Journal of Theoretical and Applied Information Technology
15th July 2016. Vol.89. No.1

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

BARRIERS TO THE UPTAKE OF E-PROCUREMENT IN THE NIGERIAN BUILDING INDUSTRY

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ABSTRACT

Although the uptake of e-Procurement technologies and processes by businesses and organizations has been very impressive in the developed countries, the same cannot be said in many developing countries where the uptake of e-Procurement is rather slow and low. This study investigated the barriers to the uptake of e-Procurement using data derived from a questionnaire survey of 213 consulting firms, contractors, client organizations and government establishments in the Nigerian building industry (NBI). The data were analyzed using descriptive statistics, factor and multiple regression analyses. The result shows that the two factors with the most significant adverse effect on the uptake of e-Procurement were the high investment cost, and lack of technical expertise required in setting up e-procurement technologies and processes. Difference between how the researchers and practitioners understood the barriers to the uptake of e-Procurement was observed. Technical, infrastructure, political, social, and cultural issues; the lack of evidence of the benefits of e-Procurement in the building industry; and lack of top management support were the three strongest predictors of low uptake of e-Procurement by the organizations surveyed. The study suggests that to ensure a critical mass uptake of e-Procurement and maximization of its benefits in the procurement of building works, services and materials in Nigeria, there is a need for concerted effort by all stakeholders in the industry to eliminate the barriers identified in this research.

Keywords: *e-Procurement, Barriers, Building Industry, Questionnaire Survey, Nigeria*

1. INTRODUCTION

As is true with the construction sector, the building industry is faced with different kinds of complex challenges, which call for the most efficient use of the available resources. Consequently, organizations involved in the procurement of building services, products and materials are constantly seeking ways of improving efficiency and effectiveness in their procurement activities. Among the different strategies considered to offer fresh opportunities for organizations in the building industry to improve communication and integration of task from different project team members and encourage teamwork in their procurement endeavours is the adoption of information and communication technology (ICT), such as the Internet[1]. This is because recent developments suggest that the procurement processes have become expensive activities for businesses as explained by White *et al*.[2] in their study on challenges to the adoption of E-commerce technology for supply chain management in the Nigerian SMEs.

The increasing use of the Internet to support the execution of procurement activities in the different industries has given rise to electronic (e) procurement. Electronic procurement generally refers to the use of electronic communications and transaction processes to buy supplies and services or conduct tendering for works as defined by Bausa *et al*. [3:5]. According to Vitkauskaite and Gatautis [4], e-Procurement entails the use of Internet-based/supported technologies and applications to procure construction materials, equipment, services and works. Gunasekaran and Ngai [5] noted that since the mid-1990s when the e-Mail and World Wide Web (WWW) services of the Internet were commercialized, the use of e-Procurement/e-Commerce technologies and tools to support the

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

execution of procurement activities in the different industrial sectors has been on the increase. This development is linked to the strategic, opportunistic and operational benefits of e-Procurement in supply chain management as explained by Teo *et al*.[6].

In the developed countries, Al-hudhaif and Alkubeyyer [7] noted that e-Commerce has been successfully adopted, while studies [8; 9; and 10] have shown that the uptake of e-Commerce technologies and processes in developing countries is relatively low and slow. This suggest that in spite of efforts made by organizations to use e-Procurement technologies and applications to support their procurement activities, challenges still exist that inhibit the success of these efforts [11]. In the construction sector, the existing studies [12; 13; 14; 15; 16) have explored several aspects of e-Procurement, including its use, benefits and barriers to its adoption. These studies reveal that among several benefits, e-Procurement use in construction can lead to cost and timesaving, increase flexibility, reduce the occurrence of errors, achieve faster response time and reduce the incidence of corruption. These studies also noted that several challenges related to infrastructure, technological, economic, social and cultural issues were militating against the successful adoption and maximization of its benefits in the different countries.

In spite of this insight gained from the existing studies, Isikdag [17] observed that there were limited numbers of empirical studies on the barriers to e-Procurement adoption in the AEC industry. In the context of Nigeria, apart from the study by Oyediran and Akintola [18] and that by Bello and Iyagba [19] on the state of e-Tendering and the barriers to the uptake of e-Procurement in construction industry, respectively, no study has specifically examined e-Procurement in the building industry in this country. Consequently, there is a limited understanding of the factors militating against the update of e-Procurement and maximization of its benefits in the NBI. It is against this background that the current study investigated the barriers to the uptake of e-Procurement with a view to suggesting ways to ensuring a critical mass uptake and maximizing its benefits in the NBI. In this study, the following key research questions were addressed.

i. What factors have the most adverse effects on the uptake of e-Procurement by organizations in the NBI?

ii. What are the different dimensions of these factors as understood by stakeholders in the NBI; and

iii. Which of these dimensions contribute mostly to predicting low uptake of e-Procurement in the NBI?

This study relied on a questionnaire survey of stakeholders in the building industry in Nigeria to address these research questions. The study contributes to knowledge in indentifying the specific factors that constitute barriers to the uptake of e-Procurement in the NBI. It also improves understanding of the different dimensions stakeholders in the NBI evaluate these barriers; and the aspects of the barriers that contribute most in predicting low uptake of e-Procurement in this industry.

2. LITERATURE REVIEW

2.1 e-Procurement Technologies and Barriers to their Adoption: Operational definitions

There are several definitions of e-Procurement or e-Commerce technologies in the published literature. However, in this study, e-Procurement or e-Commerce technology refers to the different packages, tools and/or applications that facilitate electronic communication, information exchange and transactions related to the acquisition of goods, services and works over the Internet as defined by Gunasekaran and Ngai [5]. In the context of construction generally, e-Procurement technologies and tools include several kinds of tangible and intangible objects such as web-enabled/ supported software packages; network technologies for the exchange of data and information (e.g. EDI, e-mail, and wireless technologies); web-supported transactional and collaboration applications; web-supported data collection and handling technologies (e.g. GIS, GPS, RFID, sensor networks) and interactive, integrative and collaboration technologies (e.g. Web 2.0, BIM, ERP, cloud computing, web-based project management and customized e-Procurement software applications) used to support the execution of construction procurement activities electronically [5 and 20].

