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E-Procurement and Organizational Performance in the Oil and Gas Industry: The Moderating Role of Technological Capability

Gabriel Asare
Post Graduate Student: School of Business
Kwame Nkrumah University of Science and Technology
https://orcid.org/0009-0005-0806-9015

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Abstract

Purpose: The adoption and utilization of information technologies has a strong impact on organizations performance. E-Procurement process is basically intended to maintain a strategic distance from human interface particularly the provider and purchaser communication amid the pre-bidding stage. This study seeks to examine the moderating role of technological capability on the relationship between E-procurement and organizational performance in oil and gas industry.

Methodology: The study adopted a descriptive and exploratory study design. Quantitative approach was adopted to examine and determine the modern phenomenon between the variable: E-procurement, organizational performance and technological capability in the oil and gas industry. Simple random sampling and purposive sampling techniques were used. A sample size of 106 was used. Quantitative data from questionnaires was collected and processed and analyzed using Statistical Package for Social Sciences (SPSS version 25) for accuracy. Factor analysis and structural equation modelling was run to examine the relationship among the study variables set out in the objectives.

Findings: Findings show moderately significant relationship between e-procurement and organizational performance in the oil and gas industry, which means that as e-procurement increases, organizational performance is also likely to increase. Furthermore, findings show that there is statistically significant moderate relationship between technological capability and organizational performance in the oil and gas industry. The study concluded that, interaction between technological capability and e-procurement does not significantly influence the strength or direction of the relationship between e-procurement and organizational performance.

Unique Contribution to Theory, Policy and Practice: The study recommends that, managers should prioritize developing their technological skills in order to increase organizational performance.

Keywords: *E-Procurement, Organizational Performance, Technological Capability*

Background of the study

The role of procurement has significantly changed over time, with the lack of technological capability (TC) being a major reason for inadequate development in certain firms and countries (Figueiredo, 2016). Technological capabilities and innovations in Information Technologies (IT), Information Systems (IS), and Information and Communication Technology (ICT) have become essential for organizations to provide cost-effective solutions and better consumer loyalty. The adoption and utilization of information technologies have a strong impact on organizational performance, leading organizations to transition to sustainable E-Procurement from the traditional style (Laryea & Ibem, 2016).

Developments in innovations are shifting the way buyers and providers acquire goods and services, making it easier to oversee and monitor performance contracts, tenders, and records through acquisition management portals. This helps organizations work more productively, satisfy pre-requisites efficiently, and minimize risk during the supply chain (Gelderman et al., 2016).

Ahmad et al., (2014) noted Technological Capability (TC) as the accumulation of necessary technical and theoretical knowledge and tools to guide the innovation process. E-procurement practices emerged due to deficiencies in the traditional tender framework, such as delays in the conclusion of providers for goods and ventures for organizational activities. E-procurement helps in cost reduction, improves financial performance, reduces inbound lead time and efficiency, and increases procurement volumes processed (Candela & Ulises, 2022),

Procurement functions have become a strategic unit for many organizations' performance, as prudent procurement can cut costs and increase profitability (Saad et al., 2016). This study aims to establish the moderating role of technological capability on e-procurement and organizational performance using Technological Innovation (TI) theory and Technological Capability (TC) theory.

Statement of Problem

The role of procurement has evolved significantly, with technological capabilities and innovations in IT, IS, and ICT being crucial for organizations to provide cost-effective solutions and improve consumer loyalty (Figueiredo, 2016). However, challenges such as costs, planning, board changes, and training and resources have hindered the adoption of e-procurement practices (Amani, 2021). In Ghana, implementing e-procurement systems outside legal frameworks, user and expert turnovers, failure to automate procurement procedures, capital intensiveness, and lack of infrastructure have led to sluggish adoption (Carren et al., 2020). Despite these challenges,

organizations that use e-procurement experience benefits such as cost reduction, information sharing, and transparency (Oteki et al.,2019). In the oil and gas industry, delays in procurement can lead to losses in terms of money and time. This study aims to bridge existing gaps by examining the moderating role of technological capability on the relationship between e-procurement and organizational performance in the oil and gas industry.

Objectives of the Study

The general objective of the study is to examine the moderating role of technological capability on the relationship between E-procurement and organizational performance in oil and gas industry. The specific objectives of this study are;

1. To assess the relationship between e-procurement and organizational performance in the oil and gas industry.

2. To determine the relationship between e-procurement practices and technological capability in the oil and gas industry.

3. To assess the moderating role of technological capability on the relationship between e-procurement and organizational performance in the oil and gas industry.

Theoretical Review

Defee et al., (2010) made an accession that, for research to be a good one, it must have its root in a theory (Mentzer et al., 2008). From this perspective, the study is steered by these two theories: Technological Innovation (TI) theory and Technological Capability (TC) theory.

