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ASSESSING THE DRIVERS OF ELECTRONIC PROCUREMENT SYSTEM ADOPTION AND ITS IMPACT ON VENDORS AND CLIENTS IN THE PUBLIC SECTOR

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ABSTRACT
Beneficiaries of procurement practices tend to value electronic procurement systems due to cost-effectiveness and timeliness. In recent times, researchers and practitioners have recommended the adoption of e-procurement for entities. Therefore, this study purports to establish whether vendors and clients benefit from e-procurement adoption. The study adopted a quantitative and qualitative methodology. The total sample size for the study was 62 respondents (42 questionnaires and 20 in-depth interviews). Data obtained was analysed with the aid of (SPSS v20). The qualitative data was analysed using the three stages of data condensation. The study found that Technology, Organisation and Environment related factors influence electronic procurement system adoption to satisfy vendors' and clients' needs. Based on the revealed findings in this study, we propose that the government should endeavour to provide the needed infrastructure in public institutions for the implementation of electronic procurement. The study further proposes that Parliament in collaboration with the regulatory authority (PPA) should develop requisite laws that guide public procuring entities on e-procurement activities.

Keywords: Electronic procurement, public sector, vendors and clients, critical

INTRODUCTION
Customers or clients (public institutions) ought to be the main beneficiaries of procurement. As a result, procurement has gone through processes with the intent of eliminating or at best minimizing public procurement corruption whilst maintaining value for money and fairness in the processes of procurement (Adjei, 2006; McCue, Prier & Swanson, 2015). According to Baddeley and Kopelman (2015), the Internet has also altered the way businesses are conducted in the world. They maintain that it has multiplied market shares, widened the customer network, and also decreased the cost of its subscribers. Furthermore, the existence of the Internet has improved information and communication technology; it has made a relevant impact on the speed and efficiency of the procurement process. In the view of Ferdinand (2020), the desire to end corruption and ensure openness and accountability in the public procurement system in Africa has led to the implementation of electronic procurement systems which ensure the benefits of clients and vendors. In Ghana, Adjei (2006) previously asserts that procurement in the public sector consumes 50-70% of Ghana's total expenditure (after personal emolument). The adoption of electronic procurement is noted in the e-auctions where secured contracts and economic resources are acquired. It utilises the online catalogue and ensures that purchase orders, bills of lading, credit invoices and other transfer confirmations are delivered online (Bondzi, 2010). According to Lewis-Faupel *et al.* (2016), electronic procurement ensures the transfer of electronic data to assist operations and planned procurement. Electronic procurement has tremendous impacts on the accessibility and transparency of tender opportunities in public sector procurement and this has gained competitiveness across the globe which increases economic growth (Bausa et al., 2013; Singh & Chan, 2022). In the estimation of Belisari *et al.* (2020), the adoption of e-procurement is essential to the organisation's internal efficiency through in-depth impact on its continuous existence. In his view even though the adoption of e-procurement is difficult, its implementation comes with many challenges, as the cost of adoption can impede the overall organisational performance. The current literature holds the view that e-procurement has caught the attention of both researchers and practitioners and yet few organisations implement electronic procurement (Boafo & Ahudey, 2020). The practice of electronic procurement by countries comes with enormous benefits and it is seen to be a way by which government can reduce management costs and become efficient in terms of procuring goods online (Chang & Wong, 2010; Waithaka & Kimani, 2021). This has influenced many governments' decision to adopt e-procurement as a means by which they procure goods, services and work for the country. The high savings of cost in countries can be seen in the area of e-procurement

as a result of easy processing of purchase orders which are done through an electronic means to decrease the stock amount and increase fulfilment time for orders (Nawi *et al.,* 2017).

The adoption of electronic procurement is a fast-growing trend in procurement activities in many African countries. As such, this study seeks to ascertain whether vendors and clients benefit from e-procurement implementation. It purports to establish the critical factors that influence the adoption of e-procurement and the impact on vendors and clients in the public sector of Ghana.

