3rd INTERNATIONAL CONFERENCE ON THE ENVIRONMENT

BOOK OF ABSTRACTS

THEME:

CHALLENGES OF THE AFRICAN BUILT ENVIRONMENT: A SEARCH FOR SUSTAINABLE SOLUTION

CHUKWUEMEKA ODUMEGWU OJUKWU UNIVERSITY, ULI CAMPUS

DATE: 20-22 NOVEMBER 2019.

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A BRIEF HISTORY OF THE UNIVERSITY

The Chukwuemeka Odumegwu Ojukwu University (formerly Anambra State University) was established to play the leading role in the intellectual, technological and social advancement of Anambra State. It was envisaged to be an internationally acclaimed center of excellence for scientific and technological innovation which would provide suitable manpower to address local, national and global challenges appropriately.

This University started in 2000 as Anambra State University of Science and Technology. The University has the main campus at Uli in the former site of Ekwenugo Okeke Polytechnic and the second campus at Igbariam in the former site of the College of Agriculture. The University became a conventional University in 2006 and the name was then changed to Anambra State University. The law was changed in 2014 to effect the name change to Chukwuemeka Odumegwu Ojukwu University. The new name was in recognition of the memory of the late Odumegwu Ojukwu and his contributions to the struggle for the wellbeing of the Anambra people.

The current structure of the University reflects the geographical diversity of Anambra State. The Uli Campus in Anambra South has the Faculties of Basic Medical Sciences, Engineering, Environmental Sciences, Natural Sciences, Physical Sciences and Education. The Igbariam Campus in Anambra North has the faculties of Agriculture, Arts, Social Sciences, Law, Pharmacy and Management Sciences while the Faculty of Medicine has facilities at the University Teaching Hospital, Amaku-Awka in Anambra Central. There are therefore 13 Faculties which host 55 academic Departments in the University. The University has a vibrant student organization.

ABSTRACTS

19FES41 – A REVIEW OF PUBLIC SECTOR E-PROCUREMENT SYSTEMS FOR CONSTRUCTION WORKS AND SERVICES IN NIGERIA

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Although there is a lot of research on e-procurement, the extent of implementation and percentage of public sector organizations using the e-procurement process is largely unknown in developing countries. The aim of this paper is to assess the extent of implementation of e-procurement process in the Nigerian public sector in order to make recommendations for the improvement of e-procurement in Nigeria. Review of e-procurement research in the construction industry revealed that e-commerce adoption is still quite low in developing countries, a situation exacerbated by failings in provision of power, infrastructure, human capacity and legal frameworks. Only 40% of a very limited pilot sample of construction professionals was willing to use e-tendering exclusively. During the pre-contract stage Email, Project portals, Electronic reverse auctioning and Internet based tendering software were the e-tendering components applied most frequently. At post-contract stage the most frequently applied components included Project management software, Suppliers' websites, Web-based project management systems, Wireless networks and Web-enabled multimedia technology. Due to the limited sample used in this study, it is impossible to generalize the findings.

Keywords: Construction works, e-procurement, public sector

A REVIEW OF PUBLIC SECTOR E-PROCUREMENT SYSTEMS FOR CONSTRUCTION WORKS AND SERVICES IN NIGERIA

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ABSTRACT

Although there is a lot of research on e-procurement, the extent of implementation and percentage of public sector organizations using the e-procurement process is mostly unknown in developing countries. The aim of this paper is to assess the extent of implementation of e-procurement process in the Nigerian public sector in order to make recommendations for the improvement of e-procurement in Nigeria. Review of e-procurement research in the construction industry revealed that e-commerce adoption is still quite low in developing countries, a situation exacerbated by failings in provision of power, infrastructure, human capacity and legal frameworks. Only 40% of a very limited pilot sample of construction professionals was willing to use e-tendering exclusively. During the pre-contract stage Email, Project portals, Electronic reverse auctioning and Internet based tendering software were the e-tendering components applied most frequently. At post-contract stage the most frequently applied components included Project management software, Suppliers' websites, Web-based project management systems, Wireless networks and Web-enabled multimedia technology. Due to the limited sample used in this study, it is impossible to generalize the findings.