Technological Innovation (TI) Theory

The term 'innovation' was first introduced in 1911 in Schumpeter's work, 'The Theory of Economic Development'. Innovation was defined as a revolutionary process with spontaneous and non-continuous changes. However, after the 1970s, studies on innovation rapidly generated a dense body of knowledge. Christopher Freeman, Richard R. Nelson, and Nathan Rosenberg contributed to the evolutionary approach to innovation, with Rosenberg's work "Perspectives on Technology" emphasizing the importance of technological centrality in economic growth.

Numerous studies have focused on the relationship between technology and the economy, with Dosi (1982) highlighting that technologies are carefully chosen through interactions between fundamental economic factors such as search for new opportunities, market expansion, cost reduction, and economic change. Nelson and Winter (1982) extended their considerations on the evolutionary theory approach related to economic change, reporting specific models that focus on

changes in market, economic growth, and innovation competition.

Teece (1996) analyzed firms' structures and external ties, highlighting the essential role of information networks in the rhythm and course of innovation. Freeman (1991) summarized key results from empirical research conducted in the 1960s on the external sources of scientific, technical, and market information in firms' successful innovations and the importance of information and cooperation networks with users in developing processes and products that generate innovation.

This body of knowledge has led to a series of studies focusing on the primary agent involved in innovation, particularly in a dynamic and globalized environment. Firms must innovate to remain competitive.

Technological Capability (TC) Theory

Technological Capability (TC) emerged in the 1970s as a crucial component for firms and economies to survive in today's global era. It involves the ability to acquire new knowledge and apply it for commercial purposes. Different perspectives have been presented on the definition of TC, with some arguing that it is the accumulation of necessary technical and theoretical knowledge and devices to guide innovation processes (Bell & Figueiredo 2012; Ahmad et al. 2014). Ruiz-Navas and Miyazaki (2017); Vargas et al., (2017) also suggest that firms and economies integrate TC due to diverse resources, including knowledge, practices, and abilities, to manage and generate technological change.

Technological capability as accessed by many and noted by Yakubu and Lily, (2020) enables firms to identify, acquire, and apply new external knowledge to develop operational competencies, leading to superior performance. Therefore, main goal of TC is to positively impact organization or economic performance. Different models have been developed to implement and select TC, with organizations and countries having unmatched capabilities and decision-making guidelines at different moments. These capabilities and decision-making guidelines assume dynamic characteristics and are modified as a result of efforts to solve environment-related problems (Nelson & Winter, 1982; Fitz-Oliveira & Tello-Gamarra, 2022).

The diffusion of technological activities based on capabilities stems from taxonomies created by Lall, Bell, and Pavitt in the 1980s and 1990s. Recent studies have focused on the accumulation of TC based on these taxonomies, which help map the evolution of technological trajectories. All innovative activities related to the technological cycle and the dynamics of a technological trajectory are associated with TC and the organization's innovative capability. This study will

further examine the moderating role of technological capability on the relationship between E-procurement and organizational performance in the oil and gas industry.

Empirical Review

This study reviews previous studies on E-procurement, benefits of adopting E-procurement and the challenge of E-procurement adoption focusing on local and global perspectives. It is guided by outcomes from similar studies on these variables.

E-Procurement Adoption

Studies show that technological change in firms' administration is influenced by various determinants, necessitating a pragmatic approach to understanding the mechanism of technology adoption (Pollitt 2011; Buffat 2015). E-procurement adoption is driven by improving data quality, reliable information, good relationships with buyers and suppliers, cutting administrative costs, and minimizing human participation to increase supplier and public confidence.

However, Isaac et al., (2022) reported that, it has a low adoption rate in the mining industry. Local governments with hybrid structures have received little attention in understanding the mechanism of technology adoption. E-procurement adoption is not fully adopted by all agencies, with factors such as e-security, staffing, user acceptance, and top management support influencing adoption. Yifan et al., (2021) findings shed insights on how top management support and e-security are the major influences, particularly in the public sector.

Benefits of E-Procurement Adoption

procurement systems offer numerous benefits, including transactional benefits, information management, cost reduction, and reduced manpower. Transactional benefits include increased flexibility, speed, efficiency, and effectiveness, eliminating waste and ensuring compliance (Kumar & Ganguly, 2021). E-procurement tools, such as catalogs, help organizations tackle compliance challenges and provide financial benefits.

Important for information management is the ability to obtain accurate information without stress, promoting financial gain and rich data for analysis and decisions (Adeniyi et al., 2020). E-procurement systems also help beat prices by improving negotiation skills and promoting trust and reliability. Payments are made easier and faster, with electronic invoices eliminating the need for physical visits (Harelimana, 2018).

