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A SURVEY OF PUBLIC CONSTRUCTION MANAGEMENT AGENCIES READINESS FOR E-PROCUREMENT ADOPTION

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Abstract

E-Procurement is a veritable tool for increasing efficiency, productivity and faster project delivery in construction industry practice. However, despite the administrative and managerial benefits obtainable by the adoption of e-procurement, public organizations are slow in their approach to its adoption due to their exposure to the technology application in that regards. Thus, this research aim to assess the state of readiness of government construction organization to adopt e-procurement in order to establish their responds to information communication technology innovations with a view to enhancing continuous efficiency in service delivery. Questionnaire and literature review were use as sources of data, where by the factors either for or against e-procurement adoption were identified and established. From the research findings, majority of the response shows lack of awareness and lack of experienced partners. However, the management is aware of its benefits to construction industry and will welcome changes to strategies that ensure successful migration from paper base procurement to electronic one. The study therefore recommended that a framework be developed by Government for the full adoption of e-procurement in Nigerian construction industry.

Keywords: Construction organization, e-procurement, ICT, readiness, management

1.0 INTRODUCTION

As technologies evolve fundamental changes in the methods of practice of all businesses and industries including construction have also change. The construction industry has been one of the most impacted by these radical changes. According to [1], most construction processes have been automated resulting into higher efficiency and accuracy in production. However, [2] asserts that construction procurement system is still largely traditional despite the expanding capabilities of the information communication technology (ICT). He further observe that before the advent of the internet, procurement functions were perceived by many to be routine and repetitive processes. Most organizations used to have separate procurement offices laden with responsibilities of performing definite and specific tasks. These tasks are usually labour intensive, dominated by paper, thereby making them costly, ineffective and inefficient. In view of this, various business concerns have found it both appropriate and inevitable to embrace the use of internet facilities to enhance the performance of their tasks. Connection to the internet is an indispensable requirement. It provides the platform for the operation of the e-procurement web portal, the tool that enables collaboration. It is important to note that the internet connection used for electronic procurement is fast, secure, and reliable. However, government agencies have been described as not being willing to integrate ICT into their business more intensively, unlike larger enterprises [3].

The aim of this research is to assess the state of readiness of government construction organization in order to study and establish their responds to ICT innovations with a view to enhancing continuous efficiency in service delivery. The research is a product of literature reviews and structured questionnaires which were distributed to correspondents from a defined area of study, Kaduna State Public Works Agency (KAPWA). The study examines the basic parameters for assessing the level of readiness of e-procurement adoption in construction industry.

However due to the case study, generalizations cannot be perfectly accurate.

2.0 LITERATURE REVIEW

There exist many literatures on e-procurement written by various authors in different countries for various purposes. And the fact underscores the essence, importance and relevance of this area (sub-sector) in the development of any given economy in construction.

2.1 History of E- Procurement Tools

E-Procurement tools have been around since the late 1990's, and as such, have evolved significantly to provide a robust set of tools used frequently by Fortune 500 companies as part of their procurement tool kit. These tools are also part of an overall procure-to-pay process supported by a variety of industries as procurement best practices. As these tools have evolved, so have the opinions of the tools by users, participants and industry groups.

One of the most significant changes in the procurement space with these tools over the last five years is the evolution of Software-as-a-Service (SaaS) offerings that are accessed via cloud based computing systems. Simply put, this means that companies and organizations can buy as much or as little of the functionality of the tools and related services as they need and begin using the tools almost immediately (think do it yourself or have someone else do it for you). The benefit is that this eliminates the need to buy hardware and software that would need to be installed and maintained behind a company's corporate firewall and supported by their Information Technology team. A SaaS-based solution can dramatically reduce the cost of the system, as well as the speed of startup, and often returns an ROI almost immediately. All a company or their suppliers needs for access is a web browser, with the ultimate benefit being that these tools extend the work output by buyers, category managers and other procurement knowledge workers by allowing them to use their knowledge to evaluate data rather than having to collect and assemble it as well.