The literature is replete with studies on the barriers to the uptake of e-Procurement in the different industries. According to Eadie *et al*.[13], barriers represent those factors or circumstances that prevent the implementation of an e-Procurement system. Farzin and Nezhad [21: 519] also noted that *barriers refer to the factors that inhibit e-Procurement use and produce negative results*. Corroborating these definitions, Doherty *et al* [22] described barriers or inhibitors as obstacles that must be mitigated if a successful implementation of e-Procurement must be achieved. Therefore, in the context of this study, the barriers to the uptake of e-Procurement refer to

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

those factors that inhibit the uptake and smooth implementation of e-Procurement technologies, tools and processes by organizations in the NBI.

2.2 Barriers to e-Procurement Adoption in SMEs in Developing Countries

The literature survey reveals that several authors in the different countries have attempted to identify and classify the barriers to the adoption of e-Procurement/e-Commerce. For examples, in a study to identify the benefits and barriers of e-Procurement in Malaysian SMEs, Eei *et al.*[23] noted the barriers to the uptake of e-Procurement include external factors such as technology, infrastructure and legislation, environment; and internal factors such as resource constraints and organizational and management characteristics. That study specifically found that amongst Malaysian SMEs, e-Procurement was not widely adopted; and that both external and internal factors constituted barriers to the uptake of e-Procurement. The three groups of external barriers identified in that study were technology, infrastructure and legislation, and environment, while resource constraints and organizational characteristics were the two groups of internal barriers militating against the adoption of e-Procurement in that country.

In a survey involving 161 SMEs in manufacturing, services, educational, mining, agro-allied, trading, wholesale trade, retail trade, construction, transport and storage, export, tourism and leisure in Nigeria, White *et al.*[2] investigated the challenges to the adoption of E-commerce technology in supply chain management. In support of the submission by Eei *et al* [23], the authors explained that the barriers to the uptake of e-Commerce technology could be classified into two main groups: internal and external factors. Whereas the former deals with those barriers that exist within an organization such as organizational culture, lack of resources, managers/owners attitude towards e-Commerce technologies and the level of training of employees, the latter are those outside the immediate control of an organization, and may include the lack of infrastructural facilities, funds and regulatory framework. That study identified the internal barriers to e-Commerce adoption amongst the SMEs sampled to include perception of security and reliability of the technology, lack of adequate skills, lack of awareness of benefits and organizational culture. The external barriers identified were related to infrastructure (e.g. power supply, Internet and funding). They authors also identified data integrity and protection as both internal and external barriers to e-Commerce technology adoption among the SMEs.

Also in Nigeria, Edwin and Peter [24] conducted another study to investigated and understand the barriers to e-Commerce adoption by SMEs in the different industrial sectors in the cities of Lagos, Abuja and Enugu. The authors noted that available data show an impressive growth in the rate of adoption of e-Commerce technologies and applications by SMEs in the developed countries such as the UK, USA, Canada, Australia and other emerging markets like China, India, Brazil, Singapore and others. They conceived of the barriers to e-Commerce uptake in Nigeria to include: (i) external environment (e.g. infrastructure, external pressure and socio-cultural factors) (ii) internal environment (size, resource availability, organizational culture and trained labour) (iii) perception (e.g. perceived benefits, risks, trust and cost) and (iv) attitude (e.g. age, occupational relevance, language and education). The authors identified the most critical barriers to e-Commerce adoption to include the lack of and total absence of a regulatory framework on e-Commerce security, the lack of technical skills and basic infrastructure, the lack of awareness of the potentials of e-Commerce and relative high initial costs in setting up e-Commerce strategies.

Elsewhere in Tanzania, Rumanyika and Mashenene [25] examined the impediments to e-Commerce adoption among SMEs. Based on a systematic review of published literature, the authors revealed that poor telecommunication infrastructure, poor e-Commerce security system, the lack of IT education and training; poor e-Readiness and socio-cultural beliefs and the lack of IT experts are significant impediments limiting the adoption of e-Commerce in Tanzania. The authors concluded that there was a need for all stakeholders to work together in addressing these challenges.

From the foregoing review, it is evident that several impediments exist that militate against the uptake of e-Commerce/ e-Procurement technologies among SMEs in the developing countries. These barriers include and not limited to internal barriers, external barriers and perception of the risk factors associated with e-Procurement technologies and processes.

2.2 Barriers to e-Procurement Adoption in Construction

From the review of the existing literature, it was also revealed that although there are numerous studies on the barriers to e-Procurement/e-Commerce adoption by organizations in the different industries in the developing and developed

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

countries of the world, there is a paucity of empirical literature on the barriers to the uptake of e-Procurement technologies in construction generally and the building industry in particular. In this section, attempt is made at identifying and reviewing the existing studies on the barriers to the uptake of e-Procurement in construction in countries such as Australia, Canada, Ireland, Nigeria, Turkey, the UK and South Africa. The studies indentified and reviewed in this paper are presented in Table 1.

