



**ELECTRONIC SUPPLY MANAGEMENT AND PRODUCT QUALITY OF OIL AND GAS
FIRMS IN RIVERS STATE**

Jekey, Lekue

Bazia, John N. S.

Department of Marketing, Faculty of Management Science,
University of Port Harcourt

Correspondence E-Mail: lekkue.jekey@uniport.edu.ng

Abstract

This study examined the relationship between electronic supply management (ESM) and product quality of oil and gas firms in Rivers State, Nigeria. ESM was operationalized through two key dimensions (e-sourcing and e-tendering) while product quality was assessed via product durability, product reliability, and product conformance. The study was grounded in Dynamic Capability Theory as the primary theoretical anchor. A correlational research design was adopted. The population comprised twenty (20) oil and gas firms in Rivers State, from which a census of 120 respondents was drawn. Valid responses totalled 110. Data were collected using structured questionnaires and analysed with Pearson Product Moment Correlation (PPMC) at a 0.05 significance level. The findings revealed that e-sourcing has a very strong, positive, and statistically significant relationship with product quality ($r = 0.844, p < 0.05$). Similarly, e-tendering demonstrated a strong positive and significant relationship with product quality ($r = 0.742, p < 0.05$). The study concludes that electronic supply management practices significantly enhance product quality outcomes in oil and gas firms. It recommends that firms intensify investment in digital supplier identification platforms and transparent online bidding systems to sustain competitive quality standards.

Keywords: Electronic Supply Management, E-Sourcing, E-Tendering, Product Quality, Dynamic Capability Theory, Oil and Gas Firms, Rivers State.

1.0 Introduction

The contemporary business landscape, particularly within capital-intensive sectors such as oil and gas, is increasingly defined by digital transformation and technological integration. Among the most consequential shifts in procurement and supply management is the adoption of electronic supply management (ESM) systems, which fundamentally alter how firms identify, evaluate, and contract with suppliers. ESM encompasses the deployment of internet-based tools to improve the transparency, speed, and accuracy of procurement activities, with e-sourcing and e-tendering constituting its two foundational pillars (Gunasekaran, McGaughey, Ngai & Rai, 2018; Croom & Brandon-Jones, 2017).

In the oil and gas industry, which operates under strict technical specifications, safety standards, and regulatory requirements, the quality of procured inputs is non-negotiable. Product quality is defined as the ability of a product to meet or exceed established standards and customer expectations (Kotler & Armstrong, 2014). It is a central determinant of operational success and competitive positioning.



Substandard inputs arising from poor supplier selection or opaque procurement processes can result in equipment failure, environmental incidents, regulatory sanctions, and reputational damage. Therefore, the mechanisms through which firms manage supplier selection and evaluation are directly consequential for product quality outcomes.

Rivers State hosts the majority of Nigeria's oil and gas activities, including upstream exploration, downstream refining, and oilfield services. Firms operating in this environment confront intensifying competitive pressures, amplified by declining global oil prices, tightening environmental regulation, and the imperative to deliver high-quality outputs consistently. Traditional procurement approaches, characterized by manual processes, paper-based tendering, and geographically limited supplier pools, are increasingly inadequate for meeting these demands (Isoghom & Worgu, 2024; Onwuchekwa & Eyoh, 2024). Electronic supply management offers a strategic alternative by widening supplier access through e-sourcing, standardizing bid evaluation through e-tendering, and ultimately driving higher-quality procurement outcomes.

Despite the growing empirical literature on e-procurement and organizational performance, relatively few studies have specifically examined the relationship between ESM dimensions and product quality within the oil and gas sector in Rivers State. Most existing studies focus on broader performance outcomes such as supply chain efficiency, cost reduction, or public-sector procurement (Kioko & Mwangangi, 2023; Hauwa & Umar, 2023; Abubakar, 2024). This gap is significant because product quality in the oil and gas context is shaped by unique sectoral dynamics – including technical specifications, certification requirements, and safety compliance – that differ markedly from other industries.