Key words: Construction, e-procurement, implementation, public sector.

INTRODUCTION

The Nigerian Government policy on procurement is centered on purchasing the required products or services under a fair and open competitive tendering process, guarding against corruption and achieving value for money. Attaining the United Nations Sustainable Development Goals (SDGs) in areas such as good health and well-being, clean water and sanitation, quality education, and affordable and clean energy is dependent on the effective procurement of critical infrastructure (United Nations Economic and Social Council, 2016). Nigeria's infrastructure deficit remains high despite capital investment of up to US$5.9 billion per year (Veitch, 2014).

Housing deficit in Nigeria is estimated at 17 million units (Veitch, 2014). With regards to transportation, only 18% of Nigeria's estimated 197,000 km of roads is paved (AfDB, 2013). The state of water, sanitation, education and health infrastructure is also regarded as poor due to years of neglect and ineffective allocation of resources for their procurement (Foster and Pushak, 2011). In order to stimulate the required socio-economic growth there is a need for sustained investment through procurement across all levels of government (i.e. Federal, State and Local Government). Evidence, however, points to procurement capacity deficiency in Nigeria (World Bank, 2000; Agu and Onodugo, 2009; Adewole, 2014).

To alleviate these challenges, attention has mainly focused on the Public Procurement Act 2007 (PPA, 2007). The PPA 2007 harmonises existing government practices and policies for public procurement; however despite promotion of the PPA 2007 by the federal government, donor and civil society organisations, it has not been enacted by all the states in Nigeria (Adewole, 2014). There has been a lot of research work carried out on e-procurement but most of them are often based on benefits and challenges to both the public and private sector (Caniato *et al.,* 2010; Croom and Brandon-Jones, 2007). However, not much academic research has been carried out on the extent of implementation and percentage of public sector organizations that carry out the use of the e-procurement process.

Consequent upon the above, this paper attempts to fill the gap by providing answers to the following question: What level of application has the public sector attained in the e-procurement process? In this wise the aim of this paper is to assess the extent of implementation of e-procurement process in the Nigerian public sector in order to make recommendations for the improved adoption of e-procurement in Nigeria.

THEORETICAL/CONCEPTUAL FRAMEWORK

Nowhere has the transition to a more paperless procurement system been more comprehensive than in the European Union. Transition to e-procurement in the EU has thus far involved a range of legislative measures and tools, including, among others, The European Single Procurement Document (ESPD) and e-Certis, open source e-procurement platform (e-PIOR), and The E-Invoicing Directive 2014/55/EU. Procurement digitalization would enhance streamlining of the public spending, while addressing market conditions. The main idea behind public procurement reform in the EU is to simplify procedures of public purchases through reduction of bureaucracy and to increase their efficiency by providing more flexibility (Szyd³o, 2017). Simplification of procedures of public contracting includes

electronic self-declaration for bidders (ESPD) and a rule that only the winning company is obliged to deliver full documentation that qualifies for a contract.

E-Procurement Tools Applicable to the Public Sector

The construction industry needs different e-commerce solutions; no one solution fits the entire industry. Some of the tools that have been applied in the Russian public sector include the following:

i. Online applications that are formed to create and approve purchase requisitions, and place purchase orders using software based on digital technology and the Internet.

ii. Selection of suppliers in real time allows identification of new suppliers with specific procurement requirements using digital online technologies.

iii. Electronic tenders for placing notifications about electronic tenders and electronic requests for accepting bids, receiving tender bids and offers and informing about the assignment of contracts to participants, all done online.

iv. Electronic reverse auctions to receive, evaluate offers and tender bids, as well as organize the purchase of goods online.

v. Electronic administration of the entire procurement process, involving collecting and distributing information on procurement among participants, tracking and receiving goods (e-invoicing), and conducting electronic payments.

Furthermore Zou and Seo (2006) have identified various types of e-commerce technologies applicable to the construction industry such as Electronic mail (E-mail), Internet connection, Online search, Computer Aided Design (CAD), Intranet, Computerised project management, Make/request online orders, bid invitation/tender online, Extranet, and Make/receive online payment.