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Table 1: Barriers to e-Procurement use in Construction

Authors	Study	Barriers
Aranda-Mena [26]	Review of 200 articles on the impediments to the uptake of e-Business in construction in Australia and globally	-Low or lack of awareness of e-procurement -Dearth of requisite skill - Legal and security issues -Lack of evidence-based literature on financial benefits of e-procurement use
Rankin *et al* [12]	e-Procurement in the Atlantic Canadian AE industry	-Integration of e-procurement systems with the existing work process and procurement system - Information technology investment costs - Resistance to Change -Lack of business relationship with costumers due to low level of personal contact - Barriers created by vendors or suppliers - Ownership of information used in tender process (copyright) - Security of automated procurement process - Unreliability of technologies - The negative impact of e-procurement on the organization - Effect of e-Procurement use on relationships with customers due to lack of personal contact - Lack of confidence in the new technology
Eadie et al. [13]	A study of the drivers of and barriers to e-procurement in the construction industry in Northern Ireland	-Interoperability of e-procurement software and systems - Information technology investment costs - Lack of upper management support - Lack of business relationship with costumers due to low level of personal contact - Organizational culture - Access to Internet and ICT Infrastructure - The legality of e-Procurement contracts - Integrity of data (changes to data making it inaccurate, incomplete and corrupted) - Proof intent- electronic signatures
Eadie *et al.* [27]	A survey on the reasons for the uptake of e-procurement in construction in the UK from the perspective of quantity surveyors	- Investment in compatible systems - Lack of widely accepted e-Procurement software solution - Other competing initiatives - Lack of upper management support -Lack of technical expertise -Lack of flexibility in the use of e-Procurement -Magnitude of Change required -Insufficient assessment of systems prior to Installation - Lack of pertinent case law - Different national approaches to e-Procurement - Clarity of sender and tenderers information - Security in the process-data transmission to the wrong person - Proof intent- electronic signatures - Confidentiality of information-unauthorized Viewing - Data transmission reassembly-incorrect reassembly of data transmitted in packets - Lack forum to exchange ideas on e-Procurement - Staff turnover
Isikdag *et al* [17]	Barriers to e-Procurement in the Turkish AEC industry	- Resistance to Change - Lack of upper management support - Lack of technical expertise - Lack of trust between parties in the electronic commerce - The legality of e-procurement contracts - Security in the process-data transmission to

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

		the wrong person - Confidentiality of information-unauthorized viewing - Lack of bodies supporting the shift towards e-Procurement - Lack of best practice studies and pilot projects - Lack of training regarding the implementation and use of e-commerce systems
Bello and Iyagba [19]	Comparative Analysis of Barriers to e-Procurement among Quantity Surveyors in UK and Nigeria	-Lack of a national IT policy relating to e-procurement issues -Other competing initiatives -Prove of intent - electronics signatures -Internal and external interoperability of e-procurement software -Complicated procedures and extended relationships -Confidentiality of information -Prevention of tampering with document -Resistance to changes -Enforceability of electronic contracts
Laryea and 1bem (2014b)	A survey of the barriers and prospective of e-Procurement in the South African construction industry	- Fees of the system are high - High cost of Internet services - Resistance to change - Perception of no business benefit realized - Lack of business relationship with costumers due to low level of personal contact - Lack of flexibility in the use of e-Procurement -Unreliable IT infrastructure - Poor network services in the remote areas - Internet is not accessible everywhere, and thus some small companies do not have access to e-Procurement infrastructure - The legality of e-Procurement contracts - Lack of pertinent case law - Lack of clarity of sender and tenderers information - The authenticity of documents submitted
		whether the client will approve them or will still need original copies - Confidentiality of information-unauthorized viewing - Integrity of data(changes to data making it inaccurate, incomplete and corrupted) - Data transmission reassembly-incorrect reassembly of data transmitted in packets - Lack of properly trained people to use the system - Limited people understand how the system functions, so auditing the fairness of the approach is difficult

Although the studies presented in Table 1 are not exhaustive, it is evident in Table 1 that the barriers to the update of e-Procurement in construction are varied and encompass infrastructure, technology, socio-cultural, economic, legal issues and others related knowledge of e-Procurement systems. In line with other studies on the barriers to the adoption of e-Procurement in SMEs in developing countries [2; 23 and 24], these barriers can also be classified into internal and external factors as well as the perception of e-Procurement technology and process by people in the different industries as previously highlighted. This suggests that there is a close relationship between the barriers to the adoption of e-Commerce technology among SMEs in the developing countries and the barriers to the uptake of e-Procurement in construction in countries like Australia, Canada, Ireland, Nigeria, Turkey, the UK and South Africa.

Drawing on the findings from the literature reviewed in this study, the researchers developed a conceptual framework of the current study (see Figure 1). The framework consists of four main components: external barriers, perception of the risk factors in e-Procurement technology, internal barriers and low uptake of e-Procurement in the building industry. The framework proposes that the factors inhibiting the uptake of e-Procurement by organizations in the building industry in Nigeria comprise mainly internal factors, external factors and the perception of risk factors associated with e-Procurement use. In addition, the framework shows that there is a direct relationship between internal

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

barriers, external barriers and peoples' perception of e-Procurement and the extent of its adoption in the procurement of building works, services, equipment and materials. In other words, the lack of critical mass uptake of e-Procurement or its non-adoption in the NBI is assumed to be principally due to internal factors within the organizations, external factors outside the organizations and the perception of the risks associated with the use e-Procurement by people in the industry.

