooks and Matthews, 2015; Tsai and Luan, 2016). Early supplier engagement and continuous monitoring further enhance the ability to anticipate and respond to emerging risks before they escalate into operational disruptions.

Managing single-source and critical equipment risks is particularly important in oil and gas operations, where certain components such as subsea systems, turbines, compressors, and specialized drilling tools may be available from only a limited number of qualified suppliers. Single-source dependencies increase exposure to supply interruptions, cost escalation, and technological lock-in. Strategic procurement addresses these risks through a combination of qualification of alternative suppliers, standardization of equipment specifications where feasible, and collaborative relationships with original equipment manufacturers. In cases where substitution is not practical, risk-sharing agreements, long-term service contracts, and joint contingency planning with suppliers can help ensure availability and responsiveness during critical situations.

Inventory optimization and buffer strategies play a crucial role in balancing cost efficiency with resilience. Excessive inventory ties up capital and increases storage and obsolescence risks, while insufficient inventory can lead to production downtime and safety risks. Strategic procurement frameworks employ data-driven inventory management approaches, such as criticality-based stocking, safety stock optimization, and predictive analytics linked to maintenance and production schedules. Buffer strategies are particularly important for long-lead-time and safety-critical items, where procurement lead times may exceed acceptable downtime thresholds. By aligning inventory policies with asset criticality and risk profiles, organizations can enhance resilience without incurring unnecessary costs.

Business continuity planning in procurement extends beyond inventory management to encompass end-to-end preparedness for major disruptions. Procurement-focused business continuity plans define roles, escalation pathways, and alternative sourcing arrangements in the event of supply chain shocks. These plans are closely integrated with enterprise risk management and emergency response frameworks, ensuring coordination across operations, logistics, finance, and HSE functions (Olson and Wu, 2015; Sin *et al*., 2017). Scenario planning and stress testing, such as simulating supplier failures or transportation disruptions, enable organizations to evaluate preparedness and refine response strategies. Digital tools further support continuity planning by providing real-time visibility into supplier status, inventory levels, and logistics flows during crisis situations.

In addition to these operational measures, building procurement resilience requires a cultural and organizational commitment to proactive risk

management. Cross-functional collaboration between procurement, engineering, operations, and risk management teams enhances information sharing and decision-making. Continuous learning from past disruptions, supplier audits, and performance reviews strengthens institutional knowledge and adaptive capacity.

Risk management and resilience in procurement are critical enablers of stable and safe oil and gas operations. By systematically identifying supply risks, managing critical dependencies, optimizing inventory, and embedding business continuity planning into procurement processes, organizations can reduce vulnerability to disruptions and enhance their ability to withstand and recover from adverse events. Strategic procurement thus serves not only as a cost management function but also as a cornerstone of operational resilience in an increasingly uncertain global environment.

2.5 Sustainability and Local Content Integration

Sustainability and local content integration have become central pillars of strategic procurement in the oil and gas industry as organizations respond to increasing regulatory pressure, investor scrutiny, and societal expectations. Procurement functions are uniquely positioned to translate corporate sustainability commitments into operational practice because supplier selection, contracting, and performance management directly influence environmental impacts, social outcomes, and governance standards across the value chain. Integrating sustainability and local content considerations into procurement frameworks therefore supports not only compliance and reputation management but also long-term operational resilience and shared value creation.

A core element of sustainable procurement is embedding environmental, social, and governance (ESG) criteria in supplier selection. Traditional supplier evaluation models that prioritize cost and technical capability are increasingly supplemented with ESG-based assessment criteria, including environmental management systems, labor practices, occupational health and safety performance, and corporate governance standards. In oil and gas operations, where supplier activities can pose significant environmental and safety risks, ESG screening helps identify and mitigate potential liabilities before contracts are awarded. Strategic procurement frameworks formalize these requirements through prequalification processes, weighted evaluation models, and minimum ESG performance thresholds, ensuring that sustainability considerations are integrated consistently and transparently into sourcing decisions (Eriksson and Lind, 2016; Ancarani *et al*., 2017).