Githinji and Were (2018), noted e-procurement also helps eliminate corruption and transactional malpractices, reducing administrative savings of 20-25% on order and inventory, staff numbers,

and sourcing cycle times. It may also curb maverick spending or spending off contract. Implementing e-procurement methods can significantly impact a country's economic development, especially when used by the government.

The process encourages businesses to learn and use modern technology to improve their systems and operations, aiding in capacity building in ICT and scientific business approaches. Benefits are more significant when there is high price transparency, high level of competition, and lower business costs. Moreover, e-procurement helps managers acquire new skills, leading to higher business growth.

Challenges of E-Procurement Adoption

Smart., A. (2010) highlights the challenges and risks associated with implementing e-procurement projects, including evaluating the benefits and creating a case for IT introduction. Implementation management is crucial for companies to roll out strategies and IT skills, as well as undergo thorough procurement process re-engineering before an e-procurement solution can be deployed. Successful practices focus on reducing authorization stages, regulating exceptions, eliminating paper, integrating suppliers, and considering the entire process from searching for goods to invoicing.

Ujakpa et al., (2016) highlight the lack of system integration and standardization issues, external business risk, technology risks, immaturity of e-procurement-based market services, end-user resistance, difficulty changing purchasing-related behavior among employees, and e-procurement process risks. Lack of system integration and standardization issues is due to the relatively new nature of e-procurement and the difficulty in finding benchmark reference models.

Isaac et al., (2022) report that bad internet infrastructure, expensive IT infrastructure software, weak business procedures, and lack of implementation capacity are challenges. Financial resource availability and staff competency are also identified as challenges for e-procurement acceptance. Suzzy, K., A., (2019); Githinji and Were (2018) highlight the need for an adequate legal framework, data security, uncertainty over trust and commitment among trading partners, and insufficient technological infrastructure as factors posing challenges for e-procurement implementation in government ministries.

Augustine et al., (2017) study found that hardware acquisition, staff training, insufficient budgetary allocation, and unskilled computer illiteracy among employees contribute to system specification challenges. Alisia (2018) concludes that system specifications are not only related to software integration and data management but also legal and administration procedures and IT

infrastructure.

Conceptual Framework

A conceptual framework forms a simplified familiar structure, which is meant to help gain insight into a phenomenon that one needs to explain (Orodho, 2009). Conceptual framework is that related to some abstract ideas or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones, the conceptual literature concerning the concepts and theories and explain how the variables relate (Kothari, 2004). In conducting the study, a conceptual framework was developed to show the interrelationships between the independent variables, dependent variable and mediating variables. In the study, organizational performance conceptualized as dependent variable, E-procurement as independent variable and technological capability as the mediating variable. Figure1 shows a representation of the conceptual framework below.

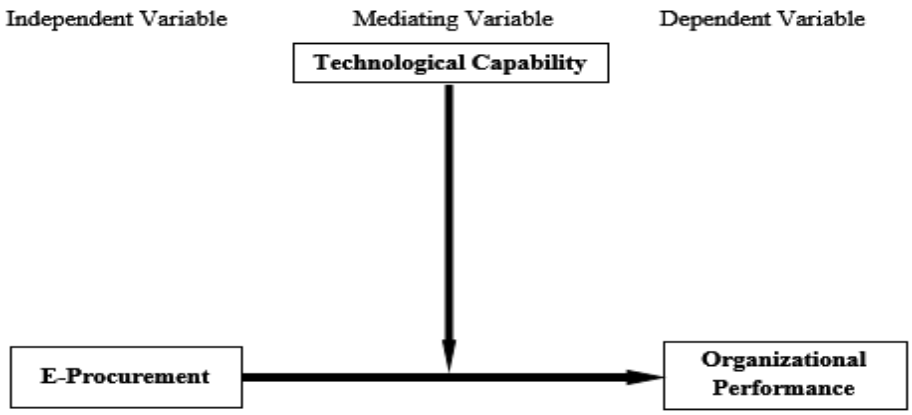

Figure 1: *Conceptual Framework of the study.*

Source: Author's construct, 2023

E-Procurement and organizational performance

E-procurement is a rapidly growing trend in the global competitive business environment, affecting the performance of organizations, industries, and economies. Market makers use e-procurement to create value and establish relationships with their business partners. Masudin et al., (2021) conducted a study on the impact of e-procurement adoption on company performance in Indonesian manufacturing companies, using questionnaires to gather data. The results support the accession that, e-procurement has a significant effect on organizational performance.