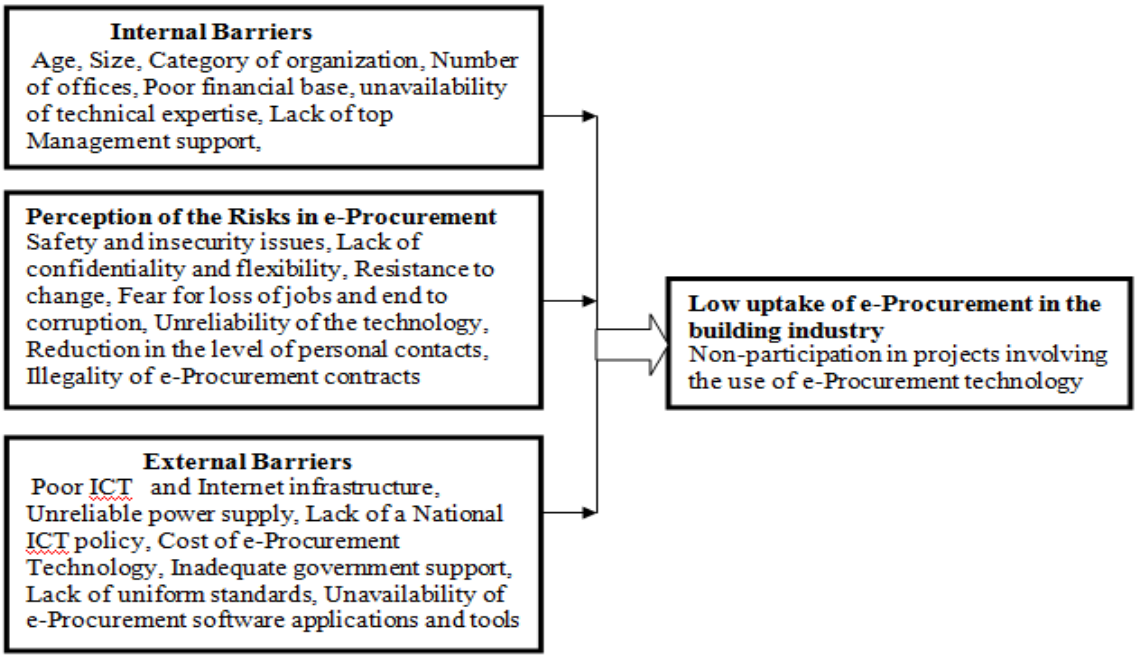

Figure 1: Conceptual Framework Of The Study

3. RESEARCH METHODS

This study investigated the barriers to the uptake of e-Procurement by organizations in the NBI. The survey research strategy was adopted due to the nature of the research questions and the fact that past studies in Canada [12], the UK [13 and 14] and South Africa [1] adopted similar strategy. In view of this, the data used were collected from both primary and secondary sources. Whereas the secondary data were derived from the review of published literature on the subject matter, the primary data came from the administration of structured questionnaire.

The study reported here was part of a larger study conducted to investigate the use of e-Procurement in the NBI. Therefore, the questionnaire used was designed by the researchers and had four sections. Section 1 focused on the professional roles of the participants and their organizations. Section 2 had questions on the different Internet-based technologies and tools used in the procurement of building works, services, equipment and materials. Section 3 contained questions relating to the factors considered important in the decision by organizations in the NBI to adopt e-Procurement. The last section of the questionnaire was used to collect data on the factors militating against the uptake and optimization of the benefits of e-Procurement in the NBI. The participants were specifically asked to rate 26 factors in order of their adverse impact on the uptake of e-Procurement by the organizations based on 5-Likert like scale of *1= "Has No Significant Effect"; 2 = "Has Very Little Effect";* **3**= *"Undecided" 4 = "Has Significant Effect"* ***5*** *= "Has The Most Significant Effect".* The 26 factors investigated were grouped into three main sub-groups, namely, internal barriers, perception of the risk associated with e-Procurement use and external barriers (Figure 1) as previously identified in the existing studies [2; 23;24 and Table 1]. It is important to state that the data presented in this paper are those extracted from the participants using Sections 1 and 4 of the questionnaire instrument.

Before the main research was conducted, the questionnaire instrument was pre-tested in a pilot survey carried out in Lagos in April 2015. Findings of the pilot survey helped the researchers in fine-tuning the questions in the questionnaire. The main

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

research was conducted between June and November 2015. The participants were drawn from architectural, building and quantity surveying firms Nigeria. The survey of architectural firms took place in June 2015 during the 2015 Architects' Colloquium in Abuja. That of building construction companies took place at Annual Builders' National Conference and Meeting at the University of Ibadan in August 2015, while survey of the Quantity Surveying firms was at the Annual QS Research Conference held at the Federal University of Technology, Akure in November 2015. The choice of these events as the main avenues for the administration of the research instrument is not far-fetched. These conferences and exhibitions are annual events that attract diverse participants (e.g. academics, professional consultants, contractors, clients and government agencies) in the building industry within and without Nigeria; and thus, provide platforms where issues bothering on the growth and development of the NBI are presented and discussed. Consequently, many researchers usually take advantage of these events to harvest the views and experiences of stakeholders in the NBI.

Those who participated in the research were randomly selected and a copy of the questionnaire was given to each participant by the researchers and four trained research assistants employed to assist in the data collection aspect of this research. Client organizations such as government ministries, agencies and departments and multinationals (e.g. oil and gas, telecommunication, manufacturing and building construction companies) in Lagos, Abuja and Port Harcourt also participated in the research. Copies of the questionnaire were mailed to elected organizations as e-mail attachments, while others were administered by hand in their offices. In the surveys, 500 copies of the questionnaire were distributed; however, 213 valid questionnaires representing around 43% of the distributed questionnaire were retrieved. Previous study [12] reported similar response rate.

The Statistical Package of the Social Sciences (SPSS) Version 20 was used in the data analysis. The first type of analysis conducted was descriptive statistics. We used this analysis to compute the proportions and percentages of the seven variables used in describing the professional roles of the participants' and the profiles of their organizations, the mean score provided by the participants for each of the 26 factors used in indentifying the factors with significant adverse effect on the uptake of e-Procurement by the organizations sampled. The second type of analysis conducted was exploratory factor analysis using principal component analysis and Varimax rotation method. Again, the authors used the factor analysis firstly to to address the second research question of the study; and secondly, to extract the dimensions (factors) used in the regression analysis.

The third analysis conducted was the Categorical Regression Analysis with optimal scaling technique also known as CATREG in the SPSS. The researchers used the CATREG analysis mainly to examine the variance explained by R^2, identify and compare the relative strengths of the barriers predicting the low uptake of e-Procurement among organizations in the NBI. The CATREG analysis was used in this study because the variables investigated are a combination of ordinal and numerical/interval data. As explained by Hussain *et al.*[29], CATREG analysis is suitable in the analysis of dataset comprising a combination of ordinal and numerical/interval data as it can transform and standardize non-numerical variables into numerical variables prior to estimation producing only standardized coefficient estimates. In the CATREG analysis, '*participation in projects involving the use of e-Procurement'* was the dependent variable, while the factor scores for the five factors extracted from the exploratory factor analysis; level of awareness on e-Procurement in construction; staff strength; age of organization, the number of offices in Nigeria; range of annual turnover and sector of procurement experience by the organizations were the independent variables.

