

EFFECT OF IMPLEMENTATION OF E-PROCUREMENT ON CORRUPT PRACTICES IN NIGERIAN CONSTRUCTION INDUSTRY

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Abstract

In Nigeria, significant efforts have been made to implement public procurement Act that will enhance probity and transparency in the process, regrettably, corrupt practices in the Nigerian construction industry are procurement based. Electronic procurement (e-procurement) has been widely adopted by both private and public sectors in the developed countries using information technology to drive accountability and promote transparency in the procurement process. However, the implementation of e-procurement as an instrument of reform in the process to reduce corrupt practice has not been well researched in Nigeria. This study examines the potential of e-procurement in reducing corrupt practices in public procurement using quantitative research approach. Questionnaires were self-administered to government officers in Ministries, Departments and Agencies (MDAs) where construction works are mostly being procured. Fifty-six (56) valid questionnaires were returned which was analysed using descriptive statistics and factor analysis. The findings revealed that unjustified use of exceptions and illicit fragmentation of the procurement practice are major causes of corruption, while the best anti-corruption strategy is to reduce lithographic works and physical contacts. The study concludes that effective implementation of e-procurement will assist in reducing unethical practices in the procurement process.

Keywords: *E-Procurement, Unethical Practices, Construction Industry, Nigeria, Public Sector*⁴⁷.

Introduction

Governments in any country of the world are the major client of the construction industry. This made governments to be recognised as the greatest procurer of works, goods and services to the civil society. In the last one decade, the budgets of the Nigerian government have been in trillions of nairas for the procurement of infrastructure across the country. Government uses procurement according to Burton (2005) as a central tool to assist in the effective management of public resources. This is because on average, between 45 to 65% of a developing country's budget and 20% to 70% of their GDP is procurement related which allude to the fact that public

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Odulana, A. O. and Oyewobi, L. O., (2019). EFFECT OF IMPLEMENTATION OF E-PROCUREMENT ON CORRUPT PRACTICES IN NIGERIAN CONSTRUCTION INDUSTRY. Collaboration for Sustainable Development in the Built Environment. International Conference of Environmental Sciences, ICES 2019. 1st International Conference of the Faculty of Environmental Sciences, University of Ilorin, Nigeria, 29th - 30th April 2019.

sectors are the largest consumers in an economy (International Institute of Sustainable Development [IISD], 2008; United Nations Development Programme [UNDP], 2006).

However, Country Procurement Assessment Report (CPAR, 1999) indicated that prior to 1999 Nigeria lost \$10 billion on a yearly basis to corruption via award of contracts. Hence, tackling corruption in public procurement is an imperative element of any effective anticorruption strategy. Adaramola (2017) reported that Bureau of Public Procurement (BPP) reiterated that most corrupt practices in Nigeria take place during public procurement. This underscored, Kaoje's (2017) assertion that corruption in the procurement process accounts for over 70 per cent of the government's total budget. World Bank (2000) and Transparency International (2006) defined 'corruption' as "the misuse of public office for private gain". Also, the UNDP (2008) viewed corruption as the misuse of entrusted power for private gain. Corruption knows no boundary and it is a global issue which constitute threats to both economic and human development of all nations.

However, it is believed that if procurement process is appropriately designed, it will bring about transparency and innovations in the way projects are procured in order to improve the services of government and enhance user's experience. To achieve this, e- procurement has been identified as the potential instrument to mitigate against corruption in the public service processes. This is due to the fact that electronic procurement assists in fighting against corrupt practices by eliminating to a considerable degree face-to-face interaction among stakeholders where most demands for kickbacks often emanate (Pictet and Bollinger, 2008). Davila, Gupta and Palmer (2003) defined e-procurement as the usage of Information and Communication Technology (ICT) such as the Internet or web-based systems intended to facilitate the acquisition of goods and services by the government or by private institutions. E-procurement is considered to be a powerful tool more than the conventional methods for the reduction or elimination of corruption. It is capable of improving the transparency and integrity of public procurement processes for example, tendering, sourcing, ordering, and auctioning. Sohail and Cavill (2008) argued that e-procurement has gained recognition as an internationally important instrument for curbing corrupt practices and misuse of power for selfish gain.