Closely linked to ESG integration is ethical sourcing and environmental compliance. Ethical sourcing encompasses respect for human rights, fair labor practices, anti-corruption measures, and responsible business conduct throughout the supply chain. Oil and gas procurement often involves suppliers operating in high-risk environments, making due diligence and monitoring essential to prevent unethical practices such as forced labor, unsafe working conditions, or bribery. Environmental compliance is equally critical, given the sector's potential impacts on ecosystems and communities. Procurement policies increasingly require suppliers to comply with environmental regulations, adopt pollution prevention measures, and demonstrate capability in waste management, emissions control, and spill prevention. Contractual clauses, audits, and performance monitoring mechanisms reinforce these expectations and provide leverage for corrective action where non-compliance is identified.

Local content policies and national development goals represent another key dimension of sustainability integration in oil and gas procurement. Many resource-producing countries mandate local participation in procurement as a means of promoting economic diversification, employment, and skills development. Strategic procurement frameworks align sourcing strategies with these policies by prioritizing qualified local suppliers, facilitating technology transfer, and supporting workforce development initiatives. Rather than treating local content as a compliance obligation, optimized procurement approaches view it as an opportunity to strengthen supply chain resilience and social license to operate. Supplier development programs, joint ventures, and mentoring arrangements help build local capacity while maintaining technical and safety standards,

contributing to sustainable national development outcomes (Heitor, 2015; Ngarachu *et al*., 2017).

Measuring the effectiveness of sustainability and local content integration requires systematic approaches to measuring social and environmental procurement outcomes. Key performance indicators are increasingly used to track metrics such as local spend percentages, employment generation, supplier safety performance, emissions reductions, and waste minimization across the supply chain. Social indicators may also include training hours provided to local suppliers, improvements in labor conditions, or community engagement outcomes linked to procurement activities. Environmental indicators focus on supplier compliance rates, incident frequency, and progress toward emissions and resource efficiency targets (Turki *et al*., 2017; Wong *et al*., 2017). Data collection and reporting mechanisms, supported by digital procurement systems, enhance transparency and enable continuous improvement.

Importantly, measurement is not limited to internal reporting but also supports external disclosure and stakeholder engagement. Investors, regulators, and communities increasingly expect oil and gas companies to demonstrate tangible progress on ESG commitments. Procurement-related sustainability metrics therefore contribute to broader corporate sustainability reporting and assurance processes.

Sustainability and local content integration are no longer peripheral considerations in oil and gas procurement but fundamental components of strategic value creation. By embedding ESG criteria in supplier selection, enforcing ethical and environmental standards, aligning procurement with national development goals, and systematically measuring outcomes, procurement functions can drive responsible operations and long-term resilience. Strategic procurement thus serves as a critical bridge between corporate sustainability ambitions and practical, measurable impacts across the oil and gas supply chain.

2.6 Performance Measurement and Monitoring

Performance measurement and monitoring constitute essential components of strategic procurement in oil and gas operations, ensuring that procurement activities deliver value, maintain operational efficiency, and support risk management objectives. In a sector characterized by complex supply chains, capital-intensive projects, and critical safety requirements, systematic performance evaluation enables organizations to track procurement effectiveness, identify areas for improvement, and reinforce accountability across the value chain. A robust performance measurement framework integrates quantitative and qualitative metrics, benchmarking against industry standards, and continuous feedback loops to foster sustainable operational and commercial excellence.

A central aspect of procurement performance management is the identification and monitoring of key procurement performance indicators (KPIs). These indicators provide measurable insights into the efficiency, cost-effectiveness, and reliability of procurement processes. Among the most critical KPIs is cost savings and cost avoidance, which reflects the financial benefits realized through strategic sourcing, negotiation, supplier rationalization, and procurement optimization initiatives. Cost savings measures capture direct reductions in expenditure compared to previous benchmarks or standard rates, while cost avoidance accounts for potential increases or inefficiencies prevented through proactive procurement practices (Grosse *et al*., 2016; Brandt *et al*., 2017). Tracking both metrics allows organizations to quantify the economic contribution of procurement and inform strategic decision-making.