In the research design and execution, the following steps were taken to enhance the validity and reliability of findings of this study. First, the questionnaire instrument was pre-tested in a pilot survey as previously discussed. Second, Cronbach's alpha coefficient test conducted on all the 26 barriers to the uptake of e-Procurement. The result showed Cronbach's alpha value of 0.834, which is more than 0.7 recommended by Pallant[28]. This suggests that the questionnaire instrument was reasonably reliable in measuring the barriers to the uptake of e-Procurement by organizations in the NBI.

4. RESULT

4.1 Profiles of the Participants and their uptake of e-Procurement

Table 2 represents the role of the participants and profiles of the organizations. In line with the sampling technique used in the selection of the respondents, the participants were from consulting and contracting firms, client organizations and government ministries, agencies and departments

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

(MADs), representing the key stakeholders in the NBI.

Table 2: Professional Roles Of The Respondents And Their Organizations

Role/ Duty/ profession	N=213	%
Role in the Building Industry		
Architect	75	35.2
Builder	47	22.1
Engineer	9	4.2
Construction/ Project manager	20	9.4
Quantity Surveyor (QS)	56	26.3
Procure/Supply Chain manager	6	1.9
Type of Organization		
Consulting firms	72	33.8
Contractors	45	21.1
Client organizations	21	9.9
Government Ministries, Agencies and Departments(MADs)	75	35.2
Sector of Procurement experience		
Public sector only	36	16.9
Private Sector only	52	24.4
Both Public and private	125	58.7
Staff Strength (Persons)		
Below 20	94	44.1
20-50	45	21.1
51-100	14	6.6
More than 100	56	26.3
No Response	4	1.9
Age of Organization		
Below 5 years	31	14.6
6-10 years	52	24.4
More than 10 years	126	59.2
No Response	4	1.9
Number of Offices in Nigeria		
One	84	39.4
Two	52	24.4
Three	17	8.0
More than three	42	19.7
No Response	18	8.5
Range of annual turnover in Naira*		
Less than 100 million	91	42.7
100-500 million	40	18.8
600 million-1billion	17	8.0
Over 1 billion	42	19.7
No Response	23	10.8

US$1=₦ 199.03 as at April 2016

From Table 2 it is evident that most of the organizations sampled were consulting and contracting firms with procurement experience in the private and public sectors, less than 50 members of staff and had a maximum of two offices in Nigeria. The result also shows that most of the organizations were more than 10 years old and had less than ₦500 million (US$2,512,190) as annual turnover. Going by the description of the characteristic features of SMEs in Nigeria and other developing countries as presented in previous studies [2, 23 and 24], it can be inferred that a majority of the organizations encountered in surveys were SMEs in the NBI.

4.2. The Level of uptake of e-Procurement in the NBI

Since awareness is the first step in the adoption of any new technology as noted Oyediran and Akintola [18], the participants were asked whether they were aware of e-Procurement use in the building industry. The result shows that a majority (75%) of the respondents were aware of e- Procurement, and around 22% said they were not aware of e-Procurement, while about 3% provided no response to this question. It was also revealed from the result that 90%, 84%, 74% and 71% of those in clients' organizations, contracting consulting firms and government MADs, respectively, were aware of e-Procurement in the building industry. This implies that the largest proportion of those who are not aware of e-Procurement use in the NBI are government MADs.

On their levels of uptake of e-Procurement with evidence in participation in building projects involving the use of e-Procurement; the result also shows that although around 9% of the participants did not indicate whether or not they have participated in a project that involved the use of e-Procurement, a majority (52%) of the participants said they have not participated in projects involving the use of e-Procurement, while 84 representing around 39% of the respondents claimed that they have participated in building projects that involved the use of e-Procurement. Further analysis of the result revealed that approximately 46% and 56% of the contracting and consulting firms, respectively, had not participated in building projects involving the use of e-Procurement. Similarly, 67% and 74% of the clients organizations and government MADs sampled, respectively, have not procured building works, services and materials electronically. This suggests that the highest users of e-Procurement in the NBI are the contractors, followed by consulting firms, while the least users are the government MADs. This result corroborates the finding indicating that the highest proportion of those who said they were not aware of e-Procurement were government MADs. This result provides support to the assumption that there are factors militating against the uptake of e-Procurement by organizations in the NBI.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Table 3: Factors With Negative Effect On The Uptake Of E-Procurement In The NBI

Factors	Mean	Std. Deviation	Rank
High cost of investment in e-Procurement technologies and tools	4.4407	4.89644	1
Lack of technical expertise to handle e-Procurement technologies	4.1243	3.17954	2
Poor Internet and ICT infrastructure in Nigeria	4.0520	1.03579	3
Unrealizable power supply situation in Nigeria	4.0506	1.12633	4
Safety and security issues in e-procurement transaction	3.9371	3.26802	5
Lack of uniform standard in the use of e-Procurement packages	3.8876	3.20465	6
Lack of interoperability of e-Procurement software packages	3.8563	3.26959	7
Inadequate government support for e-Procurement in construction	3.8036	1.08478	8
Lack of awareness on e-Procurement in the industry	3.7644	1.22437	9
Technical challenges associated with the transition paper based method to e-Procurement	3.7630	3.31424	10
Lack of a National policy on e-Procurement in Nigeria	3.7571	1.09895	11
Lack of forum to exchange ideas on the use of e-Procurement	3.7529	1.03668	12
Lack of top management support	3.7257	1.07435	13
General resistance to change by people in the construction industry	3.6307	1.16372	14
Lack of widely accepted e-Procurement software solutions in construction	3.6023	1.21927	15
The fear that e-Procurement will help curb corruption in the industry	3.5988	1.29172	16
The complicated nature and process involved in e-procurement use	3.5954	1.05565	17
Lack of universal format and standard in which construction materials are described, displayed and specified	3.5682	1.08807	18
Lack of confidentiality in e-Procurement transactions	3.5600	1.15748	19
The fear for loss of jobs and staff turnover	3.5398	1.18496	20
Concerns over the legality of electronic contracts	3.4802	1.09799	21
Inaccurate display of data and information at the receivers' end	3.4368	1.13485	22
Delays in the transmission of data and information	3.4213	2.52826	23
Lack of flexibility in the use of e-Procurement	3.3801	1.15375	24
The benefits of using e-Procurement in construction are not very clear	3.3023	1.28026	25
Relatively low human to human contact in e-Procurement transactions	3.2601	1.22307	26