Critical Success Factors for Public Sector E-Procurement

Panda and Sahu (2012) found that plethora of studies have been conducted since 1982 in the area of critical successful implementation factors for various types of e-procurement. A brief summary of the critical success factors (CSF) for e-procurement implementation in the public sector includes the following.

- Availability of managerial/technical competencies; Process re-engineering; Change management; Adequacy of supplier and IT solutions; Availability of IT infrastructure (Bof and Revitali (2007).

- The relationship between e-procurement marketplace and e-procurement adoption participation (Chang and Wong, 2010).

- Technical interoperability; Legal harmonization; Employment of digital signatures (Cimander et al., 2009)

- Organisation factors; Organisational leadership; Organisational perceived usefulness; Organisation perceived ease of use; Organisation facilitators technological factors; IT infrastructure; IT skills; e-procurement capability environmental factors; Government policy and regulations; Government advocacy; Industries acceptance (Kaliannan et al., 2009).

- Inter-agency coordination; Mandatory use of e-procurement; Evolutionary approach to implementation; End user training; Attention to user complaints and requests; Continuous monitoring of system performance (Lee et al., 2008).

- Cost Savings; Centralisation of procurement; Re-engineering of process; Budgetary control; Supplier management; Knowledge pool; Maturity of market place; Legal framework (Khanapuri et al., 2011)

Factors Limiting the Implementation of Public Sector E-Procurement

Five factors are of critical importance to sustainability of e-procurement systems in the construction industry. Although the factors apply specifically to Ghana, they are of general applicability to other developing countries.

Internet availability: this factor is the most important for e-procurement implementation. In Ghana, Mensah and Marfo (2009) indicated that public institutions reliability on central government for subvention with the attendant delays in its release erodes their ability to fulfill their financial commitment to internet service providers.

Power stability: Sub-Saharan African countries are associated with poor and inconsistent power supply with resultant negative impact on the economy especially in the construction industry (Mensah and Marfo, 2009).

Procurement officers' capacity: Brudney and Selden (1995) indicated that organisations with high level of professionalism are more receptive to change. Some form of training will be

required to enhance the capacity of procurement officers in the public sector to effectively handle e-procurement deployment.

Availability of IT infrastructure: Availability of IT infrastructure is a major factor for successful implementation of e-procurement. Bof and Revitali (2007) indicated that the costs-in-use of e-procurement are low; setup costs for the infrastructure required are however high.

Mandatory use of e-procurement: Some researchers opine that unless e-procurement is made mandatory through legislation, its implementation is unlikely to be successful otherwise (Moon, 2005).

The findings from related studies tell a well known tale; while studies from developed countries such as Russia and the EU were focused on how e-procurement could be used to drive innovation (Koscheyev & Hakimov, 2019; Obwegeser & Müller, 2018), studies from developing countries such as Nigeria and Ghana concentrated on necessities for creating an enabling environment for e-procurement (Ibem, Aduwa,.Uwakonye, Tunji-Olayeni & Ayo-Vaughan, 2018; Adzroe & Awuzie, 2018). Some secondary themes from Sri Lanka and Saudi Arabia dealt with making public procurement practice sustainable and the institutionalization of e-commerce respectively. Further examples of secondary themes include skills gap assessment of procurement officers from Nigeria (Mahamadu, Manu, Booth, Olomolaiye, Coker, Ibrahim & Lamond, 2018) and challenges faced by local construction firms in Uganda (Colonnelli & Ntungire, 2018).

MATERIALS AND METHODS

Kothari (2004) defined research design as the arrangement for collection and analysis of data in a manner that combines relevance to the research purpose with economy in procedure. A review of the methodologies adopted in related studies (see Table 1) revealed that seven out of eleven studies employed the use of questionnaire survey. The fact that survey approach provides a wider reach at relatively lower cost in terms of time and effort might inform its frequent adoption.

This paper likewise employed a questionnaire survey following an intensive review of literature around the subject of e-procurement. This was a single method, quantitative research design which targeted procurement professionals in the Federal Ministries of Works, Housing and Power; Education; as well as Health, all located in Abuja, Federal Capital Territory. A census of these professionals was attempted, thus eliminating the need for either

determination of sample size or choice of sampling technique. However only the pilot survey component made up of a sample of 5 professionals was reported in this paper.