This study therefore investigates the relationship between electronic supply management (e-sourcing and e-tendering) and product quality of oil and gas firms in Rivers State. Anchored on Dynamic Capability Theory as the primary framework, with Value Chain Theory and the Resource-Based View providing complementary theoretical grounding, the study offers a rigorous conceptual explanation of how digitally mediated procurement practices improve quality outcomes through enhanced supplier competition, operational adaptability, and value chain optimization.

The specific objectives of the study are to: (i) examine the relationship between e-sourcing and product quality of oil and gas firms in Rivers State; and (ii) assess the relationship between e-tendering and product quality of oil and gas firms in Rivers State. Correspondingly, the following null hypotheses were formulated: H_{01} : There is no significant relationship between e-sourcing and product quality of oil and gas firms in Rivers State; and H_{02} : There is no significant relationship between e-tendering and product quality of oil and gas firms in Rivers State.

2.0 Theoretical Framework

This study is anchored in Dynamic Capability Theory, supported by Value Chain Theory and the Resource-Based View (RBV), to explain the relationship between electronic supply management (ESM) practices and product quality in the oil and gas sector. Dynamic Capability Theory (Teece, Pisano & Shuen, 1997; Teece, 2007, 2018) provides the primary lens, emphasizing firms' ability to sense



environmental shifts, seize technological opportunities, and reconfigure resources to sustain competitive advantage. In the context of ESM, this theory explains how oil and gas firms adopt e-sourcing and e-tendering platforms to respond to volatile supply conditions, regulatory demands, and technological change, thereby ensuring high-quality inputs and operational excellence.

Complementing this, Porter's Value Chain Theory (1985) highlights procurement as a critical support activity that influences quality across the entire chain of operations. By digitizing procurement processes, ESM enhances supplier selection, strengthens quality-focused relationships, and multiplies value creation throughout the firm's activities. Finally, the Resource-Based View (Barney, 1991; Wernerfelt, 1984) frames digital procurement systems as strategic resources that meet the VRIN criteria (valuable, rare, inimitable, and non-substitutable). Robust ESM capabilities, such as structured tendering frameworks and data-driven supplier evaluation, become distinctive competencies that competitors cannot easily replicate, thereby sustaining product quality advantages.

Together, these theories provide a comprehensive foundation: Dynamic Capability Theory explains the adaptive processes driving ESM adoption, Value Chain Theory situates procurement within the broader system of value creation, and RBV underscores the strategic resource dimension of digital procurement. This integrated framework positions ESM as both a dynamic capability and a strategic resource that enhances product quality in the oil and gas industry.

3.0 Conceptual Clarifications

Electronic Supply Management

Electronic supply management (ESM) refers to the systematic application of internet-based and digital technologies to manage the full spectrum of supply-side activities, from supplier discovery and qualification through to contract award and performance monitoring. As a construct, ESM encompasses a broader organizational philosophy than transactional e-procurement: it embeds digital capability into strategic supplier relationship management, positioning technology as an instrument for building competitive, quality-focused supply networks (Gunasekaran et al., 2018; Kosmol, Reimann & Kaufmann, 2019).

Scholars have defined ESM in varied but complementary ways. Kim and Shunk (2014) conceptualize ESM as buyer-centric digital systems that optimize procurement interactions with selected supplier networks. Tassabehji and Moorhouse (2018) position ESM as a strategic enabler of supply chain resilience and innovation, arguing that firms with advanced ESM capabilities are better positioned to manage supply risks and sustain quality delivery. According to Croom and Brandon-Jones (2017), e-procurement systems rely on internet technology to automate and streamline the procurement process; when successfully implemented, they offer substantial efficiency, quality, and governance benefits. Common to these definitions is the centrality of technology in improving the speed, accuracy, and strategic value of supply-side decision-making.

In the oil and gas sector, ESM assumes heightened strategic importance due to the complexity and criticality of procurement decisions. The range of inputs, from drilling equipment and chemicals to safety systems and technical services, demands rigorous supplier evaluation and quality assurance



processes that digital platforms are uniquely equipped to support. Empirical evidence confirms that ESM adoption in the sector reduces procurement cycle times, improves supplier quality compliance, and enhances transparency in contract award processes (Onwuchekwa & Eyoh, 2024; Abubakar, 2024; Isoghom & Worgu, 2024).

