

CRITICAL SUCCESS FACTORS AND MANAGEMENT IMPLEMENTATION OF ELECTRONIC PROCUREMENT INITIATIVE OF THE UPSTREAM SECTOR OF THE NIGERIAN OIL AND GAS FIRMS

OMOREGBE OMORODION

University of Benin, Benin City, Nigeria
omorodion.omoregbe@uniben.edu

AZAGE JOSEPH

University of Benin, Benin City, Nigeria
azagejoseph@gmail.com

Abstract

In this study, the critical success factors (CSFs): organizational e-procurement competency, change management program, top management support, end-user training, supplier involvement, and e-procurement implementation strategy, that best support the management implementation of e-procurement initiatives in the Nigerian upstream sector of the oil and gas firms were examined. The study adopted a survey research design. The population of the study consists of all staff of the procurement entities of the respective Nigerian upstream sector of the oil and gas firms. A total of 232 copies of structured questionnaire were administered through convenience sampling technique while 229 copies were successfully retrieved. The model framework was estimated using the Ordinary Least Squares (OLS) technique through the use of Statistical Package for Social Sciences (SPSS) Version 22. It was revealed that all the CSFs examined have positive significant relationship with management implementation of e-procurement initiatives in the Nigerian upstream sector of the oil and gas firms. It was also revealed that organizational e-procurement competency confirmed the main factor that best support the management implementation of e-procurement initiative as displayed by the staff of the selected Nigerian upstream sector of the oil and gas firms. The study recommends that management should make end-users of new technology see change as a necessary ingredient for the growth of the organization because things cannot continuously be done the same way over time. Thus, top management support is needed in ensuring that end-users are trained with the requisite skills in the use of e-procurement practices. Also, management should build good business synergy, sensitization, confidence, and create opportunities for suppliers to offer their contributions/feedbacks in terms of necessary changes, issues, and concerns in developing and maintaining supplier catalogues/workability of the proposed e-procurement initiative. This will allow management to monitor areas for improvement and adjustment of e-procurement practices.

Keywords: Critical Success Factors, Management Implementation, E-Procurement Initiative.

JEL classification: O32, O33, L13, L71.

1. INTRODUCTION

The introduction of the Internet in the supply chain management is fast making organizations to gain competitive edge and more responsive to changes in business requirements, more especially in reshaping traditional mode of buying/selling relationships among firms. The quest for increased performance and the way procurement of goods, services, and works is managed necessitates the integration of Electronic Procurement (e-procurement) system. E-procurement initiative has arisen as a set of business practices that allow firms to improve on their operational performance. The proper examination of the critical success factors (CSFs) that are basic to the attainment of management implementation of e-procurement initiative cannot be overemphasized towards strategic coordination and improvement in the performance among trading partners (Omoregbe, Olufolahan, & Azage, 2022).

The initiative for e-procurement in Nigeria was introduced by government to deal with the problems of lack of accountability and transparency and to allow wider choice of buyers/suppliers in procurement activities (Omoregbe *et al*, 2022). Thus, e-procurement is a way of using the Internet technology to make it easier, faster and less expensive for the acquisition of goods and services required by the different departments of the organization thereby enormously promoting organization's operating efficiency and effectiveness in meeting the overall corporate objectives of service delivery as per the mandate of the management of Procuring Entity (PE) by ensuring that the 5 R's (which are the principal objectives of procurement) are consistently observed (the Right "Price", at the Right "Quantity", "Quality", "Time and Place" and from the Right "Source"). If the procurement department is unproductive in its acquisition of goods, services, and even works, other departments would be affected and consequently grievous towards the attainment of organizational goals. Therefore, the ability of management PE to successfully deliver its mandate is closely linked to having an effective e-procurement initiative (Matunga, Nyanamba & Okibo, 2013; Toroitich, Mburugu, & Waweru, 2017).

Despite, the benefits of e-procurement initiative, the implementation of the e-procurement system is still a major challenge by some organizations. To optimize the PE's service delivery potential, the critical success factors cannot be set in isolation of the management implementation of electronic procurement initiative. Thus, the purpose of this study was to examine the Critical Success Factors (CSFs) on management implementation perspective of electronic procurement initiative of the upstream sector of the Nigerian oil and gas firms.

1.1. STATEMENT OF THE RESEARCH PROBLEM

IBM Global Services (2003) has identified organization/management, practices/ processes, and systems/technology as the three core areas where e-procurement implementation strategy should be focused to ensure that the required practices, processes, and systems are developed in a consistent manner across organizations. Each of these perspectives highlights important aspects of the e-procurement implementation process by organizations. For the purpose of this study, the influence of organization/management implementation perspectives on the success of an e-procurement initiative will be examined due to the fact that e-procurement is currently one of the key initiatives in the public and private sectors in Nigeria for the improvement of accountability and transparency among buying/selling trading partners. Many organizations need guidance on the proceedings with this new technology (Omoregbe & Osifo, 2020). Without a set of CSFs, it seems difficult to present the state of progress and assess the success of e-procurement initiatives in organizations. The management team of the organization is charged with the obligation of making a business model work. In this regard, the fundamental problem motivating this study is the need to understand the CSFs underlying influences in the management implementation of e-procurement initiatives in the organizations.

The Nigerian upstream sector of the oil and gas industry is saddled with some daunting challenges due to youth restiveness, gas flaring, unfavorable government policies, poor infrastructural deployment and other environmentally unsustainable practices, such as land and water pollution, and among others (Omoregbe *et al*, 2022). To overcome these challenges, the Nigerian upstream sector of the oil and gas industry has to look inward, be innovative and be efficient in their use of limited budgets, scarce resources even in the midst of escalating costs of inputs in the country. They must change the traditional approach of supply chain management practices to procurement of goods, services, and works to cope with environmental issues. Thus, having the “right” critical success factors for effective management implementation of e-procurement initiative for organizations in the right context at the optimal levels of capacity needs careful examination and continuous capacity-building. Furthermore, without the “right” CSFs, management can never perform its intended implementation nor achieve its set objectives using e-procurement initiative. Each organization needs a set of CSFs that are necessary for its intended purpose and what’s “right” for one organization may not necessarily be right for another. Thus, a number of CSFs need to be examined, such as organizational e-procurement competency, change management program, top management support, end-user training, supplier involvement, and e-procurement implementation strategy, and among others (Vaidya, Sajeew & Callender, 2006) as it affects management implementation of e-procurement initiative for organizations.