Table 1: Research designs of related studies of procurement systems

Author	Year	Context	Research Design	Sample
Tutu, Kissi, Osei-Tutu & Desmond	2019	Critical factors for e-procurement implementation.	Survey	60
Ibem, Aduwa,.Uwakonye, Tunji-Olayeni & Ayo-Vaughan	2018	Awareness and use of e-Procurement technologies.	Questionnaire survey	213
Colonnelli & Ntungire	2018	Production bottlenecks faced by the construction sector.	Survey; focus groups; interviews	>600
Mahamadu, Manu, Booth, Olomolaiye, Coker, Ibrahim & Lamond	2018	Skills gaps of public procurement personnel.	Survey	288
Saastamoinen, Tammi & Reijonen	2018	Suppliers' perception of the properties of an e-procurement platform.	Survey	253
Adzroe & Awuzie	2018	Adoption of e-Business technology among Ghanaian construction micro and small businesses (GCMSBs).	Multiple case study	3 projects; 45 interviews
Ayinde & Damilare	2018	Adoption of e-commerce by informal construction market.	Questionnaire	63
Al-Yahya & Panuwatwanich	2018	E-Tendering model for public construction.	Interviews; focus group and questionnaire.	52
Ibem, Akinola, Erebor, Tolani & Nwa-uwa	2018	Digital technologies and applications used by architectural firms.	Survey	75
Aghimien, Aigbavboa, Oke & Koloko	2018	Construction professionals' perspective of construction industry digitalisation.	Survey	52
Makosa & Mwangangi	2018	E-procurement implementation in the public sector.	Case study	128

Structured questionnaires were designed and administered to achieve the various research objectives. The data thus realised was analyzed using descriptive statistical methods (Relative Importance Index and Mean Score) and the results were presented in tables and charts.

RESULTS AND DISCUSSION

The sample that served as a pilot for the study was made up of engineers, quantity surveyors and a town planner. All of the sample had university degrees and worked in the public sector. These results are presented in Table 2.

Table 2: Demographic analysis results

Parameter	Frequency	%	Parameter	Frequency	%
Profession			**Employer**		
Architect	0	0	Consulting firms	0	0
Builder	0	0	Contractor	0	0
Engineer	2	40	Client organization	0	0
Estate Surveyor	0	0	Ministries, Departments, Agencies	5	100
Quantity Surveyor	2	40	Academic institutions	0	0
Town Planner	1	20	Others	0	0
Other (specify)	0	0	Total	5	100
Total	5	100			
			Gender		
Education			Female	0	0
OND/NCE	0	0	Male	2	40
HND/B.Sc	2	40	Missing values	3	60
M.Sc	3	60	Total	5	100
Ph.D	0	0			
Total	5	100			

Some 60% of the sample agreed that e-tendering meant prequalification, while only one respondent (20%) opined that it referred to document management. Eighty percent of respondents agreed that in traditional tendering, the analysis of bids consumes the most time. Only 40% of respondents were willing to use e-tendering exclusively (see Table 3).

Table 3: Use of e-tendering

Parameter	Frequency	%
When you hear the phrase e-Tendering, what does that is mean for you?		
Invitations	0	0
RFP (request for proposal)	1	20
Prequalification	3	60
Document management	1	20
Submission of the offer	0	0
Others	0	0
Total	5	100
In traditional tendering, what areas consume the most time?		
Receiving bids	0	0
Analysing bids	4	80
Distributing bids to the sub-contractors and suppliers	0	0
Contract documents Preparation	1	20
Contractors Invitation	0	0
Others	0	0
Total	5	100

Parameter	Frequency	%
If you can decide, or have the chance, to use the e-Tendering process in your next project, what you will do?		
Use both Traditional and e-Tendering	3	60
Use e-Tendering	2	40
Use only Traditional tendering	0	0
Total	5	100

The extent to which respondents agreed that their organisations employed e-tendering components is reported in Table 4. In the main, email, project portals, electronic reverse auctioning and Internet based tendering software e.g. DecisionMax were the e-tendering components applied most frequently during the pre-contract stage. These components of e-tendering are based on ICT, the application of which in Nigeria suffers from the problems identified by Ibem *et al*. (2018) and Tutu *et al*. (2019).