E-Sourcing

E-sourcing is the process of using internet-enabled technology to identify, evaluate, and select suppliers for specific categories of procurement requirements (Nzuve, 2013; Kimutai & Ismael, 2016). It constitutes the upstream, strategic intelligence-gathering phase of procurement in which firms survey the supplier market, solicit quotations, and conduct comparative assessments of potential supply partners. E-sourcing tools include online reverse auctions, digital request-for-quotation (RFQ) platforms, electronic supplier portals, and data-driven supplier qualification systems.

The strategic value of e-sourcing lies in its capacity to expand the boundary of the firm's supplier network beyond geographic constraints. Traditional sourcing processes were limited by the physical reach of procurement staff and the accessibility of supplier information. E-sourcing dismantles these limitations, enabling firms to access global supplier databases, conduct simultaneous multi-vendor evaluations, and leverage competitive bidding dynamics to secure better pricing and quality commitments (Ratanya, 2013; Barngetuny & Kimutai, 2015). By increasing the number of competing suppliers, e-sourcing intensifies market competition and exerts upward pressure on quality commitments, a dynamic empirically validated in multiple supply chain studies (Kamaru & Were, 2018; Kioko & Mwangangi, 2023).

In the oil and gas context, e-sourcing addresses a critical vulnerability: over-reliance on a narrow pool of pre-qualified suppliers, often selected through personal networks rather than objective capability assessment. Digital sourcing platforms that integrate supplier performance data, certification records, and historical quality scores enable procurement professionals to make evidence-based supplier selection decisions. This directly contributes to product quality by ensuring that only suppliers with verified technical capabilities and track records are admitted to the supply base (Nyongesa & Moronge, 2021). Empirical studies by Khaoya and Muchelule (2019) and Isoghom and Worgu (2024) consistently confirm a positive association between e-sourcing adoption and quality-related performance outcomes.

E-Tendering

E-tendering is the electronic management of the tendering process, encompassing the digital publication of tender notices, submission of bids, automated evaluation of offers, and electronic award of contracts (Chegugu & Yusuf, 2017; Wagner & Sweeney, 2010). Unlike e-sourcing, which focuses on the strategic identification of potential suppliers, e-tendering operationalizes competitive procurement by standardizing the bid submission and evaluation process through digital platforms. It ensures that contract awards are grounded in objective, transparent criteria rather than subjective judgement or informal influence.



The impact of e-tendering on product quality operates through multiple channels. First, digital evaluation platforms enforce standardized quality criteria in bid assessment, ensuring that suppliers who meet minimum technical and quality specifications are systematically preferred. Second, the transparency of e-tendering systems, in which bid outcomes are recorded, auditable, and accessible, reduces opportunities for procurement fraud and supplier collusion, both of which are associated with quality compromise in conventional tendering processes (Barasa, Gregory & Okwaro, 2017; Galadima & Waziri, 2022). Third, by maintaining electronic records of all bids and evaluations, e-tendering platforms create institutional memory that supports continuous improvement in procurement quality standards.

In the Nigerian oil and gas sector, e-tendering is increasingly recognized as an instrument for improving procurement governance and quality assurance. Research by Nyokabi, Biraori and Wacera (2023) demonstrates that e-tendering, encompassing online supplier registration, virtual screening, and automated evaluation, has a statistically significant positive effect on organizational performance, with quality assurance as a key performance dimension. Similarly, Olamileke, Olufemi and Oludare (2021) identify e-tendering as a mechanism for promoting transparency and accountability in procurement, both of which are prerequisite conditions for consistent product quality delivery.

Product Quality

Product quality is a multi-dimensional construct representing the capacity of a product to fulfil stated and implied customer requirements at a consistent and reliable level (Garvin, 1984; Kotler & Armstrong, 2014). In competitive markets, product quality functions as both a threshold requirement, the minimum standard necessary to compete, and a differentiator that confers sustained competitive advantage on firms that exceed market expectations. For oil and gas firms, where technical performance standards are defined by regulatory bodies, industry codes, and client specifications, product quality is not merely a commercial consideration but a legal and safety imperative.