LITERATURE

Overview of Electronic Procurement Adoption in the Public Sector

According to Moszoro (2014) and Harelimana (2018), there exist certain critical factors enable the adoption of e-procurement. Amongst them are supplier adoption; end-user uptake and training; performance measurement; system integration; security and authentication; high management support; change management program; communication standards; compliance with best procurement practices; and e-procurement implementation strategy. Hardy and Williams (2011) insist that it is important for end-user uptake and training since it is positively related to the institutional management's ability to adopt e-procurement. They postulate that e-procurement contains recent technologies and changes and so it is imperative to train procurement staff to adopt new systems and how to use e-procurement tools for the success of e-procurement adoption. In the view of Previtali and Bof (2007), process re-engineering, change management, availability of IT infrastructure, adequacy of supplier and IT solutions, and availability of managerial or technical expediencies are some of the key elements for successful implementation of e-procurement. In their article, Cimander *et al.* (2009) maintained that legal harmonisation, the use of digital signatures and technical interoperability are relevant factors to meet when implementing e-procurement. The leadership of senior management is key to the successful implementation of e-procurement (Mohammadi, 2013). He asserts that it is important that considerable assistance and support be given by senior management to ensure that reforms in procurement are well understood in the agency. This will enhance high-level management staff the responsibility of setting goals and vision in other to bring about collective commitment to change in the organisational structures and processes that will result in policy formulation and strategies that are important for e-procurement adoption.

Benefits of E-procurement

E-procurement offers some potential positive effects to the beneficiaries in the procurement space if adopted. It also guarantees an efficient and effective means of promoting the acquisition and assisting the government in decreasing indirect costs expended on allocating contracts in the public space (Mahendrawathi *et al.,* 2017). Online usage of procurement processes, according to Bondzi (2010) provides a platform for more participants to be enrolled as service providers and thus promotes competitiveness. He maintained that tender invitations or proposals can be advertised online or through emails to service providers, limiting the need for the conventional letter dispatch service which consumes time and subsequently stampede the entire process. He again insists that electronic procurement rationalises the purchase request which ensures less repetition of efforts and increase precision. Kamotho and Kamotho (2014), emphasised that e-procurement reduces the funds spent in the conventional method of procurement processes by decreasing the procurement cycle time and improving payment processes. He further stated, that in e-procurement, work flows through creating request orders and payment of goods that are managed online through the electronic process of procurement, minimizing mistakes and reducing procurement duration. In his view, these processes improve the cycle time procurement of goods from orders to payments and make Internet procurement significantly reduce the cost of inputs in an institution. Additionally, with the adoption of e-procurement, governments can now reach a wider market rather than limiting themselves to local markets which previously created denial for other interested parties with equal opportunities to bid for contracts. The consistent improvement in internet technology offers the opportunity to ensure the procurement of goods and works in transparency and efficiency (Krisanthi *et al.,* 2014). According to Knudsen (2003), market efficiencies in the organisation are enhanced through six forms of e-procurement application: e-sourcing, e-tendering, e-informing, e-reverse auction, e-MRO and web-based enterprise resource planning. He further insists

that e-collaboration is essential in e-procurement performance. The important function of business relations now is to provide two-way communication, cross-functional teams and high purchasing power (Kamotho & Kamotho, 2014). Sambasivan *et al.* (2009) indicate that supplier development is closely related to client-supplier performance improvement.

Technology

Many scholars have researched and attested to the relevance of a variety of technological constructs that influence electronic adoption. According to Hardy and Williams (2011), e-procurement contains recent technologies and changes in paper-based procurement so it is imperative to train procurement staff in practice to adopt new systems tools for the success of e-procurement adoption. According to Kwon and Zmud (1987), the significance of the internal technology factor variables in institutions affects performance (infrastructure, technical skills, developer, and user time). This assertion has been noted and relied on in several empirical studies including (e.g. Cragg and King, 1993; Crook and Kumar, 1998). According to Zhu et al. (2003), technological context is noticed through implementing technological expertise of these three order constructs (IT infrastructure, Internet skills, and e-business awareness).

In Lippert's (2006) proposed model, the technological context is refined into three order variables (security concerns, reliability and deployability). The significance basis for each of these technological context variables is grounded in existing research. Organisations rely upon their information systems for day-to-day operations. Electronic system databases hold critical information on customers, suppliers, processes, and business transactions. Endangering the security of these systems can be a huge cost to the institutions in terms of dissatisfied customers resulting in a loss of goodwill, potential litigation, and a likely reduction in business.