Table 4: Extent of use of e-procurement components at pre-contract stage

ID	Extent of use of e-procurement components	Mean Score	SD	RII	Rank	Group Mean	Group rank
	Exchange of project briefs and specifications?						
3.1	Email	3.60	0.55	0.72	1	3.40	1st
3.2	Client website	3.20	0.45	0.64	2		
3.3	Others (please specify)	0.00	0.00	0.00			
	Submission of expression of interest, proposals or tenders?						
3.4	Email	2.40	0.89	0.48	2	2.27	5th
3.5	Project portal	2.40	1.34	0.48	1		
3.6	Cloud based applications e.g. MS Sharepoint, Dropbox	2.00	1.00	0.40	6		
3.7	Internet based systems software	2.20	0.84	0.44	5		
3.8	Compact disc (CD)/digital video disc (DVD)	2.20	1.10	0.44	4		
3.9	Electronic data exchange (EDI)	2.40	0.89	0.48	2		
	Evaluation and selection of expression of interest, proposals or tenders?						
3.1	Electronic reverse auctioning	2.20	0.84	0.44	1	1.93	6th
3.11	Voice over internet protocol (VOIP)	1.40	0.55	0.28	3		
3.12	Internet based tendering software e.g. DecisionMax	2.20	0.84	0.44	1		
	Communication with project team members?						
3.13	Email	4.00	1.22	0.80	1	2.85	3rd
3.14	Web 2.0 tech (social media platforms)	3.60	0.89	0.72	2		
3.15	VOIP	1.60	0.55	0.32	4		
3.16	Web-based communication apps	2.20	1.64	0.44	3		

The extent of use of e-procurement components at post-contract stage was reported in Table 5. The components most frequently applied included project management software including MS Project, suppliers' websites, Web-based project management systems, Wireless networks (such as cellular modems, phones) and Web-enabled multimedia technology. These findings are similar to that of Opatunji and Oyelami (2018), in their survey of adoption of e-commerce

technologies in the informal sector. It remains to be seen whether the findings from this extremely limited pilot survey will be borne out by that of the main survey whenever it is completed.

Table 5: Extent of use of e-procurement components at post-contract stage

ID	Extent of use of e-procurement components	Mean Score	SD	RII	Rank	Group Mean	Group rank
	Work scheduling?						
3.17	Project management applications	3.20	1.30	0.64	1	2.93	2nd
3.18	MS Project software	3.20	1.30	0.64	1		
3.19	Building Information Modelling (BIM) software	2.40	1.52	0.48	3		
	Searching for bldg materials and equipments?						
3.20	e-market place	2.40	0.89	0.48	2	2.53	4th
3.21	Geographic info system	2.40	0.89	0.48	2		
3.22	Company/suppliers websites	2.80	1.10	0.56	1		
	Purchasing and hiring of bldg materials and equipments?						
3.23	e-market place	2.20	0.84	0.44	2	1.93	6th
3.24	VOIP	1.40	0.55	0.28	3		
3.25	Web-based project management systems (WPMS)	2.20	1.10	0.44	1		
	Tracking of movement of materials from suppliers to sites?						
3.26	Wireless networks (cellular modems, phones)	2.20	1.10	0.44	1	1.75	8th
3.27	Radio frequency identification RFID	1.60	0.55	0.32	2		
3.28	Barcode technology	1.60	0.55	0.32	2		
3.29	Geographic positioning systems	1.60	0.55	0.32	2		
	Monitoring of progress of work on sites?						
3.30	Cloud-based BIM	1.60	0.55	0.32	2	1.64	9th
3.31	Web-enabled project management system	1.60	0.55	0.32	2		
3.32	Web-enabled digital cameras	1.60	0.55	0.32	2		
3.33	3D Scanner or LADAR technology	1.60	0.55	0.32	2		
3.34	Web-enabled multimedia technology	1.80	0.45	0.36	1		

CONCLUSION AND RECOMMENDATION

This paper has reviewed research that focussed on e-procurement in the construction industry. Studies from developed countries such as Russia and the EU focused on how e-procurement could be used to drive innovation, while studies from developing countries such as Nigeria and Ghana concentrated on necessities for creating an enabling environment for e-procurement. The result of review has revealed that e-commerce adoption is still quite low in developing countries. This situation has its roots in failings in provision of power, infrastructure, human capacity and legal frameworks.