Three dimensions of product quality are particularly germane to the oil and gas procurement context. First, product durability refers to the operational lifespan of a product under specified conditions, a critical attribute for equipment and materials deployed in the demanding physical environments of oilfield operations (Lienig & Bruemmer, 2017). Second, product reliability captures the probability that a product will perform its intended function without failure over a defined period, essential for safety-critical applications where component failure can trigger catastrophic consequences (Waters & Waters, 2018). Third, product conformance measures the extent to which a product meets predetermined technical specifications, the foundational quality criterion in regulated, standards-driven industries such as oil and gas (Caruana, 2022; Molina-Castillo, Munuera-Alemán & Calantone, 2021).

The linkage between electronic supply management and product quality is theoretically and empirically grounded. ESM practices improve product quality by enabling the selection of suppliers with verified quality management systems, enforcing transparent bid evaluation criteria that penalize non-conforming specifications, and creating accountability mechanisms that incentivize suppliers to maintain quality standards throughout the contract period. Research by Khaoya and Muchelule (2019),



Isoghom and Worgu (2024), and Kamaru and Were (2018) collectively support the proposition that digital procurement practices positively influence quality-related performance outcomes in supply chain contexts.

4.0 Methodology Research Design

This study adopted a correlational research design, which is appropriate for examining the nature, direction, and strength of associations between two or more variables without manipulating them (Nworgu, 2015). Correlational designs are particularly suited to organizational research contexts where experimental control is neither feasible nor ethically appropriate. The design enabled the study to systematically measure the relationship between electronic supply management dimensions (e-sourcing and e-tendering) and product quality outcomes in oil and gas firms.

Population and Sample

The population of the study consisted of all twenty (20) oil and gas firms currently operating in Rivers State, as listed in the Nigeria Business Directory and Search Engine (2023). Given the small and bounded nature of this population, a census approach was adopted in which all firms were included in the study. Six (6) respondents were drawn from each firm – comprising logistics managers, operations managers, marketing managers, information and communications technology managers, and senior operational staff – yielding a total sample of 120 respondents. This purposive multi-respondent approach ensured that data captured organizational rather than merely individual perspectives on procurement and quality practices.

Instrument and Data Collection

Primary data were collected using a structured questionnaire divided into three sections: (i) demographic information; (ii) items measuring e-sourcing and e-tendering on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree); and (iii) items measuring product quality dimensions. Content validity was established through expert review by the study supervisor and two senior lecturers from the Department of Marketing, University of Port Harcourt. Instrument reliability was assessed through a test-retest procedure administered to 20 respondents not included in the main study. Table 1 presents the Cronbach's alpha reliability coefficients for the relevant study variables.

Table 1: Reliability Analysis of Study Variables

Variables	Dimensions/Measures	No. of Items	Cronbach Alpha
E-Procurement Practice (ESM)	E-Sourcing	3	0.81
	E-Tendering	3	0.82
Competitive Intensity	Product Quality	3	0.85

Source: Survey Data, 2026.



Data Analysis

Data analysis was conducted in two stages. First, descriptive statistics, including frequencies, percentages, and weighted mean scores, were used to profile respondents and analyse item-level responses. A criterion mean of 3.0 was adopted for interpreting Likert-scale responses, with scores above this threshold treated as agreement. Second, Pearson Product Moment Correlation (PPMC) was used to test the hypothesised relationships between ESM dimensions and product quality. The decision rule for hypothesis rejection was set at $p < 0.05$. A correlation coefficient of $\pm 0.80-1.00$ was interpreted as a very strong relationship; $\pm 0.60-0.79$ as strong; $\pm 0.40-0.59$ as moderate; $\pm 0.20-0.39$ as weak; and $\pm 0.00-0.19$ as very weak. All analyses were performed using SPSS version 25.0.

5.0 Results

Response Rate and Demographic Profile

Of the 120 questionnaires administered, 112 were returned, of which 110 (91.7%) were valid and used for analysis. The majority of respondents were aged 26–35 years (46.4%), male (52.7%), married (59.1%), holders of a Bachelor's degree (49.1%), and had between 5–9 years of work experience (34.5%). This demographic profile reflects a relatively experienced, formally educated, and professionally active workforce well-positioned to provide informed assessments of electronic procurement and product quality practices.