Organisation

Internal organisational factors in this context connote the effect of organisational characteristics on the decision to adopt electronic systems (Lippert, 2006). A few authors have examined organisational parameters as independent variables of technology adoption. In the view of Mohammadi (2013), leadership of senior management is key for the successful implementation of e-procurement. This shows that the high-level management team has the duty of setting the goals and vision in other to bring about collective commitment to change in organisational structures and processes that will result in policy formulation and strategies important for e-procurement adoption. Literature also proposed that firm scope and size are important organisational factors for technology adoption (Rogers, 1995; Tornatzky and Fleischer, 1990).

Environment

The implementation success of e-procurement depends on the early involvement of suppliers (Mose et al., 2013). Even though, Competitive pressure has long been recognised as an adoption motivator in literature for electronic systems by renowned researchers including (Grover, 1993; and Lacovou *et al*., 1995). Feedback provided by suppliers will grant the public procurement unit an opportunity to monitor areas that need improvement and also increase practice (Birks et al., 2001). They suggested that, by adopting information systems, firms might be able to alter rules of competition that affect the structure of the industry and leverage new ways to outperform their competitors, thereby changing the competitive environment.

Theoretical Framework

This paper adopts the Technology- Organisation- Environment (TOE) model for the design and analysis of the study to determine the adoption of e-procurement innovation impact on the customer (Public Institution). With the growing rate of technological innovation in the world, the majority of studies conducted adapt to the Technology Readiness theory by Wu (2013) and the Technology Acceptance theory (Davis, 1989). However, we explore the TOE theory to examine the influencing factors of e-procurement adoption.

The TOE theory was developed by Tornatzy and Fleisher (1990) to determine the enablers of technological acceptance in an organisation. The theory accounts for three reasons that affect the technology adoption of an organisation. In their view, these elements could be an opportunity or weakness which comprises technology,

environment and organisation. Lippert and Govindarajulu (2006) also assert that the three key elements have an impact on the way a firm adopts or accepts technology innovation. Due to the high explanatory power of the TOE framework, we explore to determine the perceived effects of Technology, Organisation and Environment on the adoption of e-procurement and how that translates to customer or client satisfaction. The relevancy of this theory in the study is on the impact of the study. Electronic procurement is noted in this study to be influenced by certain factors proposed in the model which has the tendency to support the adoption of e-procurement that can ultimately promote customer satisfaction through cost efficiency and improved procurement lead time (Bondzi, 2010). In other to promote customer satisfaction in procurement, it is expedient to adapt to e-procurement. The TOE model is therefore explored to see the extent to which it will significantly influence the adoption of e-procurement for customer satisfaction. We therefore rely on these factors to determine how these constructs can influence the adoption of technology by the clients (Public Institutions).

METHODS

This paper adopted a mixed-method design to unravel whether vendors and clients benefit from e-procurement adoption. The researchers selected respondents from the local government institutions in Ghana. The local government institution is composed of Metropolitan, Municipal, and District Assemblies (MMDAs). Questionnaires were given to respondents whose work activities revolved around the procurement of goods, work and services of the institution. A questionnaire was used because it provided first-hand information on the main issues. The total population for the quantitative method was limited to (140) respondents because respondents were purposively sampled to include only officers whose work schedule revolves around the procurement of goods and works in the local government institution. A sample size of respondents was considered using a thumb rule. The thumb rule states that for a population of less than (1000) people, a sample ratio should be 30% (SR =n/N). The statistical package for social sciences (SPSS) v20 was used to analyse the quantitative data.

A total of (20) twenty Suppliers' were conveniently sampled for the qualitative method and interviewed to obtain their views on whether e-procurement implementation benefits their clients. These interviews were conducted with the support of an interview guide. Data obtained were passed through the three stages of data condensation and the field data obtained to have linkages with relevant literature is used for the analysis of this study. The first stage involves editing, segmenting and summarizing data collected. The next stage is the middle stage and it involves coding, which is the condensation of data into meaningful segments. The final stage is memoing and at this stage, field data found to have linkage with literature were presented (Boateng, 2014). Pseudo-names are also used to represent the respondents. The total sample size is 62 respondents, however, a total of 72 respondents' views were used (42 questionnaires and 20 in-depth interviews). A 10 per cent non-response on the questionnaires was calculated and added. This resulted in a total of fifty-two (52) questionnaires distributed to respondents in the institution. The results collected were on the factors that influence e-procurement adoption and the effects of e-procurement systems on clients or customers.