Only 40% of a sample of construction professionals was willing to use e-tendering exclusively. During the pre-contract stage Email, Project portals, Electronic reverse auctioning and Internet based tendering software were the e-tendering components applied most frequently. At post-contract stage the most frequently applied components included Project management software, Suppliers' websites, Web-based project management systems, Wireless networks and Web-enabled multimedia technology. Due to the limited sample used in this study, it is impossible to generalize the findings. Comparability with previous research is also virtually impossible. The findings however provide some idea of how e-tendering tools are being deployed in the study area.

REFERENCES

Adewole, A. (2014), "Governance reform and the challenge of implementing public procurement law regime across Nigerian state and local governments", *International Journal of Public Administration and Management Research (IJPAMR)*, 2 (4), 25-32.

Adzroe, E. K. and Awuzie, B. O. (2018). Leveraging e-business technology for construction procurement improvement: Qualitative perspectives from Ghana. *International Journal of Construction Supply Chain Management* 8, (1) 43-59. DOI: 10.14424/ijcscm801018-43-59

Aghimien, Aigbavboa, Oke, and Koloko (2018). Digitalisation in Construction Industry: Construction Professionals Perspective. Streamlining Information Transfer between Construction and Structural Engineering; Edited by Shiau, J., Vimonsatit, V., Yazdani, S., and Singh, A. ISEC Press

Agu, C. and Onodugo, V. A. (2009), "Infrastructure services decentralisation for poverty reduction: Nigerian states", *Journal of Infrastructure Development*, 1 (2) 153–178.

Al-Yahya, M., & Panuwatwanich, K. (2018). Implementing e-tendering to improve the efficiency of public construction contract in Saudi Arabia. *International Journal of Procurement Management*, 11(3), 267-294.

Ayinde, O. O. and Damilare, O. E. (2018). Informal Market and the Adoption of E-Commerce in the Procurement of Construction Materials in Lagos State, Nigeria. *International Journal of Advances in Scientific Research and Engineering (ijasre)*. 4(9) 67-73.

Bof, F. and Revitali, P. (2007) 'Organisational pre-conditions for e-procurement in governments: the Italian experience in the public health care sector', *The Electronic Journal of e-Government*, 5, (1) 1–10.

Brudney, J.L. and Selden, S.C. (1995). 'The adoption of innovation by smaller local governments: the case of computer technology', *The American Review of Public Administration*, 25, (1), 77–89.

Caniato, F., Caridi, M., Crippa, L., & Moretto, A. (2012). Environmental sustainability in fashion supply chains: An exploratory case based research. *International journal of production economics*, 135(2), 659-670.

Chang, H.H. and Wong, H.K. (2010) 'Adoption of e-procurement and participation of e-marketplace on firm performance: trust as a moderator', *Journal of Information & Management*, (47), 262–270.

Cimander, R., Hansen, M. and Kubicek, H (2009) *Electronic Signatures as Obstacle for Cross-Border E-Procurement in Europe: Lessons from the PROCURE-Project*, Institute for information Management, Bremen GmbH (ifib).

Colonnelli and Ntungire (2018). Construction and public procurement in Uganda. *WIDER Working Paper 2018/180*. The United Nations University World Institute for Development Economics Research

Croom, S. and A. Brandon-Jones, (2007). "Impact of e-procurement: Experiences from implementation in the UK public sector", *Journal of Purchasing and Supply Management*, 13(4), 294-303.

Foster, V. and Pushak, N (2011), "Nigeria's infrastructure: A continental perspective: Africa Infrastructure Country Diagnostic (AICD). Country Report", The International Bank for Reconstruction and Development - The World Bank.