In fact, a good example as given by OECD (2005) is the implementation of e-procurement systems in Korea and Mexico, where it was demonstrated that innovation in information technology could be used to avert and control corruption in public procurement. Hence, the adoption of e-procurement systems may assist all countries most especially developing countries where corruption is endemic to enhance transparency, effectiveness in the system, and decision-making, reduction in cost, monitor supplier performance, as well as improving the quality of service delivery. However, in the Nigerian construction industry, the use of e-Procurement has not been given adequate attention both in the usage as well as in terms of research efforts (Ibem et al., 2016; Aduwo et al., 2016). More importantly lack of adoption of e-Procurement is evident in African countries, where it is being employed, the adoption is still at its formative stage in spite of benefits e-Procurement in enhancing effective project delivery (Ibem & Laryea, 2015). Hashim et al. (2013) as well as Adzroe and Ingirige's (2014) research

have shown value for money can be achieved by using e-Procurement in the construction sector in countries where it has been implemented. It was further argued that it is also capable of improving firm's performance through the use of technologies (Hashim *et al.*, 2014). Against this background, this paper examines the potential of e-procurement adoption as anti-corruption tool based on the perception of the professionals working within the MDAs as a way of assisting governments in their current reform strategies to improve the economy.

Literature review

This study reviewed relevant literature from previous studies on the adoption of e-Procurement in construction and how it can assist in mitigating corrupt practices within the construction sector.

Drivers/Benefits of e-Procurement Adoption

Quite a number of studies have delineated in literature the benefits of implementing e-procurement systems as a solution for poor managerial process. Davila *et al.* (2003) showed that firms that adopt e-procurement system experience above 42% savings in their transaction costs as a result of the ease in the purchase process and the reduction in the cycle time required for purchase, which in turn, improves flexibility and offers updated information at the time of placing a purchase order. Hawking *et al.* (2004) argued that firms that implement e-procurement systems reduce their operational cost and improve on their market intelligence. These positions have been reinforced by Tai *et al.* (2010) who posited that e-procurement systems positively influence the performances of business both at the operational level and the strategic level. The benefits that may accrue from the implementation of e-procurement systems according to (Davila *et al.*, 2003; Gutiérrez, and SanJosé 2008; Gunasekaran and Ngai 2008) include reduction in order cycle time, reduction in costs, improved efficiency, enhancing inventory coordination and operational control, and promoting collaboration with business partners through improved customer satisfaction. Also, Walker and Brammer (2012) discovered that the use of e-procurement directly contributes to environmental, labour, health, and safety aspects of sustainable procurement. For example, Seong and Lee (2004) asserted that the Korean government used e-procurement systems in their public sector, to assist in reducing paperwork and red tape, and increase the choice of commodity selection and enhance standardization of services. Hence, the adoption of e-procurement will assist the Nigerian government in their current reform efforts and improve accountability and transparency in the public procurement process.

Barriers of e-Procurement Adoption

A plethora number of studies have examined the barrier to the adoption of e-procurement both in the developed countries ((Eadie *et al.*, 2007; 2010) and developing countries (Laryea and Ibem, 2014; Ibem *et al.*, 2016; Aduwo *et al.*, 2016). However, there is paucity of literature that specifically focused on public sector clients in the Nigerian construction industry. This experience is similar to that of the South African construction industry, where Laryea and Ibem (2014) argued that the degree of barriers to e-procurement usage has not been examined and

accurately expressed in the literature; which has resulted into poor understanding of the factors that hinder the usage of e-procurement in the construction sector.

However, in 2000, Bingi, Mir, and Khamaleh reported that the main worries that confront e-commerce adoption include information security and privacy of exchange, and lack of technological infrastructure required to support business operations. In a similar research conducted in Singapore, Kheng and Al Hawamdeh (2002) found that the required investment and the inadequate in-house skills constitute the main barriers confronting their firms in adopting e-procurement systems. While perceived ambiguity with respect to availability of resources and seeming difficulty of assimilating new systems with ICT system are the barriers to e-procurement implementation by firms (Subramanian and Shaw, 2004).