Reliability and Validity

The questions were tested for clarity by first administering a few of the questionnaires to some selected respondents in the Tamale metropolitan assembly. The results obtained from respondents were considered to be accurate and well-understood by all respondents. For the reliability test to be good, questions were properly worded and this enabled respondents to give consistent responses to the questions. Again, the reliability test also manifested, in that the qualitative response of respondents was consistent with the quantitative response of respondents.

RESULTS AND ANALYSIS

A total of fifty-two [52] questionnaires were administered to the respondent, and forty-six [46] were validly completed and retrieved by the researcher representing 88% of the total questionnaires administered but the first forty-two questionnaires were selected. This high response rate is attributable to the fact that the head of the institutions officially informed officers engaged in procurement to provide us with the needed assistance. The response rate obtained is accurate for further analysis as earlier research by Mugenda & Mugenda (2003) posits

that a 50% response rate is adequate for data analysis and interpretation; a response rate of 60% is good and 70% or more response rate is excellent. Also, a total of [20] interviews were conducted with suppliers of MMDAs for the qualitative analysis.

Quantitative Results on the Effects of E-Procurement

In Table 1, we measure how Technology-related factors influence e-procurement adoption using these factors: *enhanced data quality, data harmonisation, reliability of spending information, and product standardisation.* It was observed that in all statements provided, respondents were not undecided in their responses. Overall, enhanced data quality and data harmonisation, 100% of respondents agreed influenced e-procurement adoption. Additionally, 78.6% of respondents agreed reliability of spending information influences electronic procurement adoption. Also, 66.7% of respondents agreed that product standardisation influences electronic procurement adoption.

Table 1: Technology (ICT) factors on the effects of e-procurements adoption

Technology (ICT) factors	(S. A)		(A)		(U)		(S. DA)		(DA)	
	F	%	F	%	F	%	F	%	F	%
Enhanced data quality	0	0	42	100	0	0	0	0	0	0
Data harmonisation	0	0	42	100	0	0	0	0	0	0
Reliability of spending information	9	21.4	33	78.6	0	0	0	0	0	0
Product standardisation	0	0	28	66.7	0	0	0	0	14	33.3

(Authors construct 2023)

In Table 2, we measure how Organisation-related factors enable e-procurement adoption to enhance customer satisfaction using improved buyer and supplier relationships, reduced prices, reduced administrative cost and improved procurement lead time. From the table, we observed that respondents were not undecided in their responses to the statements provided. Reduced administrative cost and improved lead time, 100% of respondents respectively, strongly agreed influences e-procurement adoption. Also, improved buyer/supplier relationships and reduced prices 71.4% and 88.1% of respondents respectively agreed to influence e-procurement adoption.

Table 2: Organisational factors on the effects of e-procurement adoption

Organisational related factors	(S. A)		(A)		(U)		(S. DA)		(DA)	
	F	%	F	%	F	%	F	%	F	%
Improve buyer/supplier relationship	12	28.6	30	71.4	0	0	0	0	0	0
Reduced prices	5	37	37	88.1	0	0	0	0	0	0
Reduced administrative cost	42	100	0	0	0	0	0	0	0	0
Improved procurement lead time	42	100	0	0	0	0	0	0	0	0

(Authors construct 2023)

Table 3. The following measurements (*reduced human involvement, improved citizen service, increased public confidence and enhanced professionalism*) were tested using frequencies and percentages to determine whether environmental-related factors could enable e-procurement adoption to enhance customer satisfaction. We observed in the table that respondents were not undecided in their responses to the statements. Overall, 97.6% of respondents agreed that reduced human involvement and increased public confidence respectively influence e-procurement adoption. Again, 73.8% and 71.4% of respondents agreed that improved citizen service and also enhanced professionalism respectively influence e-procurement adoption.