Lead time reduction is another vital KPI, particularly in oil and gas operations where delays in material and service delivery can disrupt production, maintenance, and project schedules. Monitoring lead times from requisition to delivery enables procurement teams to identify bottlenecks, optimize logistics, and implement proactive measures such as advanced planning, vendor-managed inventory, or expedited shipping arrangements (Sheffi, 2015; Duncombe *et al*., 2015). Reducing lead times enhances operational continuity, minimizes downtime, and strengthens overall supply chain resilience.

Supplier performance and reliability represent a further core dimension of procurement monitoring.

KPIs in this area assess supplier adherence to contractual commitments, delivery punctuality, quality compliance, and responsiveness to operational needs. Regular evaluation of supplier performance facilitates segmentation into strategic, critical, and transactional categories, guiding decisions on relationship management, contract renewal, and development initiatives. High-performing suppliers contribute to reduced operational risk, improved efficiency, and innovation through collaborative problem-solving, whereas underperforming suppliers can be addressed through corrective action plans or alternative sourcing.

Benchmarking against industry best practices complements internal KPI monitoring by providing external reference points. Comparative analysis of procurement processes, cost structures, contract strategies, and supplier performance enables organizations to identify gaps, adopt innovative approaches, and align their procurement function with global standards. Benchmarking also supports the establishment of realistic performance targets and informs strategic priorities for continuous improvement.

Integral to the framework is the implementation of continuous feedback and improvement loops. Data collected from KPI monitoring and benchmarking is systematically analyzed and communicated to internal stakeholders, including procurement teams, operations, finance, and project management. Feedback mechanisms support corrective actions, process refinements, and the adoption of lessons learned across projects and assets. This iterative approach ensures that procurement strategies remain adaptive to market dynamics, technological advancements, and organizational objectives. Continuous improvement also fosters a culture of accountability, transparency, and innovation within the procurement function, reinforcing its strategic contribution to organizational performance.

Performance measurement and monitoring are fundamental to optimizing procurement in oil and gas operations. By defining and tracking KPIs such as cost savings, cost avoidance, lead time reduction, and supplier reliability, benchmarking against industry standards, and embedding continuous feedback loops, organizations can enhance efficiency, reduce operational risks, and drive value creation. Strategic performance monitoring transforms procurement from a transactional function into a proactive, evidence-based, and strategically aligned enabler of operational excellence, financial sustainability, and supply chain resilience (Ditillo and Lisi, 2016; Singh *et al*., 2017).

2.7 Implementation Roadmap

The successful adoption of a strategic procurement optimization framework in oil and gas operations requires a carefully designed implementation roadmap that translates theoretical concepts into practical, sustainable processes. Given the sector's complexity, high capital intensity, and operational risk, a structured roadmap ensures that procurement reforms are systematically executed, aligned with corporate objectives, and embedded within existing organizational systems. The roadmap integrates phased implementation, change management, capacity building, and system integration, providing a comprehensive pathway for achieving procurement excellence.

A phased implementation approach is critical to managing complexity and mitigating disruption. This approach divides the implementation process into sequential stages, typically beginning with diagnostic assessments, followed by pilot initiatives, incremental rollouts, and full-scale adoption. The initial diagnostic phase involves assessing the current state of procurement processes, supply chains, supplier performance, and technology infrastructure. Findings inform the prioritization of interventions and identification of high-impact areas for improvement. Pilot projects, often focused on a specific category, asset, or geographic region, enable testing of new processes, tools, and supplier engagement strategies under controlled conditions. Lessons learned during the pilot phase guide iterative refinements before scaling the framework across the organization. Phased implementation ensures manageable resource allocation, reduces operational risks, and builds organizational confidence in the new procurement approach.