Although, Gunasekaran and Ngai (2008) in a research conducted in Hong Kong, stated that barriers to e-procurement may originate from people, strategy, infrastructure or culture. Therefore, identification of those barriers forms the essential part of the key management duty in the development the right way for the implementation of e-procurement. Many of these barriers may be country specific, for instance, Oyediran and Akintola (2011) highlighted among other factors, Irregular power supply, financial implications of putting up e-tendering infrastructure and poor telecommunications infrastructure as the barriers to e-tendering. However, in the South African construction industry, Laryea and Ibem (2014) pointed out that the barriers to e-procurement adoption could be related to unreliable ICT infrastructure, cultural belief, security issues and data protection, inequality in accessing IT infrastructure by all categories of firms, inadequate knowledge on e-procurement systems and legal issues. In order to adopt e-procurement to reduce corrupt practices, Isikdag et al. (2011) stated that the construction industry needs to confront various barriers in order to fully implement this new method to procurement. This supported by Doherty et al (2013) who made it abundantly obvious that barriers are obstacles that must be alleviated if we desire an effective implementation of e-procurement.

E-procurement mitigate corruption in public sector

The corrupt and unethical practices in the procurement processes have created more problems ranging from lack of transparency, accountability, poor political control and auditing, to weak professionalism in the bureaucratic process. In order to unravel the mystery as it relates to corrupt practices in the public procurement process, Bertot, Jaeger and Grimes (2010) asserted that information and communication technology (ICT) can play a significant part in reducing the menace of corruption which will enhance a better governance. The employment of ICT will promote better association between government and citizens as well as employees in tracking events, monitoring progress in the process and eliminate the risk of corrupt practices resulting from the lack of transparency, restricted access to information, and poor accountability and control at every stage in the procurement process (Bertot, Jaeger and Grimes, 2010). These stages are divided into four according to Ware et al. (2012), who named the stages as: project identification and design: advertising, prequalification, bid document preparation, and

submission of bids; bid evaluation, post-qualification and award of contract; and contract performance, administration and supervision.

However, public sector clients prefer processes that is more accountable and very transparent, but, diverse problems such as baseless or concealed procurement planning, poor or inadequate need assessments, political burden, poor monitoring capacity of agents of government, and inconsistent cost estimate (Ware et al., 2012). Many developing and developed nations have adopted e-procurement, for example, the republic of Bangladesh introduced National e-Government Procurement (e-GP) in their public tenders' process to remove corruption and collusion in the bidding practices to enhance transparency and promote competition among the tenders (Mahmood, 2010). Adebisi et al. (2010) opined that the adoption of same e-GP system can be of help to the Nigerian government in removing the attendant bottlenecks in the current procurement system. In fact, Xinzhang and Yonggang (2011) posited that e-procurement can assist in mitigating the irregular information difficulties by improving access to information relating to the government and tenderers. Nonetheless, the procurement systems in Nigeria are paper based, hence the transfer of public procurement issues from paper based to electronic based will create a great impact in reducing problems of corrupt practices in the public sector procurement as argued by Panda and Sahu (2010).

Research method

This study examined the implementation of e-Procurement as a means of remedying corrupt practices within the Nigerian construction industry. A quantitative research approach was adopted using a questionnaire survey to obtain primary data from the target respondents. This approach has been adopted by previous researchers both in the developed countries (Neupane, 2014; Neupane et al. 2014; Eadie *et al.*, 2007; 2011; Rankin *et al.*, 2006) and developing countries (Ibem and Laryea, 2015; Ibem et al., 2016; Aduwo *et al.*, 2016). The use of questionnaire is cheaper than other methods; ensures uniformity in responses and guarantees anonymity (Mathiyazhagan & Nandan, 2010). Initially, the study conducted an in-depth literature review, to establish all of the various e-procurement issues. Through the review of the literature, analyses of different sources of information such as scholarly articles or journals, books and conference proceedings were conducted to achieve a thorough insight into the topic e-procurement and how it could be used to reduce corruption in the procurement processes. Afterwards the design the questionnaire to be used to obtain data from the professional including procurement officers in the Ministries, Departments and Agencies (MDAs) was undertaken.

The questionnaire was divided into 8 Sections, however, the results of section 1, 5 and 6 are presented here. The first section asks questions on the background of the respondents with respect to their educational background, profession and years of experience within their organizations. Section 5 presents questions on the corruption mechanism in public sector procurement process, while section 6 focused on the anti-corruption mechanism in public sector procurement process. To obtain these data, the professionals involved in the

procurement processes in the MDAs were identified and they were requested to give the candid opinion on the potentials of e-procurement in curbing corrupt practices within the industry. In order to have a more exhaustive and succinct overview of the factors involved, the questionnaire respondents were requested to rank each of the factors on a sliding scale of 1-7 on "agreement", where 1 was "strongly agree" and 7 was "strongly disagree". This offered the opportunity of gauging the level of agreement of the factors identified in the literature.