2.2 Electronic Procurement (E-Procurement)

E-Procurement (or Business- to- Business networks) is an online system by which companies can be connected directly to suppliers for the purpose of buying products and services at the lowest cost possible. e- Procurement essentially replaces its offline version, called tender. The advantages and disadvantages of e- Procurement mostly parallel the universal benefits and disadvantages of the internet. According to [4], e-Procurement is done with a software application that includes features for supplier management and complex auctions. The new generation of e-procurement is currently on demand or software as a service (SaaS). The e-procurement value chain comprises indent management, e-tendering, e-auctioning, vendor management, catalogue management and contract management. Indent management is the workflow involved in the preparation of tenders. This part of value chain is optional, with each procuring department defining its indenting process. As concerns works procurement, administrative approval and technical sanction are obtained in electronic format. On the other side, in goods procurement, indent generation activity is done online. The end result of the stage is taken as inputs for issuing the NIT [5]. The public sector organizations use e-Procurement for contracts to achieve benefits for example increased efficiency and cost savings, faster and cheaper in government procurement [6] and improved transparency, to reduce corruption, in procurement services. e- Procurement in the public sector has seen rapid growth in recent years.

2.3 Factors Influencing E-procurement Adoption and Use

Despite the great benefits of e-procurement technologies, their adoption is still at their early stages [7]. A variety of factors may affect a firm's decision to adopt and implement a particular information communication technology. In consolidating prior studies examining innovation, [8] classified variables that potentially influence information communication technology adoption into five broad categories: individual, task and innovation related, organizational and environmental characteristics. [9] also suggested that these factors may be important to differing degrees depending on the context or technology. For example, individual factors such as age or education are often more relevant with individual adoption of technology rather than organizational innovation whereby decisions are made by committees. Additionally, task characteristics may be isolated and examined when individual technologies are being studied. As this study survey the state of readiness of public agencies adoption of e-procurement systems, the focus is limited on the following key drivers, barriers to adoption of e-procurement and the level of readiness.

2.4 The Nigerian Construction Industry

The construction business in Nigeria is a multibillion Naira industry with hardly any year falling short of expected windfalls befalling successful contractors who bid for construction projects, the last 5 years has witnessed increasing patronage and profits for most construction companies in Nigeria.

It is clear that construction activities affect nearly every aspect of the economy and that the industry is vital to the continued growth of the economy. In

Nigeria, like most developing countries, the construction industry plays a dominant role in the economic activities of the country. This industry is of paramount importance for employment and economic growth. The Nigerian construction industry forms nearly 70% of the nation's fixed capital formation, yet its performance within the economy has been, and continues to be, very poor.

2.5 The Role of Procurement System in Construction Industry

Procurement systems and project organisations provide the framework for implementation and development of projects. Procurement systems and project organisations are well studied and established for major developments and in developed countries in particular. When these systems are used in developing countries for major commercial, social and infrastructure developments, appropriate results are seldom achieved. This may be due to a variety of factors, which include systemic, environmental, cultural, economic, legal, political and socio-cultural amongst other things. Therefore, in order to take advantage of collaboration, a procurement procedure is one key improvement area and can contribute substantially to project success [10-11]. A change of procurement procedures is, however, impeded by clients' habitual behaviour [12]. Although procurement procedures need to be tailored to enhance the fulfilment of different project objectives [13], clients tend to choose those procurement procedures they have a habit of using, regardless of any differences between projects [12]. In order to enhance change, an increased understanding of how electronic procurement affects project performance and delivery is vital. In order to achieve successful governance of construction projects a holistic and systemic approach to procurement procedures is crucial [14].

3.0 RESEARCH METHODOLOGY

The research is based on 29 returned questionnaires out of the 37 copies that were administered through simple purposive sampling technique within the organisation. The questionnaire contains three sections. Section A contains, the major activities of the organizations in the construction industry, the designation and educational profile of the respondents and construction works experience, while, section B and C contains issues about drivers and barriers to adoption of e-procurement and the level of readiness respectively. The data collected from the questionnaire were analysed using descriptive analyses tools such as frequency and percentage, tables and charts, of the relevance of e-procurement to public construction agency. These subjective opinions were measured on a five point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

4.0 RESULTS AND DISCUSSION

4.1 Bio-data of Respondents

Table 1 revealed, majority of the respondents which is roughly 51.7% are HND holders, 27.6% are BSc holders while 10.3% are OND and MSc holders.