Change management and stakeholder engagement are essential to overcoming resistance and ensuring alignment across functional units. Strategic

procurement optimization often involves shifts in roles, decision authority, and performance expectations, which may provoke resistance if not effectively communicated. Structured change management processes include stakeholder mapping, clear communication of objectives and benefits, participatory decision-making, and regular feedback mechanisms. Engaging key internal stakeholders including operations, finance, engineering, and project management ensures that procurement reforms are understood, supported, and integrated into day-to-day operational decision-making. External stakeholders, particularly suppliers, should also be involved in change management to ensure alignment with contractual expectations, sustainability initiatives, and performance improvement objectives (Foerstl *et al*., 2015; Butt *et al*., 2016).

Capacity building and skills development for procurement teams are critical enablers of successful implementation. Modern procurement in oil and gas requires advanced competencies in category management, supplier relationship management, contract negotiation, risk assessment, and digital analytics. Training programs, mentorship, and knowledge transfer initiatives strengthen the technical and strategic capabilities of procurement personnel. Investing in continuous professional development enhances decision-making, promotes best practices, and supports adaptation to evolving market conditions, technological innovations, and regulatory requirements. Cross-functional training initiatives can further enhance collaboration with operations, project management, and engineering teams, improving demand planning, specification development, and supplier performance evaluation (Pak *et al*., 2016; Jupp, 2016).

Integration with existing operational systems ensures that procurement optimization is not implemented in isolation but is embedded within broader organizational processes. Linking procurement functions with enterprise resource planning (ERP) systems, maintenance management platforms, project management tools, and financial reporting systems enhances visibility, data accuracy, and process efficiency. Integrated systems enable real-time monitoring of requisitions, purchase orders, supplier performance, inventory levels, and cost performance, providing actionable insights for proactive decision-making. Seamless integration also reduces redundancy, prevents errors, and supports coordinated execution of procurement, operational, and project management activities.

The implementation roadmap for strategic procurement optimization in oil and gas operations provides a structured pathway for translating strategy into practice. By employing a phased approach, engaging stakeholders effectively, building procurement team capacity, and integrating processes with existing operational systems, organizations can achieve sustainable improvements in efficiency, cost management, supplier performance, and operational resilience. A well-executed implementation roadmap ensures that procurement becomes a strategic enabler of value creation, risk mitigation, and long-term sustainability across the oil and gas value chain.

2.8 Expected Outcomes and Strategic Benefits

The adoption of a strategic procurement optimization framework in oil and gas operations is designed to deliver tangible and sustainable outcomes that extend beyond simple cost reductions. By integrating governance, risk management, digital enablement, supplier relationship management, and performance monitoring, strategic procurement transforms the procurement function from a transactional activity into a key driver of operational efficiency, risk mitigation, and value creation (Kimutai and Ismael, 2016; Nicoletti, 2017). The expected outcomes and strategic benefits can be broadly categorized into financial performance, supply chain resilience, operational continuity, and socio-economic impact.

One of the most immediate and measurable outcomes is reduced procurement costs and improved budget predictability. Procurement activities account for a substantial proportion of capital and operational expenditures in oil and gas projects, encompassing equipment, services, materials, and logistics. Strategic procurement optimization leverages spend analytics, category management, supplier rationalization, and long-term contracting to achieve cost savings and cost avoidance. Standardization of specifications and consolidation of purchases across projects enhance negotiating leverage, while proactive demand forecasting reduces emergency purchases and

premium costs. Improved budget predictability arises from the ability to anticipate procurement needs, manage lead times, and structure contracts with clear pricing mechanisms. Collectively, these practices strengthen financial control, improve project viability, and allow organizations to allocate capital more efficiently (Bodiako *et al*., 2016; Dubb, 2016).

A second significant outcome is enhanced supply chain resilience and reliability. The oil and gas sector is highly sensitive to supply chain disruptions caused by geopolitical tensions, logistical challenges, natural disasters, and supplier failures. Optimized procurement strategies, including supplier segmentation, dual sourcing, long-term partnerships, and contingency planning, mitigate the impact of these risks. By building redundancy where necessary and ensuring robust supplier qualification and monitoring, organizations can maintain continuity in the supply of critical equipment and services. Resilient supply chains reduce the likelihood of project delays, production stoppages, and safety incidents, thereby safeguarding both revenue and asset integrity.