To curb several issues that often associated with questionnaire, the instrument was pre-tested amongst professional quantity surveyors in Abuja who do not form part of the target respondents. According to Sekaran (2003), pre-testing of the instrument is important for survey questionnaire to ascertain that there is no vagueness in the questions asked by ensuring that the respondents would understand the questions the way they are intended and proposed. Feedback from the pre-testing of the survey questionnaire was used to correct inherent inadequacies identified before the main survey was carried out. The study examined the reliability of the scale of measurement used in the questionnaire by using Cronbach's alpha coefficient test conducted on all the variables used. The result indicated Cronbach's alpha value of 0.973 and 0.982 for corruption mechanism in public sector procurement process and anti-corruption mechanism in public sector procurement process respectively. This is above the required threshold of 0.7 as suggested by Pallant (2013) for a reliable survey questionnaire.

Results and discussion

The study examines the possible adoption of E-procurement for public construction projects. In order to provide reliable information, the demographic data of the respondents to the questionnaire administered were obtained. The demographic data on educational qualification, years of experience and the professional affiliation of the respondents is presented and analysed in this section. The demographic data of the respondents is presented in the following Tables.

Educational Background of respondents

The educational background of all the respondents is considered to be essential to successful implementation of E-procurement in the public sector, therefore, the qualifications of the respondents were established. Table 1 shows that 48.21% of the respondents had a least first-degree qualification. Also, approximately 32.14% of the respondents also had minimum of diploma (HND) qualifications. Table 1 further indicates that 19.64% of the respondents had a master's degree in relevant fields. In addition, none of the respondents had a doctorate degree.

Professional background of respondents

Table 1 shows that 44.64% (25) of the respondents are Quantity Surveyors by training. This is followed by Architects with 32.14%. A further of approximately 18% of the respondents who are administrative staff are trained procurement officers. Table 1 also indicates that 5% of the respondents are Civil engineers.

Years of experience of respondents

To ensure that the information for this study are reliable and provided by respondents that have good understanding of the environment where the data were sourced, the experience of the individuals involved in answering the questions was considered to be important. As a result of this, the years of experience of the individual respondent was solicited. It was apparent from

Table 4.3 that the majority of the respondents, circa 78% had between above 10 years of working experience in their current position. In addition, the number of respondents with working experience of below years accounted for 21%. However, approximately 20% of the respondents had working experience above 20 years whilst 13% of the respondents had held their current position between 15 and 20 years.

Table 1: Background information of respondent

Educational Background	Number	Percent (%)
Diploma (HND)	18	32.14
Fist Degree (BSc/Btech)	27	48.21
Masters	11	19.64
Doctorate		0.00
Total	56	100
Profession		
Administrative Officer	10	17.86
Architect	18	32.14
Quantity Surveyor	25	44.64
Civil Engineer	3	5.36
Total	56	100
Years of Experience		
Less than 10 years	12	21.43
11 to 15	26	46.43
16 to 20	7	12.50
Above 20 years	11	19.64
Total	56	100

Corruption mechanism in public sector procurement process

Table 2 reveals the respondent' rankings of corruption mechanism in public sector procurement process of e-procurement in the Nigeria construction industry. Findings from literature review revealed nine (9) corruption mechanism in public sector procurement process. It shows that 'frequent and unjustified use of exceptions' was ranked 1st with a mean score of 2.71 and standard deviation of 1.30, 'illicit fragmentation of procurement in order to apply the procedure of procurement of low value' was ranked 2nd with a mean value of 2.45 and standard deviation of 1.37, 'discriminatory technical specifications' was ranked 3rd with a mean score of 2.39 and standard deviation of 1.85, 'the formation of the procurement subject so that it can be provided only by a particular bidder' and 'discriminatory conditions for the participation of bidders' was ranked 4th with a mean score of 2.38 and standard deviation of 1.76 and 1.83 respectively. In

an average ranking by respondents ‘deliberate determination of unrealistic estimated value’ was ranked 6th with a mean score of 2.34 and standard deviation of 1.37 while the ranking was followed by ‘discriminatory criteria for the selection of the best bid’ with a mean score of 2.30 and standard deviation of 1.78. The least and final ranked variables were ‘purchase of unnecessary items (in content, quantity or quality)’ and ‘conflict of interest’ with a mean score of 2.21 and standard deviation of 1.59 and 1.50 respectively.