There have been some academic studies on the implementation of e-procurement initiative in the public hospitals (Matunga *et al*, 2013), descriptive

analysis of the critical factors that influence e-procurement implementation success in the public sector (Vaidya, *et al*, 2006), the impact of e-procurement on buyer/seller relationships (Carr & Smeltzer, 2002), and e-procurement system and rate of adoption based on the diffusion of technological innovations by the federal public hospitals (Omogbe & Osifo, 2020), e-procurement practices and sustainable organizational competitive advantage of the upstream sector of the oil and gas firms in Nigeria (Omogbe *et al*, 2022). However, there appear to be comparatively few detailed empirical studies on the evaluation of CSFs that influence management implementation of e-procurement initiative in the private sector of the Nigerian upstream sector of the oil and gas industry. The reason for this might be that implementation of e-procurement initiatives in the private sector in Nigeria is still in the infant stages of its adoption. This paper assessed the CSFs that are likely to influence the management implementation of e-procurement initiative in the private sector of the Nigerian upstream sector of the oil and gas firms.

1.2. OBJECTIVES OF THE STUDY

The main objective of the study was to examine the critical success factors that best support the management implementation perspective of e-procurement initiatives in the Nigerian upstream sector of the oil and gas firms. While, the specific objectives were to:

- a) ascertain the influence of organizational e-procurement competency on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms;
- b) determine the influence of change management program on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms;
- c) assess the influence of top management support on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms;
- d) investigate the influence of end-user training on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms;
- e) examine the influence of supplier involvement on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms; and
- f) ascertain the influence of e-procurement implementation strategy on the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.

1.3. RESEARCH HYPOTHESES

- a) There is no significant relationship between organizational e-procurement competency and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.
- b) There is no significant relationship between change management program and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.
- c) There is no significant relationship between top management support and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.
- d) There is no significant relationship between end-user training and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.
- e) There is no significant relationship between supplier involvement and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.
- f) There is no significant relationship between e-procurement implementation strategy and the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms.

2. LITERATURE REVIEW

2.1. CONCEPT OF ORGANIZATIONAL E-PROCUREMENT SYSTEM CRITICAL SUCCESS FACTORS

E-procurement refers to the use of Internet-based information and communication technologies to carry out procurement processes (Croom & Brandon-Jones, 2004). Vaidya *et al* (2006) posit that e-procurement is an end-to-end application that integrates many procurement processes in the organization. Omoregbe *et al* (2022) defined e-procurement as the systematic method of using Internet related technology to integrate organization's procurement processes in meeting the overall corporate objectives of service delivery by the procurement entity. The Internet related technology advancements associated with e-procurement initiatives include e-mail, intranet/extranet, websites, electronic resource planning, electronic data interchange etcetera. However, the corporate objectives are the principal objectives of procurement (the Right "Price", at the Right "Quantity", "Quality", "Time and Place" and from the Right "Source"), which are consistently to be observed by procuring entities of organizations. The integrated e-procurement processes in the organization include a number of stages, such as e-searching, e-sourcing, e-tendering, e-evaluation, e-negotiation, e-marketplace, e-auctioning/reverse auctioning, e-catalogue, e-receipt, and post-purchase review and among others. In essence, e-procurement initiative is the automation and integration of many procurement processes via electronic systems, especially with the use of Internet technology.

E-procurement initiative implementation success is closely connected to early supplier involvement. The preparedness of the organisation's business partners such as suppliers and other stakeholders in accepting the adoption of e-procurement system is very important. For the successful operation of e-procurement system, all available stakeholders have to be willing to make business dealings online. Thus, Omoregbe and Osifo (2020) posited that management should put in place necessary policies modalities in place that will boost suppliers/clients confidence towards certainty and acceptance that electronically sent documents and business transactions of e-procurement initiative is recognised as valid and legal. Additionally, Birks et al., (2001) asserted that management should educate suppliers on the e-procurement benefits. This they say can be provided to them through a process of consultation as early as possible in the project. The degree to which management realised and succeed in the implementation of an e-procurement initiative may well be connected with the level of e-readiness of suppliers. So, right consultation and communication with suppliers is very vital.

Organizational E-procurement Competency

Molla and Licker (2005) stated that organizational competency refers to the availability of employees with adequate experience and exposure to information and communication technology and other skills, such as business strategy that are needed to adequately perform organizational projects. Organizational competency is the combination of skills, expertise, information, performance measures, and the corporate culture that an organization utilizes in achieving its goals (Omoregbe & Azage, 2022). The availability of employees that possess these proficiencies is important for management implementation of e-procurement initiative because employees' morale, knowledge, and skill level within an organization has a direct impact on the successful implementation of e-procurement initiative. Organizational competency is critical in achieving team, success, alignment and effective implementation of e-procurement projects (Toroitich *et al*, 2017). Thus, Omoregbe and Osifo (2020) emphasized that management of the procurement entities should provide the necessary information technology infrastructure, trained personnel with requisite expertise, digital skills, and knowledge for the smooth e-procurement initiative implementation. This is very critical to the successful implementation of an e-procurement initiative.

Omoregbe *et al* (2022) argued that procurement in many instances, and especially in the case of large and complex contracts, requires team-work by professionals that represent a wide spectrum of skills. Thus, organizational competency ensures effective application of the principles of procurement and related administrative approval procedures, particularly in understanding logistics, shipment, insurance and payment procedures in addition to data recording and retrieval techniques and other requirements of internal control and audit.