Improved operational uptime and project delivery represent another critical benefit of strategic procurement. By aligning procurement planning with drilling schedules, production forecasts, and maintenance programs, organizations ensure the timely availability of materials, equipment, and services required for operational continuity. Performance-based contracting, real-time supplier monitoring, and integrated logistics management enhance reliability and responsiveness. The result is reduced downtime, more efficient project execution, and enhanced adherence to operational schedules. This operational predictability translates into higher asset utilization, optimized production output, and minimized disruption-related costs, reinforcing the strategic role of procurement in organizational performance.

Strategic procurement optimization also strengthens supplier relationships and local economic impact. Long-term partnerships with key suppliers, framework agreements, and collaborative innovation initiatives foster trust, reliability, and mutual value creation. Engaging suppliers in continuous improvement programs and aligning incentives with performance outcomes enhances service quality, responsiveness, and innovation. Furthermore, integration of local content policies and supplier development initiatives supports national economic development, job creation, and skills transfer in oil and gas-producing regions. By promoting local supplier participation and capacity building, procurement contributes to socio-economic objectives while ensuring a stable and diversified supply base (Östensson, 2017; White, 2017).

The expected outcomes and strategic benefits of procurement optimization in oil and gas operations are multifaceted. Reduced costs and improved budget predictability, enhanced supply chain resilience, improved operational uptime and project delivery, and strengthened supplier and local economic engagement collectively enhance organizational performance. By embedding strategic procurement principles into operational and corporate practices, oil and gas companies can transform procurement into a proactive, value-generating function that supports financial sustainability, operational excellence, risk management, and socio-economic development. These outcomes demonstrate that strategic procurement is not merely a support function but a key enabler of long-term competitive advantage and sustainable growth in the oil and gas industry.

CONCLUSION

The strategic procurement optimization framework presented for oil and gas operations underscores the critical role of procurement as a driver of organizational efficiency, risk mitigation, and value creation. By integrating governance, demand planning, supplier relationship management, contracting, digital enablement, risk management, and sustainability considerations, the framework provides a structured approach to transforming procurement from a transactional activity into a strategic enabler of operational and financial performance. Its relevance lies in addressing the sector's unique challenges, including capital intensity, supply chain complexity, technological dependence, regulatory compliance, and environmental and social expectations.

Through the implementation of this framework, procurement becomes a proactive function that contributes to cost control, improved budget predictability, and enhanced supply chain resilience.

Strategic alignment with corporate objectives and asset lifecycle requirements ensures that procurement decisions support operational continuity, project delivery, and long-term sustainability. By embedding performance monitoring, risk assessment, and continuous improvement mechanisms, the framework allows organizations to anticipate and respond to disruptions while fostering stronger supplier relationships and local economic participation. This highlights the role of procurement not merely as an administrative or cost-focused function, but as a value-creating activity that generates measurable benefits for the organization and its stakeholders.

Given the dynamic nature of the oil and gas industry, characterized by fluctuating commodity prices, evolving regulatory frameworks, technological advancements, and emerging environmental and social imperatives, continuous evaluation and adaptation of procurement strategies are essential. Organizations must maintain flexibility, regularly review performance metrics, update sourcing approaches, and integrate lessons learned into operational and strategic planning. By fostering an adaptive and evidence-based procurement culture, the framework ensures sustained relevance, operational resilience, and competitive advantage in a complex and rapidly changing environment.

Strategic procurement optimization is a critical lever for enhancing organizational performance in oil and gas operations. The framework provides a comprehensive guide for embedding procurement as a value-adding function while emphasizing the need for ongoing evaluation, learning, and adaptation to maintain effectiveness in an ever-evolving industrial landscape.

REFERENCES

[1] Agarwal[1], M., Sharma, R. and Alex, L.M., 2016. Challenges in supply chain management in upstream sector of oil and gas industry.