Munaku and Wycliffe (2021) investigated the influence of e-procurement on the performance of

state corporations in Kenya, using a descriptive research design with questionnaires as primary data collection. The study yielded a response rate of 95.2% from a sample size of 62, mainly from senior procurement managers of Kenya Rural Roads Authority (KeRRA). The relationship between e-procurement and performance was tested using a simple regression model.

Florence and Morrisson (2021) established the relationship between electronic procurement and performance of non-governmental organizations in Kenya, using a descriptive research design with open-ended and close-ended questionnaires. The study concluded that e-procurement and organizations' performance are related and that the use of e-procurement ensures efficiency.

Candela and Ulises (2022) assessed the impact of e-procurement practices on performance in large manufacturing firms in Buenos Aires, Argentina, using contingency theory and technology acceptance theory. The study found that firms adopting various e-procurement practices led to improved financial, transparent price information, increased procurement volumes processed, reduced inbound lead time, and enhanced organizational performance.

Barasa et al., (2017) found a positive and significant relationship between e-procurement and organizational performance, impacting microeconomics reflecting in the Gross Domestic Product at the national level. Chang and Wong (2010) examined firm motivations for adopting e-procurement and measured their performance to assess its benefits. Trust was considered as a moderating variable between the relationship of e-procurement adoption and e-marketplace participation. The results showed that firms that adopted e-procurement were more likely to participate in the e-marketplace, and their performance in efficiency, sales performance, customer satisfaction, and relationship development was enhanced after such participation.

Technological capability and organizational performance

Technology capabilities play a crucial role in a firm's competitiveness and performance. Studies have shown that technological capability can directly and indirectly impact firm performance through innovation. Lestari and Ardianti (2019) conducted a study on the influence of technological capability on business success, using Partial Least Square (PLS) to test the hypothesis. Yingwen et al., (2020) investigated the relationship between firm-level technological capability and Eco-innovation performance in the new energy vehicle industry (NEV) industry. The study found that firm-level technological capability is positively related to Eco-innovation performance, with state ownership intensifying this relationship. However, increasing government subsidies weaken this correlation.

Lucía et al., (2020) studied the mediating role of IT capability in the relationship between IT uses

and hotel agility. Results confirmed that IT uses affect organizational agility indirectly by improving the ability to manage technological resources. This provides guidance for managers to improve IT management and applications.

Camisón and Villar-López (2012) note that organizational innovation favors the development of technological innovation capabilities and that both organizational innovation and technological capabilities can lead to superior firm performance.

Sabai and Theresa (2018) presents that, the effect of digital orientation and capability on digital innovation and the mediating effect of digital innovation on the link between organizational performance and digital orientation and capability. The study tested a new conceptual framework using survey data from 105 small to medium-sized IT firms and employed structural equation model (SEM) analysis from the partial least square (PLS) approach. The results showed that digital orientation and capability have a positive effect on digital innovation and that digital innovation mediates the effect of technology orientation and digital capability on financial and non-financial performance. These findings encourage firms to embrace emerging digital technologies and digitalization trends to become innovation leaders and boost their performance.

Mediating role of technological capability

Technological capability refers to a company's ability to perform technical functions, develop new products, processes, and operate facilities effectively (Ortega, 2010). Implementing E-procurement as a strategy has a significant impact on organizational performance, improving time required in processing orders, cost of managing orders and payment to suppliers, minimizing transactional errors, improving data accuracy and quality of information received, transforming routine purchasing transactions, positively increasing performance, ensuring efficiency, improving financial, transparent price information, increasing procurement volumes processed, and reducing inbound lead time and efficiency (Masudin et al., 2021; Munaku & Wycliffe, 2021; Florence & Morrisson, 2021; Candela & Ulises, 2022).

The Technological Innovation Theory supports this interaction, stating that technological capability is a major strategic tool for organizations to enhance competitiveness and performance. E-procurement practices provide various resources, both real and intangible, that serve to grow and supply skills linked to technological capability within the firm. Implementing a set of E-Procurement practices, including e-bidding, e-tendering, e-purchasing, and e-sourcing, provides organizations with a variety of resources such as skills, knowledge, experience, relationships, tools, communications, and systems. These resources help in the development of the organization's

skills in specific areas, especially in the enhancement of technological capabilities, procurement capabilities, research and development capabilities, marketing capabilities, production capabilities, and planning skills.

The impact of technological capability on E-procurement and organizational performance might be attributed to E-procurement function in boosting technological skills. The findings advanced lead to the hypothesis that technological capability positively mediates the relationship between E-procurement and organizational performance.

Oil and gas plays a vital role in the economies of the world, particularly the energy market. Due to the dynamic and essential character of the industry, developing countries like Ghana need to maintain and boost local capabilities for economic strength and stability. Technological capability plays a strong role in upstream (exploration and production), midstream (transportation and storage), and downstream (refining and marketing) segments of the industry, and it requires significant effort from companies to realize the effects of technological capability on performance measures in every aspect of the firm while gaining competitive advantages and sustaining commercial success in the local and international market.