Top Management Support

The support from top managers is very critical to the successful implementation of e-procurement. Chatterjee, Grewal and Sambamurthy (2002, p.71) revealed that “top management support positively influences the extent of organizational assimilation of e-procurement business processes”. The top management of organization has the power and authority to make strategic decisions; thus, they can develop e-procurement vision and strategy (Vaidya *et al*, 2006). These actions legitimize the e-procurement implementation process in an organization, and signal top management commitment to successful implementation, and serve to convince other employees to expend the effort required to adopt the new system. According to Sharma and Yetton (2003, p. 534), end-users might resist new innovation if learning barriers are too high. But top management interventions in the form of authorizing end-user training and the development resource materials can help to overcome such barriers. Beatty *et al* (2001, p.341) explained that “top management support is important for e-procurement technology adoption because they transform existing organizational procedures and impact relationships with trading partners”.

However, the top management team must involve the project manager, consultants working with the committee, and agency staff to develop an implementation strategy (ECOM Group, 2002). In this regard, considerable attention and support need to be provided by senior management to ensure that the procurement reform is well understood in the organization. Furthermore, World Bank (2003) is of the view that top management team is responsible for setting the vision and goals, bringing about collective commitment for change in process and organizational structures, and formulating the policies and strategies necessary to put an e-procurement initiative in place.

Change Management Program

Vaidya *et al* (2006) affirmed that changes required in supporting business processes are directly related to the speed of implementation of e-procurement. With change management issues seeming to become more substantial as stakeholder needs increase (Consortium for Global Electronic Commerce, 2002). The World Bank (2003) report cautions that while change management may be the least expensive aspect of an e-procurement project, a lack of it can be a leading cause of project failure. However, Omoregbe and Osifo (2020) stated that some end-users may be reluctant to embrace the e-procurement initiative or possibly kick against the change management programs with the belief that there is difficulty in keeping pace with something new from the training they already have. Thus, Omoregbe and Osifo (2020) argued that top management of organizations are the ones to deploy the necessary change management to change the psyche of the employees that may not braced up with the advancement and implementation e-procurement initiative. Consequently, they suggested that increasing change in underlying e-procurement processes requires more learning and commitment on the part of end-users.

Nevertheless, Omoregbe and Osifo (2020) emphasized that consultation, communication, and issue resolution with end-users are three basic ways to achieve successful change management for e-procurement implementation:

End-User Training

The success of an organizational e-procurement initiative implementation depends on end-users making use of the new technology. KPMG (2001) asserted that the solution must be attractive to end-users to view e-procurement as the preferred means by which to purchase goods and services. The success of the implementation of e-procurement initiative also depends on how the new technology is communicated to the end-users (Birks, Bond, & Radford, 2001). According to the Consortium for Global Electronic Commerce (2002), the two major obstacles to increasing support among end-users are their level of technological awareness and acceptance, and their willingness to change long established internal business processes. Operational Services Division (2001) buttressed the fact that as implementation process develops, there is the need to have periodic user satisfaction surveys in order to identify the possible need for additional training for end-users. End-users of the organizational e-procurement with the challenge of integrating the technological innovation into their mode of operations should be encouraged and taught the art of proficiency in the use of information technology tools as a pre-requisite for the use of e-procurement facilities (Omoregbe & Osifo, 2020).

Supplier Involvement

E-procurement initiative implementation success is closely connected to early supplier involvement. The preparedness of the organization's business partners such as suppliers and other stakeholders in accepting the adoption of e-procurement system is very important. For the successful operation of e-procurement system, all available stakeholders have to be willing to make business dealings online. Thus, Omoregbe and Osifo (2020) posited that management should put in place necessary policies modalities in place that will boost suppliers/clients confidence towards certainty and acceptance that electronically sent documents and business transactions of e-procurement initiative is recognized as valid and legal. Additionally, Birks *et al.*, (2001) asserted that management should educate suppliers on the e-procurement benefits. This they say can be provided to them through a process of consultation as early as possible in the project. The degree to which management realized and succeed in the implementation of an e-procurement initiative may well be connected with the level of e-readiness of suppliers. So, right consultation and communication with suppliers is very vital.

E-Procurement Implementation Strategy

The creation of documented and executable strategies prior to the deployment of the e-procurement application is an important critical success factor (Neef, 2001). This view was further corroborated by the Operational Services Division (2001) findings that as the procurement strategy is intended to provide

savings enabled by the technology, e-procurement should be procurement-driven as well as technology-driven. Therefore, a clearly defined e-procurement strategy not only emphasizes the importance of e-procurement in the organization but takes into consideration major institutional changes from the procurement process perspective as well as from the organizational perspective (World Bank, 2003).

2.2 CONCEPT OF MANAGEMENT IMPLEMENTATION PERSPECTIVE OF E-PROCUREMENT INITIATIVE

E-procurement implementation initiative is a phase of execution of the system application. Ginzberg (1979, p.408) states that implementation is “an effort beginning with the first thought of developing a system and not ending until the project is completed or abandoned”. Chan and Swatman (1998), however, state that implementation is best described as a process of organizational change that extends over a considerable period of time. According to Dennis, Wixom and Roth (2012, p.15), “this stage is the longest and usually costly in the development process, thus, gets the most attention.” To this end, the management implementation of e-procurement initiative will help to advance the efficiency and competence of the procurement entity of the organization.

However, management implementation of e-procurement initiative is dependent on some CSFs. Management factors are those issues that are dependent on human behavior and expertise to the implementation of e-procurement initiative in the organization. These management factors consist of organizational e-procurement competency, end-user training, change management program, supplier adoption, top management support, employee resistant to change in the use of technology, and among others (Mehrtens *et al*, 2001; Beatty *et al*, 2001; Grandon & Pearson, 2004; Molla & Licker, 2005). Vaidya *et al* (2006) stated that the importance of human factors in the success of e-procurement implementations cannot be over-emphasized. They stressed that where there is a conflict between human and technological issues, the returns on e-procurement initiatives may be higher if more attention is given to the human issue.

Rogers (2003, p.6) emphasized that advancement in the use of technology brings the newness in which “some degree of uncertainty is involved in diffusion”. Uncertainty about the outcomes of the innovation still can be a problem at the stage of implementation. Thus, Sahin (2006, p.17) stated that “the implementer may need technical assistance from change agents and others to reduce the degree of uncertainty about the consequences”.