[2] Ahmad, W.N.K.W., Rezaei, J., Tavasszy, L.A. and de Brito, M.P., 2016. Commitment to and preparedness for sustainable supply chain management in the oil and gas industry. *Journal of environmental management*, *180*, pp.202-213.

[3] Ali, I., Nagalingam, S. and Gurd, B., 2017. Building resilience in SMEs of perishable product supply chains: enablers, barriers and risks. *Production Planning & Control*, *28*(15), pp.1236-1250.

[4] Ancarani, A., Guccio, C. and Rizzo, I., 2017. The role of firms' qualification in public contracts execution: An empirical assessment. *Journal of public procurement*, *16*(4), pp.554-582.

[5] Appelt, S. and Galindo-Rueda, F., 2016. Measuring the link between public procurement and innovation.

[6] Arlen, J. and Kahan, M., 2017. Corporate governance regulation through nonprosecution. *The University of Chicago Law Review*, pp.323-387.

[7] Badiru, A.B. and Osisanya, S.O., 2016. *Project management for the oil and gas industry: a world system approach*. CRC press.

[8] Blundell, N., 2017. Faster, higher, stronger: the competitive advantage of efficient data management for front-end decision making. *The APPEA Journal*, *57*(1), pp.1-9.

[9] Bodiako, A.V., Ponomareva, S.V., Rogulenko, T.M., Karp, M., Kirova, E., Gorlov, V. and Burdina, A., 2016. The goal setting of internal control in the system of project financing. *International journal of economics and financial issues*, *6*(4), pp.1945-1955.

[10] Brandt, L., Van Biesebroeck, J., Wang, L. and Zhang, Y., 2017. WTO accession and performance of Chinese manufacturing firms. *American Economic Review*, *107*(9), pp.2784-2820.

[11] Brooks, J. and Matthews, A., 2015. Trade dimensions of food security.

[12] Bruel, O., 2016. *Strategic sourcing management: Structural and operational decision-making*. Kogan Page Publishers.

[13] Butt, A., Naaranoja, M. and Savolainen, J., 2016. Project change stakeholder communication. *International Journal of Project Management*, *34*(8), pp.1579-1595.

[14] Cerruti, C., Mena, C., Skipworth, H. and Tavoletti, E., 2016. Characterizing agile supply partnerships in the fashion industry. *International Journal of Operations & Production Management*, *36*(8), pp.923-947.

[15] Cui, W., 2015. Administrative decentralization and tax compliance: A transactional cost

perspective. *University of Toronto Law Journal*, *65*(3), pp.186-238.

[16] Ditillo, A. and Lisi, I.E., 2016. Exploring sustainability control systems' integration: The relevance of sustainability orientation. *Journal of Management Accounting Research*, *28*(2), pp.125-148.

[17] Dubb, S., 2016. Community wealth building forms: What they are and how to use them at the local level. *Academy of Management Perspectives*, *30*(2), pp.141-152.

[18] Duncombe, C., Rosenblum, S., Hellmann, N., Holmes, C., Wilkinson, L., Biot, M., Bygrave, H., Hoos, D. and Garnett, G., 2015. Reframing HIV care: putting people at the centre of antiretroviral delivery. *Tropical Medicine & International Health*, *20*(4), pp.430-447.

[19] Eriksson, P.E. and Lind, H., 2016. STRATEGIES FOR REDUCING MORAL HAZARD IN CONSTRUCTION PROCUREMENT: A CONCEPTUAL FRAMEWORK. *Journal of Self-Governance & Management Economics*, *4*(1).

[20] Foerstl, K., Azadegan, A., Leppelt, T. and Hartmann, E., 2015. Drivers of supplier sustainability: Moving beyond compliance to commitment. *Journal of supply chain management*, *51*(1), pp.67-92.

[21] Gosine, R. and Warrian, P., 2017. Digitalizing extractive industries: State-of-the-art to the art-of-the-possible—Opportunities and challenges for Canada.