Table 1 Educational level of respondents ◦

Education	Frequency	Percent
OND	3	10.3
HND	15	51.7
BSC	8	27.6
MSC	3	10.3
Total	29	100

◦ The frequency were determined to obtain the Educational level of the respondents

Table 2 below, shows the years of experiences respondents have with the majority covering 41.4% within 15-20 years of experience.

4.2 Level of Readiness to E-procurement

Table 3 showed the extents to which driver/facilitators adapt to e-procurement in Nigeria. Government support e-procurement through legislation having 51.7% respondents who agree to that fact. It also showed that the client have interest in the use of e-procurement in their project. The implement of e-procurement is supported by professional bodies as indicated by 69.0%.

Table 2 Years of experience ◦

Years of experience	Frequency	Percent
0-5	3	10.3
5-10	3	10.3
10-15	9	31
15-20	12	41.4
20 and above	2	6.9
Total	29	100

◦ The frequency were determined to obtain the years of experience of the respondents

Table 3 Response on E-procurement system ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
Government support through legislation	13.8	20.7	13.8	51.7	-	100
Clients' interest in the use of e-procurement in their projects	-	-	41.4	58.6	-	100
Availability of well trained professionals to handle the tools	-	3.4	13.8	65.5	17.2	100
Cooperation and commitment of professional bodies to its implementation	-	-	24.1	69.0	6.9	100
Collaborative Procurement methods	-	-	10.3	89.7	-	100

◦ Response on E-procurement System were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

4.3 Barrier to E-Procurement

Table 4 represents the various factors that inhibit e-procurement adoption. The inhibiting factors facing the process of e-procurement adoption as 72.4% respondents agreed that proper awareness of the technology is not given within the organization and while lack of knowledgeable experienced partners was rank 58.6%. The cost of training is high and there are lack of Enabling Environment to guide implementation and habitual resistance to change. And in addition, a lot don't have proof of financial benefits as well as clients are not requesting the use of e-procurement on projects. All the above stated causes setbacks to the process of e-procurement.

4.4 Technology Barrier

Being that e-procurement strongly depends on technology, it is expected that there should be high level of proper standard technology to help facilitate e-procurement. However, some technological barrier is highlight in the tabulated result displayed below;

Table 4.5 shows that, there is high integrated software/models for all professional (SaaS), lack of standards to guide implementation, and poor internet connectivity. Considering the above stated technological barrier, it can be deduced that the technology is not properly taken care of to enable proper service delivery.

Table 4 Response on process barrier ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
Lack of Awareness of the Technology	-	-	-	72.4	27.6	100
Lack of knowledgeable and experienced partners	-	-	-	58.6	41.4	100
High Cost of Training	-	-	-	51.7	48.3	100
Lack of Enabling Environment (Government policies and legislations) to guide implementation	-	-	17.2	55.3	27.6	100
Legal and Contractual Constraints	-	-	24.7	44.8	31.0	100
Lack of Trained Professionals to handle the tools	-	-	31.0	48.3	20.7	100
Social and Habitual Resistance to Change	-	-	6.9	72.4	20.7	100
No proof of financial Benefits	-	-	55.2	31.0	13.8	100
Clients are not requesting the use of e-procurement on projects	-	-	65.5	27.6	6.9	100

◦ Response on Process Barrier were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

Table 5 Response on technology barrier ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
High Cost of Integrated software/Models for all professionals (SaaS)	-	-	58.6	41.4	-	100
Lack of Standards to Guide Implementation	-	-	-	62.1	37.9	100
Poor Internet Connectivity	-	-	6.9	62.1	31.0	100
Frequent Power Failure (PHCN)	-	-	-	48.3	51.7	100

◦ Response on Technology Barrier were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