Methodology

This study adopted a survey strategy, which involves collecting information from a sample of individuals through their representatives to the questions. This approach is useful for obtaining data from a large group, guiding the research group, and understanding respondents' features (DeFranzo, 2011). Individuals from all management levels within the oil and gas industry both private and public institutions of the population were contact to provide relevant information required to addressing the study objectives. Simple random sampling and purposive sampling technique was used with participants from Procurement, Logistics, Supply Chain, Accounts & Finance, IT, Technical/Engineering, and Project departments. Questionnaire was used in collecting primary data since it is the best tool for this study. Bhandari (2023), noted questionnaire as a list of questions or items used for gathering data from respondents regarding attitudes, experiences, or opinions. Kabiru and Njenga (2019) described data assessment as the method of information rearrangement and reduction to be readily used. The quantitative data from questionnaires were collected, processed and analyzed using the Social Sciences Statistical Package (SPSS version 25) to afford concrete findings and suggestions. In the analysis of information, this research introduced quantitative approach. The study used inferential statistics such factor analysis and structural equation modelling to measure the relationship between variables through quantitative approach.

Descriptive Analysis

In this section, an initial analysis of the data obtained from the field is carried out to assess the relationship between e-procurement and organizational performance and to determine the relationship between e-procurement practice and technological capability. Also, to assess the mediating role of technological capability on the interrelationship between e-procurement and organizational performance. This was an important step towards achieving in-depth understanding of the variables of the study.

Socio-Demographic Characteristics of the Study Participants

The socio-demographic data of respondents were undertaken to gather information relevant to help in the analysis of the results. The following variables constitute the socio-demographic characteristics of the study: gender, educational status, department within organization, management level and job experience.

The socio-demographic characteristics of 106 respondents employed. A good number (60.4%) of males took part in the survey than their female counterparts (39.6%). Majority (59.4%) of the participant are graduates as against few (2.8%) who have other qualification. Majority (39.6%) of the respondents are in the Procurement and Supply chain department whereas few (3.8%) are in the Operations unit of the organization. More than half (59.4%) of the respondents are in the middle level of position in the organization whereas few (11.3%) are in the top management level. Majority (37.7%) of the respondents have worked with the organization for 1-5 years as against few (3.8%) who have worked for 21 years and above.

Factor Analysis of E-procurement and organizational performance

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.828
Bartlett's Test of Sphericity	Approx. Chi-Square	526.086
	Df	28
	Sig.	.000

Source: Field Data 2023

A KMO value of 0.828 indicates that the data is considered to be very good for factor analysis. Bartlett's test has chi-square value of 526.086 with 28 degrees of freedom and a significance level

of 0.000. Since the p-value (Sig.) is less than 0.05, it indicates that the correlations between the variables are significantly different from an identity matrix.

Table 2: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.560	56.999	56.999	4.560	56.999	56.999	3.075	38.433	38.433
2	1.279	15.986	72.985	1.279	15.986	72.985	2.764	34.552	72.985
3	.741	9.258	82.242						
4	.411	5.142	87.384						
5	.377	4.707	92.091						
6	.284	3.553	95.644						
7	.203	2.543	98.187						
8	.145	1.813	100.000						

Extraction Method: Principal Component Analysis

Source: Field Data 2023

The Eigenvalues connected with each factor indicates the variance clarified by that specific linear component. The factor analysis shows that two components explain about 73% of the total variance of the 8 variables (Table 2). The Eigenvalue above or equivalent to 0.5 was assumed to enable flexibility in the research outcome, meaning that only factors that account for variances grater or equal to 0.5 are used in the factor extraction.

Table 3: Rotated Component Matrix[a]

STATEMENT	Component	
	1	2
E-procurement is fully implemented.	.217	.878
E-procurement is provided full support.	.208	.892
Systems used are of high quality.	.255	.802
E-Procurement transforms all routine purchasing transactions to high efficiency.	.585	.546
E-Procurement provides better management information and knowledge regarding suppliers.	.871	.170
E-Procurement frees up procurement efforts and resources.	.803	.217
E-Procurement reduces the costs of acquiring materials.	.627	.377
E-Procurement leads to better supply performance measurement.	.884	.197

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Source: Field Data 2023

Rotated component matrix after varimax rotation and after the variables have been organized by the absolute values of the loadings with three components. At this point, values above 0.70 are considered to be highly correlated. From Table 3, the six (6) major E-procurement and organizational performance variables are as follows: E-procurement is fully implemented (0.878), E-procurement is provided full support (0.892), Systems used are of high quality (0.802), E-Procurement provides better management information and knowledge regarding suppliers (0.871), E-Procurement frees up procurement efforts and resources (0.803) and E-Procurement leads to better supply performance measurement (0.884).