[22] Grosse, S.D., Berry, R.J., Tilford, J.M., Kucik, J.E. and Waitzman, N.J., 2016. Retrospective assessment of cost savings from prevention: folic acid fortification and spina bifida in the US. *American journal of preventive medicine*, *50*(5), pp.S74-S80.

[23] Hallikas, J. and Lintukangas, K., 2016. Purchasing and supply: An investigation of risk management performance. *International Journal of Production Economics*, *171*, pp.487-494.

[24] Handfield, R.B., Primo, M. and 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), pp.15-41.

[25] Heitor, M., 2015. How university global partnerships may facilitate a new era of international affairs and foster political and economic relations. *Technological Forecasting and Social Change*, *95*, pp.276-293.

[26] Helmold, M. and Terry, B., 2016. Global sourcing and supply management excellence in China. *Singapur: Springer Verlag*.

[27] Inubiwon, B.E., 2017. Developing small and medium enterprises in the Nigerian oil and gas sector.

[28] Jensen, P.A., 2017. Strategic sourcing and procurement of facilities management services. *Journal of Global Operations and Strategic Sourcing*, *10*(2), pp.138-158.

[29] Joshi, P.S., Haghnegahdar, L., Anika, Z. and Singh, M., 2017. Supply chain innovations in the oil and gas industry. In *IISE Annual Conference. Proceedings* (pp. 1852-1857). Institute of Industrial and Systems Engineers (IISE).

[30] Jupp, J.R., 2016. Cross industry learning: a comparative study of product lifecycle management and building information modelling. *International Journal of Product Lifecycle Management*, *9*(3), pp.258-284.

[31] Kimutai, B. and Ismael, N.S., 2016. Role of strategic e-sourcing practices on supply chain performance in state corporations in Kenya: A case of Kenya Electricity Generating Company Ltd. *International Academic Journal of Procurement and Supply Chain Management*, *2*(2), pp.113-133.

[32] Li, Q., Niu, B. and Chu, L.K., 2016. Forward sourcing or spot trading? Optimal commodity procurement policy with demand uncertainty risk and forecast update. *IEEE Systems Journal*, *11*(3), pp.1526-1536.

[33] Lorino, P., Mourey, D. and Schmidt, G., 2017. Goffman's theory of frames and situated meaning-making in performance reviews. The case of a category management approach in the French retail sector. *Accounting, Organizations and Society*, *58*, pp.32-49.

[34] Martek, I. and Chen, C., 2016. Value chain supply procurement strategies in international construction: cases of foreign constructors in China. *Management Decision*, *54*(2), pp.501-521.

[35] Moretto, A., Ronchi, S. and Patrucco, A.S., 2017. Increasing the effectiveness of procurement decisions: The value of big data in the procurement process. *International Journal of RF Technologies*, *8*(3), pp.79-103.

[36] Ngarachu, A., Draper, P. and Owino, K., 2017. Are Private Sustainability Standards Obstacles to or Enablers of SME Participation in Value Chains. *Insights from South Africa and Kenya. September*.

[37] Nicoletti, B., 2017. The future: procurement 4.0. In *Agile Procurement: Volume II: Designing and Implementing a Digital Transformation* (pp. 189-230). Cham: Springer International Publishing.

[38] Olejnik, L., Englehardt, S. and Narayanan, A., 2017. Battery status not included: Assessing privacy in web standards. In *2017 International Workshop on Privacy Engineering*.

[39] Olson, D.L. and Wu, D.D., 2015. *Enterprise risk management* (Vol. 3). World Scientific Publishing Company.

[40] Östensson, O., 2017. Local content, supply chains, and shared infrastructure. *Extractive Industries*, *505*.

[41] Pak, A., Carden, L.L. and Kovach, J.V., 2016. Integration of project management, human resource development, and business teams: a partnership, planning model for organizational training and development initiatives. *Human Resource Development International*, *19*(3), pp.245-260.