Table 3: Environment factors on the effects of e-procurement adoption

Environmental related factors	(S. A)		(A)		(U)		(S. DA)		(DA)	
	F	%	F	%	F	%	F	%	F	%
Reduce human involvement	1	2.4	41	97.6	0	0	0	0	0	0
Improved citizen service	11	26.2	31	73.8	0	0	0	0	0	0
Increased public confidence	1	2.4	41	97.6	0	0	0	0	0	0
Enhanced professionalism	12	28.6	30	71.4	0	0	0	0	0	0

(Authors construct 2023)

Qualitative Analysis of the Effects of E-Procurement on Clients

This part provides results of how e-procurement adoption impacts customer satisfaction under the factors espoused in this study. Responses were obtained on each of the main factors to assess their impact on customer satisfaction.

Effect of Technology/ICT-Related Factors

The first part represents e-procurement adoption on customer satisfaction through the impact of technology-related factors. *Enhanced data quality, data harmonisation, and reliability of spending information reflected in the views of respondents.*

Some suppliers interviewed elaborated that:

... E-procurement will ensure that data of purchase items are kept in one electronic item and duplicated into a pen drive and memory cards to prevent loss of data... (Maami)

... Information is safeguarded and harmonised for other procurement activities and this prevents the organisation from calling back suppliers for information previously given to the institution... the quality is also enhanced (CYO)

... Institutions now can match expense information to each good, work or service to be acquired by the organisation through the use of electronic devices. This assures officers of procurement entities that the information obtained from the source is consistent and can be used (Wabir)

... Data sharing between two or more departments is possible without any paper transfers. This is possible through the application of electronic systems. ... (Sandy)

Effect of Organisation-Related Factors

The second part shows how e-procurement adoption reflects on customer satisfaction through organisational factor indicators espoused in this study. Such as *improved buyer and supplier relationships; reduced administrative costs and improved procurement lead time.* We assess the views of the respondents to determine if they will reflect on the benefits listed.

Some suppliers interviewed asserted that:

...The cost of advertisement and invoice documents as well as other related paper documentation is all avoided when practicing e-procurement which improves our relationship (Naab).

... Electronic procurement allows e-mail messages to be sent to suppliers inviting them to tender and this practice saves cost and time spent... (Bali)

Before we supply goods to the organisation, we go through a series of processes that require more suppliers to come for such activities resulting in spending many resources which include time. Once we engage in these processes, it delays the procurement process. ...the e-procurement process information is disseminated to all suppliers with less time spent. ...this enhances the quick deliveries of items ordered by the entity. ... (Hasib)

Effects of Environmental-Related Factors

The third part also measures how e-procurement adoption impacts customer satisfaction through environmental factors and indicators identified in the study: *Reduced human involvement, improved citizen service, and enhanced professionalism.* The views of respondents reflected on factor indicators identified in the study.

Some stationery material suppliers asserted that:

… The paper-based procurement process involves face-to-face interactions. This process brings us, as suppliers and buyers together… (Joe).

…Frequent contact between us as suppliers and buyers enhances human involvement. However, once electronic procurement is enabled, it reduces the rate of human contact since most of the activities are done online. This makes me feel satisfied… (Baba).

Most of the procurement activities will now be conducted through electronic means which limits the officer's capacity to have control over the activities. ... (Faris).

DISCUSSION

This part of the study provides explanations for the findings of the study and also compares the findings to previous studies that either corroborate or disprove the findings revealed in this study.

Technology Related Factors

The study reveals that the implementation of e-procurement will improve client data quality and data harmonisation through digital saving and this enhances the reliability of spending information. This finding is in line with an earlier observation of Baddeley and Kopelman (2015) that the existence of the Internet has improved information and communication technology; it has made a relevant impact on the speed and efficiency of the procurement process. This observation is further confirmed by qualitative results obtained from suppliers which indicated that data quality and data harmonisation would improve the data storage and record keeping of procurement entities if e-procurement is implemented. Respondents stated that the use of paper documents as a means of harmonizing data of vendors and clients in the paper-based procurement could be susceptible to inadequacies in data due to losses and prone to damages as compared to the e-procurement systems since records can be duplicated into other storage items.