2.3. EMPIRICAL REVIEW

Vaidya *et al* (2006) studied the Critical Success Factors (CSFs) likely to impact the success of e-procurement initiatives in the public sector. It identifies a number of relevant variables for each CSF and presents a model for future research. It also analyses the relative importance of different CSFs and observes that organization and management factors are the most important category for success of

e-procurement initiatives. The study recommends that if e-procurement initiatives in the public sector are to assist the development of e-procurement across the information economy, there should be wider discussion and agreement on what constitutes the relevant CSFs and how the achievement of success can be assessed.

Omogbe and Osifo (2020) investigated the perception of e-procurement system and rate of adoption in the federal public hospitals in Edo State of Nigeria. The rate of adoption is premised on Rogers' diffusion of innovations approach using the process of innovation characteristics: relative advantage, trialability, compatibility, observability, and complexity of e-procurement system to evaluate the rate at which organizations adopt new innovations. The study used convenience sampling technique to select 45 management staff of procurement departments of three federal public hospitals spread across Edo State. The Ordinary Least Squares (OLS) technique was used to estimate the model that was developed. The regression results demonstrated that all the exogenous variables were significant and positively influenced the rate of adoption in the federal public hospitals in Edo State, except complexity of e-procurement system that had a significant negative predictor on management of the hospitals' policy decision to adopt electronic procurement system. It was therefore recommended that management of the hospitals' procurement department should deploy the necessary information technology infrastructure, personnel with requisite expertise, digital skills, and knowledge for the successful adoption of the e-procurement system.

Omogbe *et al* (2022) examined the impact of electronic procurement practices and sustainable organizational competitive advantage of the upstream sector of the oil and gas firms in Nigeria. Specifically, it assessed the relationship between electronic tendering, electronic invoicing, electronic payment, and electronic auctioning and sustainable competitive advantage of some selected upstream sector of the Nigerian oil and gas companies in the Niger-Delta region of Nigeria. The ex-post facto and survey research design were adopted for this study. The population of the study was the employees and management staff of the procurement department of the respective upstream oil and gas firms in the Niger-Delta region of Nigeria. A total of 224 copies of questionnaire were distributed through the use of convenience sampling technique to the staff that constituted the sample. The research model was estimated using the Ordinary Least Squares (OLS) technique through the use of Statistical Package for Social Sciences (SPSS) Version 22. The study found that electronic tendering, electronic invoicing and electronic payment have positive significant relationship with sustainable organizational competitive advantage in the upstream oil and gas industry while electronic auctioning has no significant influence, but has positive relationship with sustainable organizational competitive advantage in upstream oil and gas industry. The study recommended that management of organizations should encourage the practice of electronic tendering, automate the practice of invoicing and ensure all payments are carried out using e-payment to implement electronic auctioning practices as all these will lead to sustainable organizational competitive advantage of the organizations.

3. METHODOLOGY

The study examined the organizational critical success factors and management implementation perspective of electronic procurement initiative. This study concentrated on oil and gas firms in the upstream sector operating in the nine states of the Niger Delta zone of Nigeria for purpose of obtaining information about the firms' electronic procurement practices system. This zone includes the following states: Edo, Imo, Cross River, Ondo, Bayelsa, Abia, Rivers, Delta, and Akwa-Ibom. The Nigerian upstream oil and gas comprise of both indigenous and multinational corporations. The choice of the Niger-Delta region of Nigeria as a geographical coverage is necessitated upon by the high number of upstream oil and gas companies in the zone due vast oil and gas wells and exploration. Furthermore, most of the upstream activities in Nigeria are carried out in these states, such as crude oil transportation and storages; drilling operations; civil works in terms of site surveys and preparation of drilling locations; geodesic survey; seismic data acquisition; geological activities; exploration and production activities, and among others. Consequently, the choice of upstream sector is predicated on the adoption of electronic procurement initiatives by firms that constituted the sector. The study specifically examined the administrative offices of the various oil and gas companies in the nine states of the region. The issues specifically examined included management implementation perspective of electronic procurement initiative as the endogenous variable; while organizational critical success factors were proxied with six constructs: organizational e-procurement competency, change management program, top management support, end-user training, supplier involvement, and e-procurement implementation strategy as the independent variables.

The study made use of primary data that were collected through field survey using structured questionnaire. The survey research design was adopted for the study. This implies that the study was able to collect data from more than one oil and gas firms in the Nigerian upstream sector, and thus making the study to cover a wider scope in terms of geographical coverage/respondents. The justification for the use of the survey research design is that the research was conducted at a particular point in time between January, 2022 and June, 2022. This method was also chosen in order to refer to phenomena as they exist in real life. Also, it is relatively economical in terms of time and resources. The population of the study consists of all the senior and management staff of the procurement department of the respective upstream oil and gas companies in the Niger-Delta region of Nigeria. The senior and management staffs were used because they make policy decisions pertaining to procurement and demands for supplies for the oil and gas firms. Due to their knowledge and experiences, they are assumed to be conversant with the management of the oil and gas firms' operations and procurement procedures and therefore, can easily provide the needed information for the study. The population size consists of forty eight (48) companies with estimated number of employees of five hundred and fifty-two (552) senior and management staff in the procurement departments/units as at January, 2022. The oil and gas companies in the upstream sector include (1) Joint venture

companies with Nigerian National Petroleum Corporation (NNPC) which comprises of Mobil, Chevron, Shell, Total, Pan-Ocean, NAOC, NPDC and TEPNG; (2) Production sharing companies consists of New Cross, Ocean Energy, Sahara, Conoco Phillips, Fes-Napims, Oando, Esso, Addax, Snepco, Teepeco and Stardeep; (3) Independent (Sole Risks) companies (National Oil Companies) include First Hydro Carbon, ND Western, Naconde, Consolidated Oil, Shoreline, Monipulo, Allied Camac, Continental Oil, Cavendish, Seplast, Express Petroleum, Dubri Oil and Atlas; and (4) Marginal Fields include Niger Delta Petroleum, Oriental Energy, Prime Exploration, Inaltersmith, Energia Limited, Pillar, Midwestern, Britannia and Platform Petroleum. The distribution is shown in Table 1:

Table 1. *Distribution of Population Size*

S/N	Upstream Firms Categories	Number of Firms	Population Size of Management Staff
1	Joint Venture Companies (JVCs)	11	158
2	Production Sharing Companies (PSC)	10	145
3	Independent (Sole Risk) (NOC)	15	121
4	Marginal Fields (MF)	12	128
	Total	48	552

Source: NNPC Annual Report (2020)/Researchers' Survey (2022).