Table 2: Descriptive statistics for corruption mechanism in public sector procurement process

Coding	Variable Description	Mean(\bar{x})	Std. Deviation (σ_X)	Ranking
CMP5	Frequent and unjustified use of exceptions	2.71	1.30	1
CMP3	Illicit fragmentation of procurement in order to apply the procedure of procurement of low value	2.45	1.37	2
CMP8	Discriminatory technical specifications	2.39	1.85	3
CMP4	The formation of the procurement subject so that it can be provided only by a particular bidder	2.38	1.76	4
CMP7	Discriminatory conditions for the participation of bidders	2.38	1.83	4
CMP2	Deliberate determination of unrealistic estimated value	2.34	1.37	6
CMP9	Discriminatory criteria for the selection of the best bid	2.30	1.78	7
CMP1	Purchase of unnecessary items (in content, quantity or quality)	2.21	1.59	8
CMP6	Conflict of interest	2.21	1.50	8

Results from Exploratory Factor Analysis

The results from the EFA on the benefits of e-procurement from the government perspective are presented in Tables 3. The data were subjected to PCA using direct oblimin rotation. The KMO measure of sampling adequacy was examined with a value of 0.897, which greater than the acceptable minimum value of 0.5 (Field, 2013) and the Bartlett’s test of sphericity was also statistically significant ($P < 0.05$). Kaiser’s criterion using the Eigenvalue with an Eigenvalue equal to or greater than 1 was adopted. Subsequently, the factor loading and the commonalities

(h^2) of the factors of the variables loaded were assessed (Field, 2013; Hair *et al.*, 2010). As indicated in Table 3, one (1) factor with eigenvalues exceeding 1.0 was extracted. The total variance explained by the factor extracted is 82.895. Hence, the final statistics of the PCA and the extracted factor accounted for approximately 83 percent of the total variance explained by the factor.

Table 3: Factor loadings for the Rotated Components

Coding	Variable Description	Component loading	
		1	Communalities
CMP1	Purchase of unnecessary items (in content, quantity or quality)	0.838	0.703
CMP2	Deliberate determination of unrealistic estimated value	0.822	0.675
CMP3	Illicit fragmentation of procurement in order to apply the procedure of procurement of low value	0.852	0.726
CMP4	The formation of the procurement subject so that it can be provided only by a particular bidder	0.957	0.915
CMP5	Frequent and unjustified use of exceptions	0.925	0.856
CMP6	Conflict of interest	0.893	0.797
CMP7	Discriminatory conditions for the participation of bidders	0.964	0.93
CMP8	Discriminatory technical specifications	0.968	0.937
CMP9	Discriminatory criteria for the selection of the best bid	0.96	0.922
	Total	7.461	
	% of Variance	82.895	
	Cumulative %	82.895	

KMO= 0.897, Bartlett's Test of Sphericity =780.947, df = 36, p=0.000

The study conducted principal axis factoring and this precipitated one factor with eigenvalues greater than 1 as shown in Table 3. Based on the investigation of the inherent associations among the variables that clustered on the factor, the following interpretation was made. The only factor extracted was labelled **corruption mechanism in public sector procurement process**. The name given to this factor was derived from a close inspection of the variables loaded on the factor and from the components using the variables with the highest loading factor. The essential indicators of the only factors extracted are explained below.

Factor 1: corruption mechanism in public sector procurement process

All variables were clustered on a factor without any omission and the extracted variables accounted for total variance extracted for the factor. However, out of the 9 variables loaded on the factor, the following variables showed the highest factor loadings: *Discriminatory conditions for the participation of bidders (96.4%)*; *Discriminatory technical specifications (96.8%)*; *Discriminatory criteria for the selection of the best bid (96%)*; *The formation of the procurement subject so that it can be provided only by a particular bidder (95.7%)*; and *Frequent and unjustified use of exceptions (92.5%)*. While *Deliberate determination of unrealistic estimated value (82.2%)* has the least factor loading. This cluster accounted for 82.895 percent of the total variance.