[42] Papadopoulos, G.A., Zamer, N., Gayialis, S.P. and Tatsiopoulos, I.P., 2016. Supply chain improvement in construction industry. *Universal Journal of Management*, *4*(10), pp.528-534.

[43] Pepper, S.E., Pickett, C.A., Queirolo, A., Bachner, K.M. and Worrall, L.G., 2015. *The US/IAEA Workshop on Software Sustainability for Safeguards Instrumentation: Report to the NNSA DOE Office of International Nuclear Safeguards (NA-241)* (No. BNL-107824-2015). Brookhaven National Laboratory (BNL), Upton, NY (United States).

[44] Plugge, A., Borman, M. and Janssen, M., 2016. Strategic manoeuvers in outsourcing arrangements: The need for adapting capability in delivering long-term results. *Strategic Outsourcing: An International Journal*, *9*(2), pp.139-158.

[45] Provines, C.D., 2017. Value-based pricing meets twenty-first century procurement. *Journal of Revenue and Pricing Management*, *16*(1), pp.4-17.

[46] Rebelo, M.F., Santos, G. and Silva, R., 2016. Integration of management systems: towards a sustained success and development of organizations. *Journal of cleaner production*, *127*, pp.96-111.

[47] Reddy, D.V. and Swamidas, A.S.J., 2016. *Essentials of offshore structures: framed and gravity platforms*. CRC press.

[48] Ross, D.F., 2015. Procurement and supplier management. In *Distribution planning and control: Managing in the era of supply chain management* (pp. 531-604). New York, NY: Springer US.

[49] Sheffi, Y., 2015. Preparing for disruptions through early detection. *MIT Sloan Management Review*, *57*(1), p.31.

[50] Sin, I.S.M., Musa, N.A. and Ng, K.Y.N., 2017. Building business resilience through incident management body of knowledge (IMBOKTM): The amalgamated framework for total resilient capability. *Global Business & Finance Review (GBFR)*, *22*(1), pp.38-50.

[51] Singh, R., Sharma, S.K. and Matai, R., 2017. Barriers and Enablers of Strategic Sourcing Risk Management: A Perspective of Indian Automotive Industry. *EVIDENCE BASED MANAGEMENT*, p.236.

[52] Sithole, B., Silva, S.G. and Kavelj, M., 2016. Supply chain optimization: enhancing end-to-end visibility. *Procedia engineering*, *159*, pp.12-18.

[53] Sparrow, P.R. and Makram, H., 2015. What is the value of talent management? Building value-driven processes within a talent management architecture. *Human resource management review*, *25*(3), pp.249-263.

[54] Stein, V. and Wiedemann, A., 2016. Risk governance: Conceptualization, tasks, and research agenda. *Journal of Business Economics*, *86*(8), pp.813-836.

[55] Teece, D., Peteraf, M. and Leih, S., 2016. Dynamic capabilities and organizational agility: Risk, uncertainty, and strategy in the innovation economy. *California management review*, *58*(4), pp.13-35.

[56] Tsai, H.F. and Luan, C.J., 2016. What makes firms embrace risks? A risk-taking capability perspective. *BRQ Business Research Quarterly*, *19*(3), pp.219-231.

[57] Turki, M., Medhioub, E. and Kallel, M., 2017. Evaluation of a national food industry based on environmental performance and condition indicators: critical success and barriers of EMS implementation in Tunisia. *Environment Systems and Decisions*, *37*(4), pp.423-434.

[58] White, S., 2017. Regulating for local content: Limitations of legal and regulatory instruments in promoting small scale suppliers in extractive industries in developing economies. *The Extractive Industries and Society*, *4*(2), pp.260-266.

[59] Wicken, O., 2016. 12 Industrial diversification processes and strategies in an oil economy. *Economic diversification policies in natural resource rich economies*, *295*.

[60] Wong, J.J., Abdullah, M.O., Baini, R. and Tan, Y.H., 2017. Performance monitoring: A study on ISO 14001 certified power plant in Malaysia. *Journal of cleaner production*, *147*, pp.165-174.