Factor Analysis of E-procurement practices and technological capability

Table 4: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.867
Bartlett's Test of Sphericity	Approx. Chi-Square	505.413
	Df	21
	Sig.	.000

Source: Field Data 2023

A KMO value of 0.867 indicates that the data is considered to be very good for factor analysis. Bartlett's test has chi-square value of 505.413 with 21 degrees of freedom and a significance level of 0.000. Since the p-value (Sig.) is less than 0.05, it indicates that the correlations between the variables are significantly different from an identity matrix.

Table 5: Total Variance Explained

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	4.750	67.858	67.858	4.750	67.858	67.858
2	.580	8.284	76.142			
3	.517	7.381	83.523			
4	.404	5.775	89.298			
5	.392	5.599	94.897			
6	.209	2.979	97.876			
7	.149	2.124	100.000			

Extraction Method: Principal Component Analysis

Source: Field Data 2023

The Eigenvalues connected with each factor indicates the variance clarified by that specific linear component. The factor analysis shows that one component explain about 67.9% of the total

variance of the 7 variables (Table 5). The Eigenvalue above or equivalent to 0.5 was assumed to enable flexibility in the research outcome, meaning that only factors that account for variances greater or equal to 0.5 are used in the factor extraction.

Table 6: Component Matrix[a]

STATEMENTS	Component 1
Increasing output quality in process, techniques machinery and software	.743
Determining and eliminating non-value-added activities in delivery related process	.829
Decreasing variable cost and increasing delivery speed in delivery logistics	.863
Increasing quality in components and materials in current products	.872
Decreasing manufacturing cost of components and materials of current product	.854
Developing new technical specifications and functionalities	.811
Renewing the design of the current and new products through changes such as appearance, packaging and shape	.786

Extraction Method: Principal Component Analysis

a. 1 components extracted

Source: Field Data 2023

The component matrix (one component cannot be rotated) have been organized by the absolute values of the loadings with one component. At this point, values above 0.75 are considered to be highly correlated. From Table 6, the six (6) major E-procurement practices and technological capability are as follows: Determining and eliminating non-value-added activities in delivery related process (0.829), Decreasing variable cost and increasing delivery speed in delivery logistics (0.863), Increasing quality in components and materials in current products (0.872), Decreasing manufacturing cost of components and materials of current product (0.854), Developing new technical specifications and functionalities (0.811) and Renewing the design of the current and new products through changes such as appearance, packaging and shape (0.786).

Factor analysis of the moderating role of technological capability on the interrelationship between e-procurement and organizational performance

Table 7: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.905
Bartlett's Test of Sphericity	Approx. Chi-Square	670.031
	Df	28
	Sig.	.000

Source: Field Data 2023

Since the KMO value (0.905) is greater than 0.6 it indicates that the data is considered to be very suitable for factor analysis. Bartlett's test has chi-square value of 670.031 with 28 degrees of freedom and a significance level of 0.000. Since the p-value (Sig.) is less than 0.05, it indicates that the correlations between the variables are significantly different from an identity matrix.

Table 8: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.587	69.838	69.838	5.587	69.838	69.838
2	.634	7.924	77.761			
3	.532	6.646	84.407			
4	.404	5.052	89.459			
5	.273	3.411	92.870			
6	.222	2.773	95.643			
7	.204	2.549	98.192			
8	.145	1.808	100.000			

Extraction Method: Principal Component Analysis

Source: Field Data 2023

The Eigenvalues connected with each factor indicates the variance clarified by that specific linear component. The factor analysis shows that one component explain about 70% of the total variance of the 8 variables (Table 8). The Eigenvalue above or equivalent to 0.5 was assumed to enable flexibility in the research outcome, meaning that only factors that account for variances greater or equal to 0.5 are used in the factor extraction.