4.4 Level of Adoption

The adoption level of e-procurement is revealed in table below. From Table 6 this study disclose that, majority of the management of sampled the construction industry are aware of e-procurement and its benefits to the construction industry this is agreed by 62.1% respondents, 51.7% agreed that they are aware of the successes recorded by using e-procurement tools in construction business. However, most industries are not interest in working with e-procurement system being that 34.5% strongly disagreed, 24.1% disagree 27.6% are uncertain/unsure while just 13.8% stated that their management are interested. Again agencies have policy for training and capacity building to keep their staffs up to date with e-procurement system but have not yet provides adequate financial resources to facilitate e-procurement implementation in their practice. However, they seem ready to align their business processes to achieve e-procurement implementation in their practice as indicated by 62.1% respondents who agreed and 6.9% who strongly agreed, also seem that 55.2% have agreed to change management strategies that will ensure successful migration paper based procurement to electronic based procurement practices while 51.7% are uncertain/unsure on the developed business strategies that will yield successful e-procurement adoption in their organization.

Table 6 Response on management assessment ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
Our management is aware of e-procurement and its benefits to the construction industry	-	-	37.9	62.1	-	100
We are aware of the successes recorded by using e-procurement tools in construction business	-	13.8	34.5	51.7	-	100
Our management is keenly interested in working with e-procurement system	34.5	24.1	27.6	13.8	-	100
We have a policy for training and capacity building to keep our staff up to date with e-procurement system	-	6.9	20.7	34.5	37.9	100
We have provided adequate financial resources to facilitate e-procurement implementation in our practices	41.4	44.8	13.8	-	-	100
We are ready to align our Business processes to achieve e-procurement implementation in our practice	-	13.8	17.2	62.1	6.9	100
We have change management strategies that will ensure successful migration paper based procurement to electronic based procurement practices	6.9	6.9	31.0	55.2	-	100
We have developed business Strategies that will yield Successful e-procurement Adoption in our organization	3.4	20.7	51.7	24.1	-	100
We have discovered the importance and benefits of adopting e-procurement in our practice of building procurement and construction	-	17.2	34.5	37.9	10.3	100

◦ Response on Management Assessment were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

Table 7 revealed that majority of the industries covering 48.3% and 17.2% have agreed and strongly agreed respectively that there are setbacks and inefficiencies in their current business process however, most of them have flexible business process that can accommodate e-procurement system, business process supports and encourage interdisciplinary/inter organizational collaboration.

Table 8 shows that most responds are uncertain/unsure if they have people with the ability to implement change and move quickly to adopt e-procurement, and have identified clearly defined roles and responsibilities of staff who use (or will use) e-procurement. In addition, it is revealed that their current organizational structure provides an environment that is well suited for e-procurement adoption, high percent have the necessary IT literacy, functional expertise and skills to use e-procurement tool.

From Table 9, it's clear that technology is one of the major setbacks inhibiting e-procurement adoption with 41% and 31% agreeing and strongly agreeing that there are not adequate infrastructures to support e-procurement adoption in must organisation as well as effective intranet/ extranet facilities to facilitate information sharing and interoperability in working with e-procurement. However, it's revealed that there are well defined IT policies in organisation's documents. Meanwhile there is high level of uncertainty as to whether there is familiarity with the use of specialist software applications related to our expertise.

Table 7 Response on process assessment ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
We have identified the setbacks and inefficiencies in our current business process	-	10.3	24.1	48.3	17.2	100
Our existing business processes are flexible enough to accommodate e-procurement system	-	10.3	27.6	51.7	10.3	100
Our business process supports and encourage interdisciplinary/inter organizational collaboration	-	-	37.9	55.2	6.9	100
We have designed new web based information sharing system that supports e -procurement practice among members from all disciplines within construction cycle	13.8	41.4	24.1	20.7	-	100
We made changes to our current business or practice (where necessary) to facilitate the adoption of e-procurement system	27.6	48.3	17.2	6.9	-	100
Our use of e-procurement tool will improve integration of procurement practice and construction processes	-	-	10.3	51.7	37.9	100
Our use of e-procurement tool will facilitate faster and more cost effective construction business processes	-	20.7	13.8	48.3	17.2	100

◦ Response on Process Assessment were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