Ibem, E. O., Aduwo, E. B., Uwakonye U. O., Tunji-Olayeni, P. F. and Ayo-Vaughan, E. A. (2018). Survey data on e-Procurement adoption in the Nigerian building industry. *Data in Brief 18* 823–826.

Ibem, E. O., Akinola, A. O., Erebor, E. M., Tolani, M. O., & Nwa-uwa, A. E. (2018). Survey data on digitalization of building procurement process by architectural firms in Abuja, Nigeria. *Data in brief*, *20*, 1062-1067.

Kaliannan, M., Awang, H. and Raman, M. (2009) 'Electronic procurement: a case study of Malaysia's e-procurement initiative', *International Journal of Electronic Governance*, 2(2–3), 103–117.

Khanapuri, V.B., Nayak, S. and Soni, P. (2011) 'Framework to overcome challenges of implementation of e-procurement in Indian context', *Proc International Conference on Technology and Business Management*, Mumbai.

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Delhi: New Age International.

Lee, S., Zaltman, G. and Deshpande, R. (2008) 'Supplies and materials management', *Plymouth International Journal of Managing Value and Supply Chains (IJMVSC)*, 6(1) 1-4.

Mahamadu, A. M., Manu, P., Booth, C., Olomolaiye, P., Coker, A., Ibrahim, A., & Lamond, J. (2018). Infrastructure procurement skills gap amongst procurement personnel in Nigeria's public sector. *Journal of Engineering, Design and Technology*, 16(1), 2-24.

Makosa, P. and Mwangangi, P. (2018). Factors influencing e-procurement implementation in public sector in South Sudan. *International Journal of Supply Chain and Logistics* 2(2), 1 - 23,

Mensah, E.A. and Marfo, G. (2009) E-Business Adoption in the Banking Industry in Ghana.

Moon, M. (2005) 'E-procurement management in state governments: diffusion of e-procurement practices and its determinants', *Journal of Public Procurement*, 12(2) 212–238.

Obwegeser, N. and Müller, S. D. (2018). Innovation and public procurement: Terminology, concepts, and applications. *Technovation* 74-75 pp1-7.

Panda, P. and Sahu, G.P. (2012) E-Procurement Implementation: Critical Analysis of Success Factors' Impact on Project Outcome, Motilal Nehru National Institute of Technology, Allahabad, India.

Public Procurement Act, (PPA) (2007). Procurement Procedures Manual for Public Procurement in Nigeria. *Bureau of Public Procurement, Abuja, FCT, Nigeria*.

Saastamoinen, J., Tammi, T., & Reijonen, H. (2018). E-procurement and SME involvement in public procurement of innovations: an exploratory study. *Inderscience Enterprises Ltd*. http://dx.doi.org/10.1504/IJPM.2018.10012141. pp1-26.

Szydło, W., (2017). Judicial Review of Adherence to the Principle of Transparency in European Union Public Procurement Law, *Eurasian Studies in Business and Economics*, 5, 405-420.

Tutu, S.O., Kissi, E., Osei-Tutu, E. and Desmond, A. (2019) 'Evaluating critical factors for the implementation of e-procurement in Ghana', *Int. J. Procurement Management*, 12(1), 1–14.

United Nations Economic and Social Council (2016), Progress towards the Sustainable Development Goals - Report of the Secretary-General, *United Nations Economic and Social Council*, available at https://unstats.un.org/sdgs/files/report/2016/secretary-general-sdg-report-2016--EN.pdf. (accessed 23 March 2017).

Veitch, C. (2014), Infrastructure Industry in Nigeria - Who owns Who. available at: http://www.whoownswhom.co.za/public/sasector/report_content/Pages%20from% 20502%20 -%20The%20Infrastructure%20Industry%20Nigeria%20-%20March%202016%20-%20Contents.pdf. (accessed 03 April 2016)

Zou, P. X., & Seo, Y. (2006). Effective applications of e-commerce technologies in construction supply chain: current practice and future improvement. *Journal of Information Technology in Construction* (ITcon), 11(10), 127-147.