The study arrived at a sample size of two hundred and thirty two (232) respondents through the use of number estimation formula as suggested by Yamane (1967). It is calculated below.

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size; N = population size (finite population); e = desired level of significance; (in this case is 5 per cent)

$$n = \frac{552}{1 + 552(0.05)^2}$$

n = 231.9; approximately 232

Table 2. *Breakdown of Sample Size*

S/N	Upstream Firms Categories	Population Size of Staff	Sample Size of Staff
1	Joint Venture Companies (JVCs)	158	66
2	Production Sharing Companies (PSC)	145	61

3	Independent (Sole Risk) (NOC)	121	51
4	Marginal Fields (MF)	128	54
	Total	552	232

Source: Researchers' Survey (2022).

The administration of copies of the questionnaire was done using convenience sampling technique to the respondents. Out of the sample size of 232 given copies of questionnaire given to respondents, 229 respondents' copies of questionnaire were valid. This made the response rate to be 98.7 per cent; hence, the responses were used for data analysis, interpretation and presentation.

Theoretical Framework and Model Specification

Many theories have been employed to explain the critical success factors that best support the management implementation of e-procurement initiatives by organizations. However, the study's theoretical pillar is premised on the Rogers' Diffusion of Innovations Theory (DIT) and the Technology Acceptance Model (TAM). DIT assists in explaining the process of organizations' implementation of a new technology. Rogers (2003:5) described innovation "as an idea, practice, or object that is perceived as new by potential adopters and which is considered as desirable to adopt." For Rogers, "an innovation is an instrumental action that is designed to reduce the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (Rogers, 2003, p.13).

The TAM is a theory that can be used to describe factors that determine issues affecting users' acceptance, inculcation and utilization of new technology to achieve improved performance in the organization. Ducey (2013, p.20) explains that "the TAM is a means for understanding the relationship between humans and technology through Perceived Usefulness (PU) and Perceived Ease of Use (PEU), which are the important determinants of technology acceptance and user behavior." The TAM drivers can be internal, such as end users' skills, knowledge, attitude, reputation, competence, mind-set, and intention in accepting new technology, or external such as management pressures to implement e-procurement initiatives in order to improve operational performance of the firm.

Thus, e-procurement initiative implementation is to improve accountability and transparency of the process for the procurement for goods, services, and works by organizations in achieving the basic objectives of supply of goods at the right price, right quantity, right quality, right time and place, and right source. The theory is very apt in examining the management implementation of electronic procurement initiative as it describes the process/activities involved through cultures that operate at the personal and organizational level. Consequently, the model for this study was formulated based on the Diffusion of Innovations/ TAM theoretical framework, which is expressed as management implementation of e-procurement initiative is a function of organizational e-procurement competency, change management

program, top management support, end-user training, supplier involvement, and e-procurement implementation strategy. It was therefore stated functionally as:

$$MEI = f(OEM, CMP, TMS, EUT, SIV, EIS) \dots\dots\dots (1)$$

$$MEI = \beta_0 + \beta_1 OCM + \beta_2 CMP + \beta_3 TMS + \beta_4 EUT + \beta_5 SIV + \beta_6 EIS + \varepsilon \dots\dots\dots (2)$$

Where: MEI = management implementation of e-procurement initiative; OEM = organizational e-procurement competency; CMP = change management program; TMS = top management support; EUT = end-user training; SIV = supplier involvement; and EIS = e-procurement implementation strategy. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$ and β_6 = coefficients of elasticity displaying degrees of explanation power about management implementation of e-procurement initiative; β_0 = constant term; and ε = error term.

And apriori expectations: $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 > 0, \beta_5 > 0, \beta_6 > 0 \dots\dots\dots (3)$

The collected data were analyzed using descriptive statistics, that is, mean and standard deviation, and inferential statistics in interpreting the respondents' perception of issues raised in the questionnaire. All the data were coded, and test analyses were done at 5 per cent level of significance using the Statistical Package for the Social Sciences (SPSS) version 22.0.

4. RESULTS AND DISCUSSIONS

4.1 DIAGNOSTIC TESTS AND ESTIMATION OF ORDINARY LEAST SQUARES (OLS) REGRESSION RESULTS

The Cronbach's alpha coefficient test, Pearson correlations, Factor Analysis, Kaiser Meyer-Olkin (KMO), and Bartlett's Tests diagnostic tests were carried out in this study. The analyses are as shown below:

The structured questionnaire for the study contained two sections: the profile of the respondents and specific questions designed to measure the management staff's competence, knowledge, expertise, top management support, experience, and among others in line with the management implementation of the organizations' procurement initiatives. The research instrument was a closed ended questionnaire that consists of five-point Likert type scales ranging from 1=strongly disagree (SD), 2=disagree (D), 3=undecided (U), 4=agree (A), to 5=strongly agree (SA) to measure all the items.

However, to test the questionnaire for reliability, the researchers used Cronbach's alpha coefficient test, a diagnostic measure to determine the internal consistency of the items employed. The study conducted data cleaning by identifying incomplete or inaccurate responses which were then corrected to improve the quality of the responses. The result of the reliability analysis is summarized in Table 3.

Table 3: Cronbach Alpha

Variables/Constructs	Number of Items	Cronbach Alpha
Organizational e-procurement competency	4	0.8029
Change management program	4	0.8017
Top management support	4	0.7812
End-user training	4	0.8565
Supplier involvement	4	0.7934
E-procurement implementation strategy	4	0.7817
Management implementation of e-procurement initiatives	4	0.819

Source: Researchers' computation based on the field survey 2022 using SPSS 22.0

The Cronbach's alpha value for each construct as shown in Table 3 is above 0.6. This means that the questionnaire is reliable and can be depended upon to elicit the needed information from the respondents (Nunnally & Bernstein, 1994).