Table 9: Component Matrix[a]

STATEMENTS	Component
	1
Provide our clients with services that offer unique benefits superior to those of competitors	.812
Our firm actively carries out its work on developing existing products and creating new products	.848
We enhance the range of our products and services with not previously release products and services	.880
We try to acquire new products by differing technical specifications and functionalities	.785
Importance is given to training Research and Development personnel	.883
Our employees cleverly transform information from internal and external sources into valuable knowledge for our company	.841
Our company sees presenting new ideas and methods to improve business processes that are important for the success of the company	.824
Our company constantly increase allocated budgets of Research and Development personnel	.807

Extraction Method: Principal Component Analysis

a. 1 components extracted

Source: Field Data 2023

The component matrix (the component cannot be rotated since all the loadings are above 0.5) have been organized by the absolute values of the loadings with one component. At this point, values

above 0.75 are considered to be highly correlated. From Table 9, the eight (8) major technological capability on the relationship between e-procurement and organizational performance are as follows: (0.812), Our firm actively carries out its work on developing existing products and creating new products (0.848), We enhance the range of our products and services with not previously release products and services (0.880), We try to acquire new products by differing technical specifications and functionalities (0.785), Our employees cleverly transform information from internal and external sources into valuable knowledge for our company (0.841), Our company sees presenting new ideas and methods to improve business processes that are important for the success of the company and Renewing the design of the current (0.824) and Our company constantly increase allocated budgets of Research and Development personnel (0.807).

Structural Equation Modelling

In this section, multivariate technique was undertaken based on formulated set of linear relations between the variables, typically, analyzing the covariance matrix of the observed variables, aiding estimation from sample data and its fit tested. Regression weight was chosen for its general term of wide variety of techniques, to analyze the relationship between the variables. The dependent variable is modeled with probability distributions whose parameters is assumed to vary (deterministically) with the independent variable. From the study, it is presented in table 11 and explained in section below.

Table 10: Regression weight

	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Structural						
OP <-						
EP	0.339	0.0850041	4.00	0.000	0.1730677	0.5062776
TC	0.4301	0.0819741	5.25	0.000	0.2694337	0.5907662
Inter EP*TC	-0.0533	0.0581432	-0.92	0.359	-0.1672637	0.0606536
Cons	0.9207	0.3043657	3.03	0.002	0.3241635	1.517255

Source: Field Data 2023

Relationship between e-procurement and organizational performance

From table 10 above, the coefficient of e-procurement is 0.339. This coefficient represents the strength of the relationship between e-procurement and organizational performance in the oil and gas industry. The p-value for the coefficient of e-procurement is less than 0.005 (P>|z| < 0.005) which suggests that there is a statistically significant moderate positive relationship e-procurement and organizational performance in the oil and gas industry. This also means that as e-procurement increases, organizational performance is also likely to increase.

Relationship between e-procurement practices and technological capability

From table 10 above, the coefficient of e-procurement is 0.4301. This coefficient represents the strength of the relationship between e-procurement and technological capability in the oil and gas industry. The p-value for the coefficient of "e-procurement" is less than 0.005 (P>|z| < 0.005) which suggests that there is a statistically significant, moderate positive relationship e-procurement and technological capability in the oil and gas industry. This also means that as "e-procurement" increases, technological capability is also likely to increase.

The moderating role of technological capability on the interrelationship between e-procurement and organizational performance

From table 10 above, the coefficient of interaction between technological capability and e-procurement is -0.0533. This coefficient represents the strength of the interaction effect between technological capability and e-procurement on the endogenous variable organizational performance. Since the coefficient of the interaction term inter EP*TC is not statistically significant (p > 0.05), we can conclude that there is no evidence of moderation by technological capability on the relationship between e-procurement and organizational performance in the oil and gas industry. That is, the interaction between technological capability and e-procurement does not significantly influence the strength or direction of the relationship between e-procurement and organizational performance.

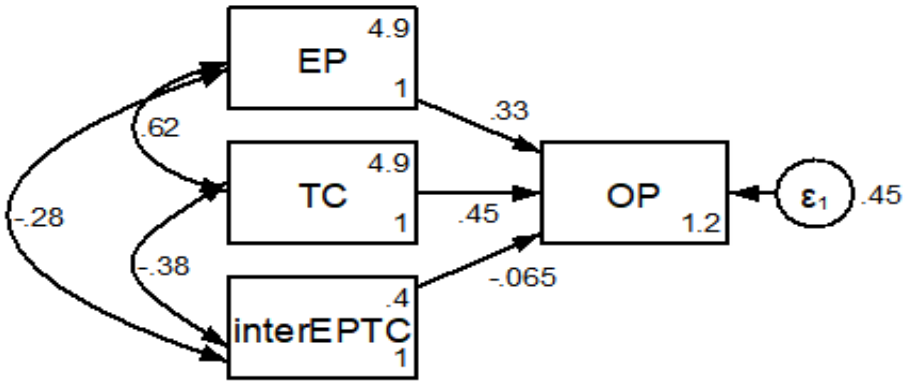

Figure 2: Moderation analysis

Source: Field Data 2023

Discussion of results

Based on the study's objectives, the results of the analyses are discussed further below;

Relationship between e-procurement and organizational performance

Masudin et al., (2021) found that e-procurement has a significant effect on organizations performance which supports the findings of this current study. The study by Munaku and Wycliffe (2021) indicated that, e-procurement has transformed all routine purchasing transactions, positively increases the performance of state corporations however, does not reduce the costs of acquiring materials and freeing up resources correlate with the findings of this study which established a relationship between e-procurement and organizational performance, however, as to whether it does not reduce the costs of acquiring materials and freeing up resources was not considered in this study.