Anti-corruption mechanism in public sector procurement

Table 4 reveals the respondent' rankings of anti-corruption mechanism in public sector procurement process of e-procurement in the Nigeria construction industry. Fifteen (15) anti-corruption mechanisms were identified from extensive review of literature. Findings revealed that 'reduced lithographic works with a mean score of 2.41 and standard deviation of 1.36 ranked 1st, 'real time access to construction project information' with a mean score of 2.32 and standard deviation of 1.22 ranked 2nd, 'adoption of BIM to eliminate unwarranted review of contract to increase cost' with a mean score of 2.30 and standard deviation of 1.46 ranked 3rd, 'declaration of conflict of interest by stakeholders involved in the procurement process' with a mean score of 2.23 and standard deviation of 1.60 ranked 4th while 'homogeneous standard for project requirements' ranked 5th with a mean score of 2.14 and standard deviation of 1.30.

In addition, 'disclosure of procurement related information' (Mean=2.07 SD=1.45) and 'elimination of ring formation, collusion and distortion of e-bidding' (Mean=2.07 SD=1.64) ranked 6th, 'automation of construction procurement process' with a mean score of 1.93 and standard deviation of 1.40 ranked 8th. In the 9th rank was 'reduced human interface and interaction in bidding process' with a mean score of 1.91 and standard deviation of 1.46, 'reduction/removal of unnecessary projects' with a mean score of 1.89 and standard deviation of 1.51.

In the least and final ranks were 'transparency in the procurement process of construction works' (Mean=1.88 SD=1.42), 'improved healthy competition among bidders and suppliers' (Mean=1.86 SD=1.34), 'accountability in procurement process through contract auditing' (Mean=1.34 SD=1.37), 'effective evaluation and monitoring of construction contracts' (Mean=1.80 SD=1.40) and 'effective record and inventory management' (Mean=1.80 SD=1.47).

Table 4: Descriptive statistics for Anti-corruption mechanism in public sector procurement

Coding	Variable Description	Mean(\bar{x})	Std. Deviation (σ_X)	Ranking
SFEC9	Reduced lithographic works and physical contacts	2.41	1.36	1
SFEC4	Real time access to construction project information	2.32	1.22	2
SFEC15	Adoption of BIM to eliminate unwarranted review of contract to increase cost	2.30	1.46	2
SFEC2	Declaration of conflict of interest by stakeholders involved in the procurement process	2.23	1.60	4
SFEC13	Homogeneous standard for project requirements	2.14	1.30	5
SFEC8	Disclosure of procurement related information	2.07	1.45	6
SFEC14	Elimination of ring formation, collusion and distortion of e-bidding	2.07	1.64	6
SFEC3	Automation of construction procurement process	1.93	1.40	8
SFEC6	Reduced human interface and interaction in bidding process	1.91	1.46	9
SFEC1	Reduction/removal of unnecessary projects	1.89	1.51	10
SFEC7	Transparency in the procurement process of construction works	1.88	1.42	11
SFEC5	Improved healthy competition among bidders and suppliers	1.86	1.34	12
SFEC12	Accountability in procurement process through contract auditing	1.84	1.37	13
SFEC10	Effective evaluation and monitoring of construction contracts	1.80	1.40	14
SFEC11	Effective record and inventory management	1.80	1.47	14

Results from Exploratory Factor Analysis

The results from the EFA on the benefits of e-procurement from the government perspective are presented in Tables 4.21. The data were subjected to PCA using direct oblimin rotation. The KMO measure of sampling adequacy was examined with a value of 0.913, which greater

than the acceptable minimum value of 0.5 (Field, 2013) and the Bartlett's test of sphericity was also statistically significant ($P < 0.05$). Kaiser's criterion using the Eigenvalue with an Eigenvalue equal to or greater than 1 was adopted. Subsequently, the factor loading and the communalities (h^2) of the factors of the variables loaded were assessed (Field, 2013; Hair *et al.*, 2010). As indicated in Table 5, one (1) factor with eigenvalues exceeding 1.0 was extracted. The total variance explained by the factor extracted is 80.539. Hence, the final statistics of the PCA and the extracted factor accounted for approximately 81 percent of the total variance explained by the factor.