Table 4: Pearson's Correlation Coefficient for All Variables

Variables	Mean	Standard Deviation	MEI	OCM	CMP	TMS	EUT	SIV	EIS
MEI	4.2130	0.8107	1.0000						
OEM	4.3726	0.7371	0.4287	1.0000					
CMP	3.9428	0.5043	0.5455	0.1159	1.0000				
TMS	4.1719	0.6927	0.3331	0.5338	0.1357	1.0000			
EUT	3.8762	0.3972	0.4282	0.4285	0.2443	0.3167	1.0000		
SIV	3.6873	0.4236	0.2538	0.3532	0.5945	0.4882	0.3714	1.0000	
EIS	3.2185	0.2185	0.1923	0.4923	0.3011	0.5448	0.2459	0.4971	1.0000

Source: Researchers' computation based on the field survey 2022 using SPSS 22.0

Table 4 showed associations among variables and to confirm if there is incidence of multi-collinearity. It was observed that when management implementation perspective of e-procurement initiatives (MEI=1) was at perfect unit value, critical success factors proxied organizational e-procurement competency (OEM=0.4287); change management program (CMP=0.5455); top management support (TMS=0.3331) end-user training (EUT=0.4282, supplier involvement (SIV=0.2538), and e-procurement implementation strategy (EIS=0.1923) were positively interrelated with management implementation perspective of e-procurement initiatives at 5 per cent (1-tailed). Consequently, there was no presence of multi-collinearity since none of the exogenous variables was perfectly correlated or above 0.80 (80%) with management implementation perspective of e-procurement initiatives as suggested by Dwivedi (2008) for case of multi-collinearity. Furthermore, the results imply that the explanatory variable data were appropriate for regression purposes. Thus, we progressed to check for sampling

adequacy with the use of Kaiser Meyer-Olkin (KMO) and Bartlett’s test of sphericity as presented in Table 5.

Table 5. Factor Analysis, Kaiser Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin (Measure of Sampling Adequacy).		0.607
	Approx. Chi-Square	650.240
Bartlett's Test of Sphericity	Df	12
	Sig.	0.000

Source: Authors' Compilation (2022) (SPSS. 22)

Factor analysis was used to evaluate the underlying relationships of a large number of items and to determine whether they can be reduced to a smaller set of factors or the data can be summarized in order to ease the application of the multivariate technique (Hair, Black, Babin, & Anderson, 2014). Being that this study is related to theory testing, it is therefore suitable to use Confirmatory Factor Analysis (CFA) to investigate constructs validity and to confirm the fit of the hypothesized factor structure against the obtained data. Hair *et al.* (2014) argued that the sample size should be adequate, that is, should be 100 or larger and observations must be equal or more than 10 times the number of variables. To this end, three main items need to be checked and confirmed before proceeding with factor analysis: first, strong foundational rationale supporting the existence of a structure; second, an existence of sufficient correlation among the variables supported by Bartlett's test of sphericity with sigma value less than 0.05; and finally, Measure of Sampling Adequacy (MSA). Hair *et al.* (2014) stated that the values for each variable should exceed 0.5; else the variables should be deleted one at a time. According to Nunnally and Bernstein (1994), after performing the factor analysis, total variance explained needs to be examined as well as factor loadings and communalities which all must be within the acceptable range.

Since the sample size was 232 which is larger than 100, it can be claimed that the sample size condition for running the factor analysis is met here. As far as the number of observations is concerned, the study has seven main variables and therefore the number of observations is more than 10 times the number of variables. Consequently, the assumption of variables/observations ration is met. The Kaiser Meyer-Olkin (KMO) was used to test sampling adequacy. The value from Table 5 was 0.607. This analysis has a high potential to inflate the component loadings. The factor loading is statistically significant. The Bartlett’s test of sphericity also proved to be significant following the result of the estimated chi-square value of 650.240 and significant at 1 per cent. Thus, there is an existence of sufficient correlation among the variables. This implied that sampled upstream oil and gas firms and required observations were adequate to justify the study. Hence, we proceed to the use of Ordinary Least Squares (OLS) regression in the next section.

Multiple Regression and Test of Hypotheses

Table 6. Ordinary Least Squares (OLS) Regression Estimation

Variable	Coefficient	Standard Error	t- Statistics	P-value	Hypotheses
MEI	0.8471	0.3109	2.7247	0.0000	Significant
OEM	0.9011	0.3291	2.7380	0.0000	Significant
CMP	0.7502	0.2996	2.5041	0.0000	Significant
TMS	0.4990	0.1889	2.6416	0.0000	Significant
EUT	0.4701	0.1903	2.4703	0.0001	Significant
SIV	0.7538	0.3150	2.3931	0.0002	Significant
EIS	0.5698	0.2401	2.3732	0.0004	Significant
R=0.8579^a; R²=0.6948; Adjusted R²=0.6204; Standard Error of the Estimate=1.8932 F-Stat (Prob.)=34.0011[0.0000]; Durbin Watson= 1.9829					

Source: Researchers' computation based on the field survey 2022 using SPSS 22.0

$$EI = 0.8471 + 0.9011OCM + 0.7502CMP + 0.4990ETMS + 0.4701EUT + 0.7538SIV + 0.5698EIS$$

$$(2.7247) \quad (2.7380) \quad (2.5041) \quad (2.6416) \quad (2.4703) \quad (2.3931) \quad (2.3732)$$

Table 6 showed the OLS regression method results of the variables examined. The values shown below the model in parentheses against coefficients were t-statistics. The results indicated that all the explanatory variables used to proxy CSFs: organizational e-procurement competency (OEM), change management program (CMP), top management support (TMS), end-user training (EUT), supplier involvement (SIV), and e-procurement implementation strategy (EIS) indicated positive coefficients and were also statistically significant.