A close scrutiny of the result in Table 3 reveals that of the 26 factors investigated in the surveys, the high cost of investment in e-Procurement technologies and tools with Mean value of 4.4407 emerged as the number one factor in terms of having adverse effect on the uptake of e-Procurement by organizations in the NBI. Next to this are the lack of technical expertise to handle e-Procurement technologies and tools in the organizations (4.1243); poor Internet and ICT infrastructure (4.0520); and unreliable power supply situation in Nigeria (4.0506), respectively.

4.4 Dimensions of the Factors inhibiting the uptake of e-Procurement in the NBI

Prior to conducting the exploratory factor analysis, it was important to investigate the suitability of our survey data for this type of analysis. This was done by examining the Kaiser-Meyer- Olkin Measure of Sampling Adequacy (KMO) and conducting the Bartlett's Test of Sphericity. The result shows the KMO value of .610 and Bartlett's test is significant ($p = .000$), which are more than 0.6 for KMO and 0.05 for Bartlett's test recommended by Pallant[28]. The implication of this result is that our survey data is suitable factor analysis.

Table 4 shows the result of the exploratory factor analysis performed on the 26 factors considered as the factors inhibiting to the uptake of e-Procurement

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by the organizations sampled. It can be seen from the result in Table 4 that the participants in the survey evaluated the 26 factors in five key dimensions. These dimensions explained approximately 62% of the total variance in the 26 factors included in the survey.

Table 4: Dimensions Of The Factors Inhibiting To The Uptake Of E-Procurement

Dimensions of Evaluation	Factor Loading	% of Variance	% Cumulative
Dimension 1: **Technical, infrastructure, political, social, and cultural issues**		27.298	27.298
Technical challenges associated with the transition paper based method to e-procurement	0.558		
Lack of widely accepted e-Procurement software solutions in construction	0.520		
The complicated nature and process involved in e-procurement use	0.565		
Unreliable power supply situation in Nigeria	0.571		
Poor internet and ICT infrastructure in Nigeria	0.613		
Safety and security issues in e-Procurement transaction	0.663		
Lack of confidentiality in e-Procurement transactions	0.691		
concerns over legality of electronic contracts	0.655		
Lack of a National policy on e-Procurement in Nigeria	0.640		
Lack of forum to exchange ideas on the use of e-procurement	0.591		
Inadequate government support for e-procurement in construction	0.487		
Lack of universal format and standard in which construction materials are described, displayed and specified	0.498		
General resistance to change by people in the construction industry	0.670		
Lack of flexibility in the use of e-procurement	0.527		
Relatively low human- human contact in e-procurement transactions	0.487		
Lack of awareness on e-procurement in the industry	0.484		
The fear for loss of jobs and staff turnover	0.458		
Inaccurate display of data and information at the receivers' end	0.664		
The fear that e-Procurement will help curb corruption in the industry	0.543		
Dimension 2: Lack of skill manpower, interoperability, uniform standards and high cost of e-Procurement technologies		14.376	**41.674**
Lack of technical expertise to handle e-procurement technologies	0.975		
High cost of investment in e-procurement	0.785		

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

technologies and tools			
Lack of interoperability of e-procurement software packages	0.974		
Lack of uniform standard in the use of e-procurement packages	0.975		
Dimension 3: **Lack of top management support**	0.485	8.691	**50.365**
Dimension 4: The benefits of using e-Procure in construction are not very clear	0.643	5.964	**56.329**
Dimension 5: Delays in the transmission of data and information	0.560	5.507	**61.836**

The result in Table 4 shows that the Dimension 1 (Factor 1) inhibiting the uptake of e-Procurement in the NBI is related to technical, infrastructure, political, social, and cultural issues. This dimension explained about 27% of the variance in the 26 factors investigated with 19 factors loaded on it. Dimension 2 (Factor 2) deals with the lack of skill manpower, interoperability, uniform standards and high cost of e-Procurement technologies; and this accounted for around 14% of the variance in the 26 factors investigated with four factors loaded on it. Dimension 3 (Factor 3) is the lack of top management support in the organizations, which accounted for around 9% variance and Dimension 4 (Factor 4) is the lack of evidence of the benefits of using e-Procurement in the NBI. This accounted for about 6% of the variance in the factors investigated. The last dimension (Factor 5), which also accounted for around 6% of the variance in the 26 factors investigated, deals with the perception that there are delays in the transmission of data and information in e-Procurement systems.

4.5 Predictors of Low Uptake of e-Procurement in the NBI

As noted earlier, in this study we used the CATREG analysis to investigate the predictors of low uptake of e-Procurement in the NBI. The dependent variable was the "*Participation in a Project involving the use of e-Procurement*", while the five dimensions extracted from the exploratory factor analysis; level of awareness on e-Procurement in construction; staff strength; age of organization, the number of offices in Nigeria; range of annual turnover and sector of procurement experience by the organizations were the independent variables. This translated to 11 independent variables investigated in this study. The result reveals that of the 11 factors included in the regression model, five significantly predicted the low uptake of e-Procurement among the organizations sampled with $F(47.918,61.028) = 109.000$, $P < 0.014$. The R^2 value (0.440) of the model indicates that the regression model explains around 44% of the variance in the low uptake of e-Procurement amongst organizations in the NBI. The coefficients of the regression analysis are as presented in Table 5.