Furthermore, the study findings agree with Florence and Morrisson (2021) and Candela & Ulises (2022), that e-procurement and organizations performance are related and use of e-procurement ensures efficiency to organizations' performance and firms adopt various E-procurement practices have; led to improved financial, transparent price information, increased procurement volumes processed, and reduced inbound lead time and efficiency of organizations performance respectively.

Again, study by Barasa et al., (2017) concluded that, e-procurement has a significant effect on the organizational performance, there is a positive and significant relationship between e-procurement and organizational performance and impact the micro economics reflecting in the Gross Domestic

Product at the national level which is in similitude to the findings of this study.

Chang and Wong (2010) study showed that firms that adopted e-procurement were more likely to participate in the e-marketplace and that the firm's performance in efficiency, sales performance, customer satisfaction, and relationship development was enhanced after such participation agree with this study.

Relationship between technological capability and organizational performance

Lestari and Ardianti (2019) study result indicated that, technological capability not only a direct but also an indirect impact on firm performance through innovation. Yingwen et al., (2020) empirical findings demonstrate that firm-level technological capability is positively related to Eco-innovation performance, and state ownership intensifies this positive relationship. Surprisingly, increasing government subsidy tends to weaken this correlation. The results also show that firms with higher technological capabilities prefer cooperative R&D, while those with lower technological capabilities tend to choose internal R&D. These findings support the findings of this current study.

Lucía et al., (2020) demonstrate the mediating role of IT capability, confirming IT uses affect organizational agility not only directly but also indirectly by improving the ability to manage technological resources. Such findings provide guidance to managers to improve IT management and applications, suggesting future lines of research. This study however, analyzed the moderation role of technological capability between e-procurement and organizational performance.

Sabai and Theresa (2018) study found that digital orientation and digital capability have positive effect on digital innovation and also that digital innovation mediates the effect of technology orientation and digital capability on financial and non-financial performance. This current study used technological capability as moderation variable and found it to improve organizational performance.

The moderating role of technological capability on the interrelationship between e-procurement and organizational performance

Masudin et al., (2021) found that Implementing E-procurement a technological capability as a strategy has a significant effect on organizations performances. Adeyeye (2019) concluded that technological capability and e- procurement jointly and independently predict organizational performance. However, in this study, it was found that interaction between technological capability and e-procurement does not significantly influence organizational performance.

Conclusion

In respect of the findings of the study, it can therefore be concluded that there is a positive and significant relationship between e-procurement and organizational performance. The study also concluded that there is a positive and significant relationship between technological capability and organizational performance. The study finally concluded that the interaction between technological capability and e-procurement does not positively and significantly influence the strength or direction of the relationship between e-procurement and organizational performance.

Recommendation

The research examines the moderating role of technological capability on the relationship between E-procurement and organizational performance in the oil and gas industry. The findings suggest that enterprises should ensure full implementation of E-procurement, provide full support, and use high-quality systems. This is crucial for firms' organizational performance and management should focus on improving them.

The study also suggests that focusing on increasing output quality in process, techniques, machinery, and software is essential for enhancing organizational performance. This variable scored low in principal component analysis, but it is crucial for enhancing the performance of oil and gas firms.

Lastly, the study highlights the moderating role of technological capability on the interrelationship between e-procurement and organizational performance in the oil and gas industry, as it determines the degree to which e-procurement and organizational performance are successful in producing desired results.

Implications of Findings

E-procurement technologies significantly improve organizational performance, indicating the need for businesses to invest in them. This can be achieved by streamlining the procurement process and improving existing systems. Managers should also focus on developing their technological skills to enhance organizational performance. This involves providing staff with the necessary knowledge and tools to effectively use technology in their jobs. The study's findings validate the link between e-procurement and organizational performance, highlighting the importance of technology adoption in business results. The study also supports the idea that an organization's ability to effectively harness technology affects its overall effectiveness and success. However, the integration of e-procurement technology and technological capability may not significantly change organizational performance, highlighting the need for further exploration.

Suggestions for Future Research

Future research should carry out longitudinal studies to look at how e-procurement adoption affects organizational performance over the long term. Examine the effects of e-procurement procedures on long-term financial results, operational effectiveness, and competitive advantage. Also future research should look into the connection between e-procurement and sustainability performance to see how e-procurement practices affect results for the environment and society, like a smaller carbon footprint, ethical sourcing, and responsible supplier management.

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