From Table 6, comparing their calculated t-value of 2.7380, 2.5041, 2.6416, 2.4703, 2.3931, and 2.3732 respectively with the t-table value of 2.39 at 5 percent level, indicate that a unit increase in OEM, CMP, TMS, EUT, SIV and EIS will lead to an increase in MEI of the Nigerian upstream sector of the oil and gas industry by 0.9011, 0.7502, 0.4990, 0.4701, 0.7538, and 0.5698 units respectively.

However, considering the strength to which the independent variables affect the dependent variable in Table 4 and Table 6, the coefficient results showed that organizational e-procurement competency has the most significant effect on rate of management implementation of e-procurement initiative by the Nigerian oil and gas firms in the upstream sector (mean = 4.3726, SD = 0.7371, $\beta_1 = 0.9011$, $p < 0.05$), and e-procurement implementation strategy has the least significant effect on rate of management implementation of e-procurement initiative by the Nigerian oil and gas firms in the upstream sector (mean = 3.2185, SD = 0.2185, $\beta_6 = 0.5698$, $p < 0.05$). Thus, organizational e-procurement competency as a critical success factor is the strongest significant predictor of rate of management implementation of e-procurement initiative by the Nigerian oil and gas firms in the upstream sector. In fact, the perception of organizational e-procurement competency by management staff as a critical success factor in the management implementation of e-procurement initiative by the Nigerian oil and gas firms in the upstream sector as having greater value in improving the operational efficiency of the e-procurement system.

Furthermore, it is inferred that the critical success factor of the organization stood at a high positive correlation coefficient of 0.8579 (85.79 per cent), with management implementation of e-procurement initiatives (MEI). The coefficient of determination ($R^2 = 0.6948$), indicates that for the period under study based on the available data, organizational competency, change management program, top management support, end-user training, supplier involvement, and e-procurement implementation strategy of the organizational e-procurement system critical success factors, jointly accounted for 69.48 per cent systematic variations in the management implementation of e-procurement initiatives while 30.52 per cent were captured by the error term. Also, the adjusted coefficient of determination ($R^2=0.6204$) indicated that about 62 per cent of the variations are well explained after adjusting the degree of freedom by the independent variables. The overall test (F-statistic, which is the goodness-of-fit measure) that indicated value of 34.001 units and at significant level of 1 per cent, compared with standard error of regression with minimal value of 1.8932, suggested that the overall result is statistically significant. The Durbin-Watson statistic with value of 1.9829, implied absent of autocorrelation in the result which is a further indication that results are suitable for prediction and policy judgement.

4.2 DISCUSSION OF FINDINGS

First, it was observed in Table 4 that organizational e-procurement competency had overall mean index of 4.3726 and greater than the standard deviation of 0.7371 indicating that respondents were of the opinion that organizational e-procurement competency (OEM) has relationship with management implementation of e-procurement initiatives. The organizational competency in Table 6 which showed positive coefficient value of 0.9011 units, conformed to our apriori expectation, such that a unit increase in organizational e-procurement competency (OEM) would lead to increase in management implementation of e-procurement initiatives by 90.11 per cent. The hypothesis tested indicated that organizational e-procurement competency as a success critical factor was statistically significant, suggesting that it is a strong influencing factor of management implementation of e-procurement initiatives. The outcome revealed that organizational e-procurement competency has significant positive relationship with management implementation of e-procurement initiatives of some selected Nigeria upstream oil and gas firms in the Niger-Delta region. This finding concurred to extant studies of Vaidya *et al* (2006) and Molla and Licker (2005). They affirmed that organizational e-procurement competency is a business strategy that is adequately needed by staff to realize management implementation of e-procurement projects. Thus, organizational e-procurement competency is a tool that can be used by organizations to utilize the effective facilitation and achievement of implementation of e-procurement initiatives.

Second, it was inferred in Table 4 that change management program had overall mean index of 3.9428 and greater than the standard deviation of 0.5043

indicating that respondents were of the opinion that change management program (CMP) has relationship with management implementation of e-procurement initiatives. The change management program in Table 6 which showed positive coefficient value of 0.7502 units is in line with our apriori expectation, such that a unit increase in change management program (CMP) would lead to increase in management implementation of e-procurement initiatives by 75.02 per cent. This was manifested in the test of hypothesis tested which indicated that management program (CMP) as one of the organizational success critical factors was statistically significant, meaning that it is a strong influencing factor of management implementation in relation to e-procurement initiatives of some selected Nigerian upstream oil and gas companies in the Niger-Delta region. This is in support of our apriori expectation, implying that a unit increase in change management program (CMP) selection could increase management implementation of e-procurement initiatives. The finding is consistent with the views of Vaidya *et al* (2006) and Omoregbe and Osifo (2020). They revealed that change management program as a critical success factor of the organization enhances and improves efficiency of management implementation of e-procurement initiatives. Consequently, changes required in business processes towards the implementation of e-procurement initiatives should be encouraged. However, changes to the use of new technology such as e-procurement initiative that may prove difficult in keeping pace with support from end-users should be done by management through consultation, communication, and issue resolution as modes of change management programs.

Third, it was also found in Table 4 that overall mean and standard deviation index of top management support (TMS) stood at 4.1719 and 0.6927 respectively indicating that majority of the respondents were of the agreed perceptions that top management support has relationship in fostering management implementation of e-procurement initiatives. Top management support which indicated positive coefficient value of 0.4990 in Table 6, implied that a unit increase in top management support could bring about increase in management implementation of e-procurement initiatives by about 50 per cent. The hypothesis tested showed that top management support is statistically significant, indicating that it is a strong determinant of CSFs in relation to top management support. This is consistent with views and findings of Vaidya *et al* (2006) and Chatterjee *et al* (2002). They revealed that top management support positively influences the extent of organizational integration of e-procurement business processes. They affirmed that top management of organizations has the will power and wherewithal to make strategic decisions towards the successful implementation of e-procurement initiatives. Therefore, top management of organizations can make policy decisions, such as training of end-users, involvement of project managers, consultants working with the committee, and agency staff to develop an implementation strategy. These decisions can be critical to the success of an e-procurement implementation.