Descriptive Analysis

Table 2 presents the descriptive analysis of the study variables. All items recorded weighted mean scores above the criterion mean of 3.0, indicating respondent agreement with statements measuring e-sourcing, e-tendering, and product quality.

Table 2: Descriptive Summary of Study Variables

Variable	Item	Weighted Mean	Decision
E-Sourcing	Firm transacts with suppliers online	3.68	Agreed
	Web system constantly upgraded for transactions	3.84	Agreed
	Web platforms standardized for procurement	3.85	Agreed
E-Tendering	E-tendering enhances procurement accessibility	3.89	Agreed
	Online screening and selection of suppliers enabled	3.95	Agreed
	Transparency in tendering process improved	3.87	Agreed
Product Quality	Products viewed from customer perspective	3.75	Agreed
	Quality defined by customer perception	3.71	Agreed
	Product quality is key to firm success	3.61	Agreed



The results indicate that respondents agreed with all nine measurement items across the three variables. For e-sourcing, weighted means ranged from 3.68 to 3.85, reflecting consistent agreement that firms utilise and upgrade online transaction platforms. For e-tendering, weighted means ranged from 3.87 to 3.95, indicating strong agreement that digital tendering enhances accessibility, transparency, and supplier screening. For product quality, weighted means ranged from 3.61 to 3.75, reflecting respondent agreement that product quality is customer-centric and a key factor in firm success.

Hypotheses Testing

Hypothesis One: E-Sourcing and Product Quality

Table 3 presents the Pearson Product Moment Correlation (PPMC) results for the relationship between e-sourcing and product quality.

Table 3: PPMC Results on the Relationship between E-Sourcing and Product Quality

Variable	E-Sourcing	Product Quality
E-Sourcing (Pearson r)	1.000	.844**
Sig. (2-tailed)	—	.000
Product Quality (Pearson r)	.844**	1.000
Sig. (2-tailed)	.000	—

**Correlation significant at the 0.01 level (2-tailed).

The PPMC coefficient of $r = 0.844$ indicates a very strong positive relationship between e-sourcing and product quality of oil and gas firms in Rivers State. Since the p-value (0.000) is less than the 0.05 significance threshold, the null hypothesis H_01 is rejected. The study therefore concludes that there is a significant positive relationship between e-sourcing and product quality of oil and gas firms in Rivers State.

Hypothesis Two: E-Tendering and Product Quality

Table 4 presents the PPMC results for the relationship between e-tendering and product quality.

Table 4: PPMC Results on the Relationship between E-Tendering and Product Quality

Variable	E-Tendering	Product Quality
E-Tendering (Pearson r)	1.000	.742**
Sig. (2-tailed)	—	.000
Product Quality (Pearson r)	.742**	1.000
Sig. (2-tailed)	.000	—

**Correlation significant at the 0.01 level (2-tailed).



The PPMC coefficient of $r = 0.742$ indicates a strong positive relationship between e-tendering and product quality of oil and gas firms in Rivers State. Since the p-value (0.000) is less than the 0.05 significance threshold, the null hypothesis H_02 is rejected. The study therefore concludes that there is a significant positive relationship between e-tendering and product quality of oil and gas firms in Rivers State.

Discussion of Findings

The study reveals that electronic supply management significantly enhances product quality in oil and gas firms in Rivers State. A very strong positive relationship was found between e-sourcing and product quality ($r = 0.844$, $p < 0.05$), consistent with Dynamic Capability Theory. E-sourcing expands supplier options, enables evidence-based evaluation, and allows firms to reconfigure supplier relationships through digital platforms, leading to improved durability, reliability, and conformance of inputs. This aligns with prior studies showing that e-sourcing strengthens procurement practices and quality outcomes.

Similarly, a strong positive relationship was observed between e-tendering and product quality ($r = 0.742$, $p < 0.05$), supporting Value Chain Theory. E-tendering embeds objective, standardized quality criteria into contract awards, reduces reliance on informal networks, and ensures transparency in supplier evaluation. While its impact is slightly lower than e-sourcing, it plays a critical role in assuring quality at the contract stage. Together, these findings demonstrate that digitizing both sourcing and tendering creates a dual-layer quality assurance mechanism. This not only strengthens supplier selection but also embeds transparency and accountability into procurement processes, a vital achievement in addressing the challenges of procurement governance in Nigeria.