Table 5: Coefficients of the Multiple Regression Analysis

	Standardized Coefficients		df	F	Sig.
	Beta	Bootstrap (1000) Estimate of Std. Error			
Sector of procurement experience	0.088	0.100	2	.775	0.464
Staff strength of your organization	0.077	0.109	3	.498	0.685
Organizations' years of existence	0.060	0.103	2	.336	0.716
Number of offices in Nigeria	0.239	0.109	3	4.787	0.073
Range of organization' annual turn over	0.262	0.159	2	2.702	0.004*
Dimension 1: Technical, infrastructure, political, social, and cultural issues	-0.893	0.266	6	11.289	0.000*
Dimension 2: Lack of skill manpower, interoperability, uniform standards and high cost of e-Procurement technologies	0.191	0.382	4	.249	0.909
Dimension 3: Lack of top management support	0.324	0.194	3	2.792	0.032*
Dimension 4: The benefits of using e-Procurement in construction are not very clear	-0.348	0.161	3	4.656	0.005*
Dimension 5: Delays in the transmission of data and information	-.0197	0.219	2	.809	0.449
Level of awareness on e-Procurement in construction	0.289	0.118	1	5.992	0.017*

**significant predictors*

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Examination of result in Table 5 will shows that the five significant predictors of low update of e-Procurement by the organizations are: (i) the organizations' turnover (ii) technical, infrastructure, political, social, and cultural issues (Dimension 1); (iii) lack of top management support (Dimension 3); (iv) the inability of the participants to understand the benefits of using e-Procurement (Dimension 4); and (v) the level of awareness on e-Procurement use. From the beta values in the second column of Table 5, it is also evident that technical, infrastructure, political, social and cultural issues with beta value 0.893 has the highest impact on the low uptake of e-Procurement in the NBI. This is followed by the lack of evidence of the benefits of using e-Procurement in the NBI (0.348); the lack of top management support (0.324), the annual turnover of the organizations (0.262) and level of awareness on e-Procurement in construction, respectively.

5 DISCUSSION

This study investigated the barriers to the uptake of e-Procurement among organizations in the building industry in Nigeria using three research questions: (i) what factors have the most adverse effects on the uptake of e-Procurement by organizations in the NBI? (ii)What are the different dimensions of these factors as understood by stakeholders in the NBI; and (iii) which of these dimensions contribute mostly to predicting low update of e-Procurement in the NBI? In relation to these research questions, the authors identified three key findings and brought them forward for further discussion in this section of the paper.

The first issue deals with the factors that constituted the greatest barriers to the uptake of e-Procurement by organizations in the NBI. From the result presented in Table 3, it is evident that the factor that constituted the greatnesses barriers to the adoption of e-Procurement in the NBI is high cost of investment in e-Procurement technologies and tools. This is an economic factor, which can one the one hand linked to the cost of e-Procurement technologies and tools as provided by the vendors, and on the other hand the financial capability of the organizations to acquire, use and maintain this technology. Therefore, this factor is considered as both internal and external barriers to the uptake of e-Procurement by the organizations. Recall that Rankin *et al.*[12] and Eadie et al.[13] found high information technology investment cost in Canada and the UK, respectively, as a key barriers to the adoption of e-Procurement, while Laryea and 1bem [20] identified the high cost of Internet services as one of the barriers to e-Procurement adoption in the South African industry. Similarly, Edwin and Peter [24] also identified relative high initial costs in setting up e-Commerce strategies as a major barrier to the adoption of this technology by SMEs in Nigeria as previously highlighted. In the light of this, the possible explanation to this finding is that most of the organizations encountered in the surveys are SMEs with relatively low turnover; and thus do not really have the financial capacity to acquire and use e-Procurement systems available in this country.

Next is the lack of technical expertise to handle e-Procurement technologies and tools in the organizations. This is an internal barrier, which was also identified by previous studies [17; 20; 26 and 27]. This finding is understandable because e-Procurement technologies and process are relatively new and requires trained personnel for its success implementation in organizations. This suggests that the organizations sampled are yet to develop the expertise required for the successful adoption of e-Procurement. This is of course very common in the developing countries, as previous studies [2; 24 and 25] have indicated.

There are also the barriers linked to poor Internet and ICT infrastructure and unreliable power supply in Nigeria. This finding corroborates that by Oyediran and Akintola [18] which identified poor Internet and ICT infrastructure as well as unreliable power supply as key barriers militating against the adoption of e-Tendering in the construction sector in Nigeria. Notably, these are external barriers, which are outside the control of the organizations sampled. The issue here is that despite Nigeria's huge population of Internet users, the quality of Internet services in this country leaves much to be desired. In the first instance, access to the Internet is very limited to major town and cities in this country. Secondly, the cost of internet services is relatively high in Nigeria. This situation can be linked the poor state of ICT infrastructure, which has resulted bandwidth issue in this country. One of the consequences of this is that the current supply does not meet the demand for Internet services. Related to this is the epileptic power supply situation in this country. It is unbelievable that Nigeria with over 180 million people generates less than 5,000 megawatts of electricity, which is not enough to meet the demand of power supply in Lagos alone with over 12 million people. Since e-Procurement technologies and processes rely on constant power supply, it is difficult for organizations and businesses in country to use these technologies and processes in the absence of constant supply of electricity.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

The second issue relates to the dimensions of the factors that inhibit the uptake of e-Procurement as evaluated by the participants in the surveys. This study revealed that participants in the surveys understood the 26 factors investigated in five main dimensions. These dimensions are: (i) technical, infrastructure, political, social, and cultural issues (ii) the lack of skill manpower, interoperability, uniform standards and high cost of e-Procurement technologies, (iii) the lack of top management support in the organizations (iv) the lack of evidence on the benefits of using e-Procurement in the NBI; and (v) the respondents' perception that there are delays in the transmission of data and information using e-Procurement systems. Although these dimensions are not exactly the same as those three dimensions conceived of in this study and illustrated in Figure 1, the five dimensions identified represent the factors the participants actually responded to in their evaluation of the factors inhibiting the uptake of e-Procurement in their different organizations.