Table 5: Factor loadings for the Rotated Components

Coding	Variable Description	Component loading	
		1	Communalities
SFEC1	Reduction/removal of unnecessary projects	0.886	0.784
SFEC2	Declaration of conflict of interest by stakeholders involved in the procurement process	0.881	0.776
SFEC3	Automation of construction procurement process	0.906	0.822
SFEC4	Real time access to construction project information	0.882	0.778
SFEC5	Improved healthy competition among bidders and suppliers	0.943	0.889
SFEC6	Reduced human interface and interaction in bidding process	0.852	0.725
SFEC7	Transparency in the procurement process of construction works	0.93	0.864
SFEC8	Disclosure of procurement related information	0.899	0.808
SFEC9	Reduced lithographic works and physical contacts	0.901	0.812
SFEC10	Effective evaluation and monitoring of construction contracts	0.941	0.886
SFEC11	Effective record and inventory management	0.935	0.875
SFEC12	Accountability in procurement process through contract auditing	0.883	0.78
SFEC13	Homogeneous standard for project requirements	0.838	0.702
SFEC14	Elimination of ring formation, collusion and distortion of e-bidding	0.901	0.811
SFEC15	Adoption of BIM to eliminate unwarranted review of contract to increase cost	0.876	0.768
	Total	12.081	
	% of Variance	80.539	

KMO= 0.913, Bartlett's Test of Sphericity =1279.02, df = 105, p=0.000

The study conducted principal axis factoring and this precipitated one factor with eigenvalues greater than 1 as shown in Table 5. Based on the investigation of the inherent associations among the variables that clustered on the factor, the following interpretation was made. The only factor extracted was labelled **Anti-corruption mechanism in public sector procurement**. The name given to this factor was derived from a close inspection of the variables loaded on the factor and from the components using the variables with the highest loading factor. The essential indicators of the only factors extracted are explained below.

Factor 1: Anti-corruption mechanism in public sector procurement

All variables were clustered on a factor without any omission and the extracted variables accounted for total variance extracted for the factor. However, out of the 15 variables loaded on the factor, the following variables showed the highest factor loadings: *Reduced lithographic works (90.1%)*; *Effective evaluation and monitoring of construction contracts (94.1%)*; *Effective record and inventory management (93.5%)*; *Improved healthy competition among bidders and suppliers (94.3%)*; *Automation of construction procurement process (90.6%)*; *Transparency in the procurement process of construction works (93%)*. While *Homogeneous standard for project requirements (83.8%)* has the least factor loading. This cluster accounted for 82.895 percent of the total variance.

Discussion

This study examines the causes of corruption in the public procurement system in Abuja Nigeria and the potential of e-procurement in reducing corrupt practices in public procurement processes using quantitative research approach. The paper contributes to the existing literature on the seeming benefits of public e-procurement by examining how it can be used to curb corrupt practices. The findings revealed that unjustified use of exceptions and illicit fragmentation of the procurement practice are major causes of corruption, while the best anti-corruption strategy is to reduced lithographic works and physical contacts. The finding from the analysed data supports the previous finding from Neupane *et al.* (2012) which established that the anti-corruption proficiencies of public e-procurement in developing countries. In the same vein, Pathak *et al.* (2008) highlighted that e-government initiatives such e-tendering, e-sourcing etc., often lead to enhanced government– citizen relationship and also capable of reducing corruption.

Overall, the findings indicate the causes of the corrupt practice is basically entrenched by face-to-face interaction of the stakeholders and underlined that public e-procurement anti-corruption abilities can assist to guide public, private organisations, contractors, public procurement practitioners on the perceived benefits of public e-procurement for reducing the tendencies of corruption in public procurement. The findings are in line with recent research conducted by

Neupane et al. (2014) who asserted that emerging countries needs to make a decision to adoption of e-procurement to fight corruption in public procurement.

Conclusion

This study examines the causes of corruption in the public procurement system in Abuja Nigeria and the potential of e-procurement in reducing corrupt practices in public procurement processes. The results from this study have several implications for government, academic, international agency, procurement practitioners of developing countries by promoting their understanding of the seeming anti-corruption benefits of e-procurement in reducing corruption. In overall, this study results offer a clear guideline for both the developed and developing countries with regards to the implementation of e-procurement technology so as to reduce corrupt practices in public procurement.

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