6.0 Implications of The Study

The study contributes theoretically by extending Dynamic Capability Theory into the domain of digital procurement, showing that e-sourcing and e-tendering function as dynamic capabilities that help firms sense market changes, seize quality-enhancing opportunities, and reconfigure supplier networks. It also validates the complementary roles of Value Chain Theory and the Resource-Based View, confirming that optimizing procurement activities multiplies value across the chain and that distinctive digital procurement resources generate inimitable competitive advantages.

Managerially, the findings highlight the strategic importance of investing in e-sourcing platforms and embedding explicit quality criteria into e-tendering processes. Managers should prioritize supplier registries, quality scoring systems, and evidence-based shortlisting, while also ensuring procurement staff are trained to effectively use digital tools. Human capital development is thus a critical complement to technological infrastructure.

From a policy perspective, the study underscores the need for institutional frameworks mandating standardized ESM adoption in Nigeria's oil and gas sector. Policymakers should establish governance standards for supplier qualification and contract transparency, while also addressing enabling



conditions such as reliable digital infrastructure, regulatory frameworks for electronic transactions, and robust cybersecurity standards.

Contribution to Knowledge

This study makes an original empirical contribution by establishing the ESM–product quality nexus specifically within the oil and gas sector in Rivers State, Nigeria — a context that has been largely absent from the e-procurement literature. While prior studies have examined e-procurement in relation to general performance, operational efficiency, or public-sector procurement (Kioko & Mwangangi, 2023; Hauwa & Umar, 2023; Isoghom & Worgu, 2024), this study isolates and quantifies the specific quality-enhancement pathways through which e-sourcing and e-tendering operate. The findings fill a gap in the literature and provide a foundation for future research on the disaggregated quality outcomes of digital procurement practices in sector-specific contexts.

7.0 Conclusion

This study examined the relationship between electronic supply management, operationalized through e-sourcing and e-tendering, and product quality of oil and gas firms in Rivers State. The empirical evidence reveals that both ESM dimensions have significant positive relationships with product quality, with e-sourcing recording a very strong correlation ($r = 0.844$, $p < 0.05$) and e-tendering recording a strong correlation ($r = 0.742$, $p < 0.05$). These findings confirm that the adoption of digital procurement practices, grounded in the adaptability logic of Dynamic Capability Theory, the value-optimization framework of Value Chain Theory, and the resource-advantage framework of the Resource-Based View, is associated with measurable improvements in product quality outcomes in the oil and gas sector.

The study contributes to the empirical literature by establishing the ESM–product quality nexus within a specific, under-researched sectoral and geographical context. It validates the theoretical proposition that enabling dynamic procurement capabilities and optimizing the procurement value chain through digital platforms enhances the quality of procured inputs and, by extension, the quality of products delivered to end users. The findings call for deliberate, strategic investment in ESM platforms by oil and gas firms and for supportive policy frameworks that promote digital procurement governance across the Nigerian energy sector.

8.0 Recommendations

The study recommends that oil and gas firms in Rivers State systematically invest in digital e-sourcing platforms with updated registries of certified suppliers, incorporating quality scoring systems to ensure reliability and durability of inputs. Firms should also deploy structured e-tendering systems that embed explicit product quality criteria, such as technical specifications and certification requirements, into bid evaluations, aligning contract awards with quality-compliant suppliers. Management is advised to prioritize staff training in digital procurement tools, collaborating with government agencies and educational institutions to build competence in leveraging e-sourcing and e-tendering for quality assurance. At the policy level, regulatory authorities should establish minimum governance standards



mandating certified digital platforms for supplier qualification and contract awards, while incentivizing adoption through measures like tax concessions. Finally, firms should integrate supplier performance dashboards into ESM platforms to continuously monitor product quality delivery, enabling real-time corrective action and operationalizing the adaptive reconfiguration logic of Dynamic Capability Theory.

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