Organisation Related Factor

The study reveals that the implementation of e-procurement will enhance the procurement of goods, work and services of vendors and clients through reduced administrative costs and improved procurement lead time. The finding confirms an earlier study by Nawi et al. (2017) that e-procurement improves procurement lead time and promotes the reduction of cost through internal accessibility and other communication technology. Again, this finding confirms an earlier study by Chang and Wong (2010) that the practice of e-procurement by countries comes with enormous benefits and it is seen to be a way by which government can reduce the cost of management and efficiency through procuring goods using electronic mediums. This view is further supported by the responses obtained in the qualitative study which indicates that procurement processes using paper-based methods are tedious and have the tendency to delay the procurement lead time but maintains that an electronic procurement system will streamline the procurement processes and ensure quick and easier procurement processes by the client. Again, respondents were of the view that e-procurement reduces costs since advertisement and invoice documents costs are all avoided in the course of the procurement processes using e-procurement.

Environmental Related Factor

The study indicates that electronic procurement adoption reduces human involvement in the procurement processes and this promotes supplier confidence. This finding confirms an earlier study by Kiogora Thiga and Makau (2016) that e-procurement adoption in public procurement corrects or prevents the activities of deviant behaviours like corruption and this protects the government purse, allowing the state to judiciously use its limited resources for the benefit of its citizens. This finding is further confirmed by results obtained from the qualitative

study on suppliers which indicates that e-procurement implementation will reduce human involvement and increase supplier confidence. They insist that human involvement at each stage of the procurement processes in paper-based procurement has resulted in endangering public and supplier confidence in the whole procurement process. However, respondents were hopeful that the implementation of e-procurement would reduce human involvement in the procurement process and enhance public and supplier confidence.

CONCLUSION AND RECOMMENDATION

The paper sought to establish how Technology, Organisation and environmental factors influence electronic procurement adoption to satisfy vendors' and clients' needs in the public sector of Ghana.

The study found that Technology-related factors influence electronic system adoption through enhanced data quality and data harmonisation to satisfy vendors and clients. Again, Organisation factors also influence electronic system adoption through improved procurement lead time, reduced prices and administrative costs which benefits clients and vendors. Again, the study found that Environmental-related factors influence e-procurement adoption through reduced human involvement and increased public confidence to impact clients and vendors. The study thus concludes that electronic procurement adoption satisfies vendors and clients in the public sector of Ghana

Based on the revealed findings in this study, we propose that the government of Ghana should endeavour to provide the needed infrastructure in these public sector institutions for the implementation of electronic procurement. The provision of infrastructure in these institutions will enhance the smooth adoption of electronic procurement systems to provide the needed benefits to vendors and clients. The study further proposes that Parliament in collaboration with the regulatory authority (PPA) should develop requisite laws that guide public procuring entities on e-procurement activities.

STUDY IMPLICATION

Theoretical Implication

Our study confirms the influencing factors to e-procurement adoption and how electronic procurement satisfies clients and vendors. Even though other studies have espoused some other critical factors to e-procurement adoption. This study further reveals that Technology, Environment and Organisation are necessary factors that influence electronic procurement adoption. The application of these factors is rarely known in the public e-procurement debate in Ghana. This therefore adds knowledge to the literature by highlighting the influencing factors determined in this study on electronic procurement adoption in the public sector. The review further contributes to the TOE model theory. The basis for the influencing factors to electronic procurement adoption espoused in this study was derived from the Technology, Organisation and Environment factors contained in the TOE model.

Managerial Contribution

Our findings provide insight for procurement managers and policymakers in the public sector. The significance of these findings is to provide information on some other influencing factors. Thus some reasons that motivate the adoption of electronic procurement in the public sector. Literature previously asserts that top management support, willingness of staff, and ICT gadgets are necessary motivators for electronic procurement adoption. This study has further broadened the scope and determined that other factors contribute by influencing the adoption of electronic procurement that satisfies clients and vendors.

FURTHER RESEARCH AREAS

This study was limited to the decentralised institutions in Ghana particularly MMDA's that provide governance at the local level, and as such, further research is required to include other institutions at the national level to broaden the scope of the findings.

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