Table 8 Response to people assessment ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
We have people with the ability to implement change and move quickly to adopt e-procurement system	-	27.6	34.5	31.0	6.9	100
We have identified and clearly defined roles and responsibilities of staff who use (or will use) e-procurement	-	-	24.1	69.0	6.9	100
Our current organizational structure provides an environment that is well suited for e-procurement adoption	-	-	34.5	65.5	-	100
Our staff have the necessary IT literacy, functional expertise and skills to use e-procurement tool	-	6.9	24.1	65.5	3.4	100
Our staff have recognized the importance and benefits of adopting e-procurement tool in our practice of building, cost, design and construction	-	6.9	24.1	55.2	13.8	100
Our cost and design professionals have adequate knowledge on the use e-procurement tool	-	-	24.1	44.8	31.0	100
Our staff fully understand the importance of training required for adopting e-procurement tool	-	20.7	17.2	48.3	13.6	100
We have devised training procedures that will enable our staff to effectively use e-procurement tool	-	3.4	17.2	58.6	20.7	100
We are committed to addressing any issues/inhibitions that staff may have about using e-procurement tool	-	13.8	27.6	34.5	24.1	100
We have provided our cost and design department with the necessary manpower to handle procurement electronically	13.8	17.2	37.9	31.0	-	100
We encourage all our staff to learn and use e-procurement tool in all applicable practices	-	10.3	17.2	51.7	20.7	100
Our procurement officers/users have adequate knowledge of the business processes with e-procurement tool	3.4	-	10.3	65.5	20.7	100
We have qualified IT staff that can manage e-procurement operations with other professionals	-	-	6.9	62.1	31.0	100

◦ Response on People Assessment were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

Table 9 Response to technology assessment ◦

Response	Strongly Disagree (%)	Disagree (%)	Uncertain/ Unsure (%)	Agree (%)	Strongly Agree (%)	Total (%)
We have adequate infrastructure(computer systems and software) to support e-procurement adoption in our organization	31.0	41.4	27.6	0	0	100
We have well defined IT policy in our organization	-	24.1	27.6	31.0	17.2	100
We have effective intranet and extranet facilities to facilitate information sharing and interoperability in working with e-procurement tool	13.8	34.5	20.7	20.7	10.3	100
We are familiar with the use specialist software applications related to our expertise	-	13.8	41.4	24.1	20.7	100

◦ Response on Technology Assessment were measured on a five point Likert scale, where 1 = strongly, disagree, 2 = disagree, 3 = uncertain/unsure, 4 = agree and 5 = strongly agree.

5.0 CONCLUSION

Although the study derived its responses from a confined field survey, it has this submission as its conclusion and recommendations: The survey revealed that the organization (KAPWA) best service delivery is construction and maintenance of public infrastructures with majority of their staffs as HND's holders and having 15-20 years of experience. Hence, the management staffs have rated 'Collaborative Procurement methods' and 'cooperation and commitment of professional bodies' as the most important driver of e-procurement adoption. While the barrier to e-procurement is the lack of awareness of the technology among professionals and clients, and lack of knowledgeable and experienced partners. Furthermore, it's revealed that the management is ready to adopt e-procurement however, it's unveil in this work that the management has yet provide adequate financial resources to facilitate e-procurement implementation in their practices. And that there are not yet adequate infrastructure such as computer systems, software and the likes that is put in place to support e-procurement adoption in that organization as well as there are not yet effective intranet and extranet facilities to facilitate information sharing and interoperability in working with e-procurement tool. Therefore, this research agrees with what [10-11] had said that collaboration of procurement procedure is a major key driver again [12] had said that a change procurement procedures is impede by client's habitual behaviour and on the other hand this work Agrees with [8] who had earlier categorized the barriers into individual, task and innovation related, organizational and environmental characteristics again [9] had also said that these factors may be important to differing degrees depending on the context or technology for example age or education are often more relevant with individual and management adoption of any technology. The survey therefore recommends that:

1. A framework should be developed for the full adoption of e-procurement in Nigerian construction industry.
2. A simulation model should be developed for training students in construction related courses in institutions of learning.
3. Further research should be conducted to establish the state of readiness of all other sectors of the Nigerian construction industry for the adoption of e-procurement because the adoption will require other collaborations.
4. Nigerian Government must not just make policies about any new IT development but must move towards achieving its goals through implementations and adequate funding.

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