Furthermore, Table 4 indicated overall mean and standard deviation index of end-user training (EUT) were 3.8762 and 0.3972 respectively suggesting that most

of the respondents were of the agreed view that end-user training (EUT) has relationship with management implementation of e-procurement initiatives. End-user training (EUT) which showed positive coefficient value of 0.4701 in Table 6, which implied that a unit increase in end-user training (EUT) could bring about increase in management implementation of e-procurement initiatives by about 47.01 per cent. The hypothesis tested showed that end-user training (EUT) is statistically significant and positive in relation with sustainable competitive advantage of some selected upstream oil and gas companies in the Niger-Delta region of Nigeria, indicating that it is a strong determinant of CSFs. The result is in line with our apriori expectation. This implied that end-user training (EUT) as organizational CSFs is a strong influencing factor of management implementation of e-procurement initiatives. This finding is corroborated with the study of Birks, *et al* (2001) that the training of end users of the e-procurement initiative of the organization is a way to increase support, acceptance, and the willingness among users to change long established internal business processes. Hence, end-users training can assist organizations in overcoming barriers to management implementation of new technology such as e-procurement initiative.

Additionally, it was observed in Table 4 that supplier involvement (SIV) had overall mean index of 3.6873 and greater than the standard deviation of 0.4236 indicating that respondents were of the opinion that supplier involvement (SIV) has relationship with management implementation of e-procurement initiatives. The supplier involvement (SIV) in Table 6 which showed positive coefficient value of 0.7538 units, conformed to our apriori expectation, such that a unit increase in supplier involvement (SIV) would lead to increase in management implementation of e-procurement initiatives by 75.38 per cent. The hypothesis tested indicated that supplier involvement (SIV) as a success critical factor was statistically significant, suggesting that it is a strong influencing factor of management implementation of e-procurement initiatives. The outcome revealed that supplier involvement (SIV) has significant positive relationship with management implementation of e-procurement initiatives of some selected Nigerian upstream oil and gas firms in the Niger-Delta region. This finding is in support of extant studies of Birks *et al.* (2001) and Vaidya *et al* (2006) that e-procurement implementation success is closely related to early supplier involvement. The stakeholders of the organizational e-procurement initiatives such as customers and suppliers must be carried along in accepting the implementation and successful operation of e-procurement system.

Finally, it was inferred in Table 4 that e-procurement implementation strategy (EIS) had overall mean index of 3.2185 and greater than the standard deviation of 0.2185 indicating that respondents were of the opinion that e-procurement implementation strategy (EIS) has relationship with management implementation of e-procurement initiatives. The e-procurement implementation strategy (EIS) in Table 6 which showed positive coefficient value of 0.5698 units is in line with our apriori expectation, such that a unit increase in e-procurement implementation strategy (EIS) would lead to increase in management

implementation of e-procurement initiatives by 56.98 per cent. This was manifested in the test of hypothesis tested which indicated that e-procurement implementation strategy (EIS) as one of the organizational success critical factors was statistically significant, meaning that it is a strong influencing factor of management implementation in relation to e-procurement initiatives of some selected Nigerian upstream oil and gas companies in the Niger-Delta region. The finding is consistent with the view of Neef (2001) that the creation of documented and executable strategies prior to the deployment of the e-procurement application is an important critical success factor. To this end, a clearly defined e-procurement strategy should take into consideration in ensuring that e-procurement initiatives be technology-driven and ensuring accountability/transparency of the procurement process.

5. CONCLUSION

The goal of this study was to examine the critical success factors that best support the management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms. The study concluded that organizational e-procurement competency of e-procurement system critical success factors was the more appropriate factors of the features of management implementation perspective of e-procurement initiatives.

This study contributes to the electronic procurement system adoption literature as a way to examine the effect of each dimension of critical success factors on management implementation of e-procurement initiatives of the Nigerian upstream sector of the oil and gas firms. It points out the importance of determining the e-procurement system critical success factors that should be highly embraced in supporting management implementation of e-procurement initiatives in organizations.

5.1. RECOMMENDATIONS

- i. Organizations can become procurement specialists over time if management combines valuable sector knowledge such as expertise and long experience in the procurement process with a thorough understanding of the procedural aspects of procurement.
- ii. Organizations that want to be successful in management implementation of e-procurement initiatives should ensure that senior management supports the initiative.
- iii. Organizations should see change as necessary because things cannot continuously be done the same way over and over, thus, organizations more especially the ones yet to adopt e-procurement initiative to do so for them to be competitive.
- iv. Organizations should train users of the e-procurement tools/practices with the requisite skills which is critical to the success of an e-procurement initiative implementation.

- v. The identification of skills and training of end-users in e-procurement initiative should be given a high priority by management in order for the benefits of the operational functionalities of the e-procurement initiative to be realized.
- vi. Management should demonstrate the proposed solution of the e-procurement initiative and create opportunities for suppliers to offer their contributions/feedbacks in terms of necessary changes, issues, and concerns more especially in developing and maintaining supplier catalogues/workability of the proposed e-procurement initiative. This will allow the organization's procurement department to monitor areas for improvement and adjust e-procurement practices accordingly.
- vii. Due to the several technicalities involved in managing new innovations such as e-procurement initiative for successful service delivery, e-procurement strategy should be based on the introduction of comprehensive procurement practices.
- viii. Management should build good business synergy, sensitization, and confidence in suppliers on the need to key into the trend of e-procurement system as it helps in reducing operational cost, elimination of manual orders, and processing costs and among others.

5.2. RECOMMENDATION FOR FURTHER RESEARCH

This research examined the influence of organizational critical success factors on management implementation perspective of electronic procurement initiative of the Nigerian upstream sector of the oil and gas firms. The Local Authority Strategy for e-procurement report (IBM Global Services, 2003) has identified organization/management, practices/processes, and systems/ technology as the three areas where e-procurement implementation strategy should be focused to ensure that the required practices, processes, and systems are developed and rolled out in a consistent manner across organizations. Further research should be undertaken to establish the effect of these three implementation perspectives on the success of electronic procurement initiative in the public and private organizations. Each of these perspectives highlights important aspects of the e-procurement implementation process of the organization.

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