Further examination of each of these five dimensions shows that the first dimension comprises both external and internal barriers and perceptions of the risks associated with the use of e-Procurement as identified by Edwin and Peter [24] and the studies listed in Table 1 and captured in the conceptual framework of this study (Figure 1). In the same vein, second dimension also encompasses internal and external barriers as well as perception of the risks of e-Procurement, while the fourth and fifth dimensions are peoples' perception of the risks factors in e-Procurement use as identified in the studies summarized in Table 1. However, the third dimension is principally an internal barrier and previous studies [13; 17 and 27] have shown that it was a key barrier in the uptake of e-Procurement in the construction sector in the UK and Turkey, respectively. This specific finding indicates that whereas researchers conceived of the barriers to the uptake of e-Procurement technologies in three main dimensions: internal and external barriers and perceptions of the risk factors in e-Procurement technologies, the practitioners who use these technologies and processes understand these barriers in five different dimensions.

The last issue relates to the factors that predict the low uptake of e-Procurement among the organizations sampled in the surveys. Result of the CATREG analysis as displayed in Table 5 revealed that five factors emerged as the significant predictors of low uptake of e-Procurement among organizations in the NBI. In the order of their impact and contributions to explaining the inability of most of the organizations sampled to adopt e-Procurement, the factors are: (i) technical, infrastructure, political, social, and cultural issues (ii) the perception that the benefits of using e-Procurement in the building industry are not clear (iii) the lack of top management support (iv) the level of awareness on e-Procurement use; and (v) the organizations' turnover. This means that technical, infrastructure, political, social, and cultural issues as listed in Table 4 is the factor with highest impact and contribution in explaining why many of the organizations sampled have not participated in projects involving the use of e-Procurement in Nigeria. This result did not come as a surprise because a majority of the variables listed under this factor have been previously identified as the barriers to the adoption of e-Procurement by organizations in the construction sector in both developed and developing countries (see Table 1).

The second factor with the highest impact and contribution to explaining why most of the organizations have not used e-Procurement is perceived lack of evidence of the benefits of e-Procurement use in the NBI. This finding supports previous studies [20 and 26] indicating that the perception of no business benefit realized in e-Procurement was one of the barriers to the adoption of e-Procurement in the construction sector in Australia and South Africa, respectively. In addition, the emergence of the lack of top management support as one of the predictors of low uptake of e-Procurement did not also come as a surprise. This is because previous studies [13; 17 and 27] have shown that this was a key barrier to the uptake of e-Procurement in the construction industry in the UK and Turkey, respectively. Based on the foregoing, it can be inferred that findings of the current study are consistent with the existing studies reviewed in Section 2.1 and summarized in Table 1 as they relates to the barriers to the uptake of e-Procurement in the NBI. The findings of this study also validate the assumptions in the conceptual framework of the study as illustrated in Figure 1 on the influence of internal and external barriers as well as peoples' perception of the risk factors in e-Procurement use.

6 CONCLUSIONS AND RECOMMENDATIONS

This study investigated the barriers to the uptake of e-Procurement among organizations in the NBI using data derived from an industry-wide questionnaire survey conducted in Nigeria in 2015. Based on the findings, the following conclusions can be made. The first is that the factors considered to have the most significant negative effect on the

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

uptake of e-Procurement are the high investment cost on e-Procurement technologies and tools and the lack of technical expertise to handle e-Procurement technologies and tools in the NBI. The second conclusion is that against the conception by researchers and scholars of the factors inhibiting the uptake of e-Procurement in three dimensions, the practitioners in the NBI understood the factors in five main dimensions. The last conclusion is that technical, infrastructure, political, social, and cultural issues have the highest impact and contribution in explaining the reason why most of the organizations encountered in the survey were yet to use e-Procurement.

The findings of this study have a number of implications that are noteworthy. The first implication is that to ensure a critical mass uptake and maximisation of the benefits of e-Procurement in the NBI, vendors of e-Procurement technologies and applications need to take advantage of the huge market and economy of scale in making the cost of their products and services affordable to a majority of potential users in Nigeria. In addition, more investment in the ICT and power supply is needed to further develop and expand the capacity of these sectors to meeting growing demand for quality ICT services and uninterrupted power supply. This would encourage the uptake and sustained use of e-Procurement in this country in general and the building industry in particular. Another implication of this study is that the way researchers conceive barriers to the uptake of e-Procurement is different from how practitioners in the building industry in Nigeria understand them. Therefore, understanding the perspectives of the users by researchers and scholars is very vital in making suggestions that would facilitate a critical mass uptake of e-Procurement in the NBI.

The last implication of this study is that all stakeholders need to collaborate to eliminate the obvious technical, infrastructure, political, social, and cultural barriers to the uptake of e-Procurement in the NBI. This calls for the government to take a leading role in the formulation of legislation and establishment of robust regulatory framework for the e-Commerce sub-sector in Nigeria. This can help put an end to the political and legal barriers to the uptake of e-Procurement in the NBI. For the firms and professional bodies in the industry, there is a need for capacity building programmmes in the area of information technology (IT) in general and e-Procurement in particular among their employees and members. Such programmes can be in the forms of training workshops and short courses. Furthermore, aggressive enlightenment campaigns are also required to educate client organizations, professional consultants, contractors and government MADs on the benefits of e-Procurement use in the building industry. This can help change peoples' mindset and perception of the risk factors associated with e-Procurement use leading to a critical mass uptake of this technology and maximization of its benefits in the procurement of building works, services and materials in Nigeria

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