Adoption of e-Procurement Systems in Developing Countries: A Nigerian Public Sector Perspective

Adebayo V.O. and Evans R.D.

2015 KBEI
IEEE-2015, 2nd International Conference on
Knowledge-Based Engineering and Innovation (KBEI)

Adoption of e-Procurement Systems in Developing Countries: A Nigerian Public Sector Perspective

Victor Olalekan Adebayo and Richard David Evans
Westminster Business School
University of Westminster
London, United Kingdom
V.Adebayo, R.Evans@westminster.ac.uk

***Abstract*—In the last 10 years, numerous studies have examined the adoption of e-procurement by both public and private organisations. However, experiential studies relating to the adoption of e-procurement systems by public sector organisations in developing countries appears neglected. This study, through empirical research, aims to examine the level of adoption of e-procurement in Nigeria with the view of gaining an understanding of the drivers, benefits, barriers, critical success factors, organisational performance post implementation and the impact of e-procurement utilisation on curtailing corruption in public procurement. Results were obtained using a web-based survey, sent to 174 interviewees operating in the e-Procurement departments of Nigerian public sector organisations. In total, 74 responses were received, with results identifying that the majority of those surveyed had not received sufficient training in the use of e-procurement systems. We also identify that at an operational level, public sector organisations are yet to fully attain the full benefits of e-procurement.**

Keywords—developing countries; e-Procurement adoption; procurement systems; public sector investigation.

I. INTRODUCTION

E-procurement is changing the way companies' source their goods and services, with the increased utilisation of procurement methods, such as Electronic Data Interchange (EDI), Enterprise Resource Planning (ERP) systems and the Worldwide Web (WWW) being used by companies to conduct procurement activities [1]. During the last 10 years, studies have explored the adoption of e-procurement systems by organisations in both the private and public sectors [2, 3, 4]. However, research relating to the adoption and application of e-procurement systems, especially in developing countries, such as those found in Sub-Saharan Africa, appears severely neglected in procurement literature [5]. This research aims to extend this shortage in literature by examining and assessing the level of adoption of e-procurement systems in Nigerian public sector organisations, with the view of gaining an understanding of the drivers, benefits, barriers, perceived critical success factors and the organisational performance post implementation. The study further seeks to gain insight into how e-procurement may help government officials curb corrupt practices in public procurement.

II. THE PROCUREMENT PROCESS

The process of procurement involves several stages and supplementary sub-stages. The exact model varies depending on the typology of the industry or sector. Figure 1 illustrates the traditional procurement process, dividing it into 5 key stages: 1) Outlining of business requirements; 2) Developing a procurement plan; 3) Supplier appraisal and selection; 4) Negotiation and contract finalisation and award; and 5) Induction and integration.

During the Outline of business requirements phase, business needs are defined. Requirements are captured in documentary form which serve as a reference point for future purposes. During the Development of procurement plan phase, the procurement approach is established. Information from the business requirement phase is utilised to determine the plan. The Supplier Appraisal and Selection phase is primarily concerned with selecting the most appropriate suppliers for the procurement requirement. At the end of this process, a shortlist of suppliers is produced which agrees the procurement approach to be adopted with the shortlisted suppliers. During the Negotiation and contract award phase, negotiations are completed and the most appropriate supplier(s) are selected. Finally, during the induction and integration phase, assistance is provided to suppliers, equipping them to deliver all aspects of the contract; this confirms that all parties are acquainted with the payment framework and also introduces performance procedures and reporting.

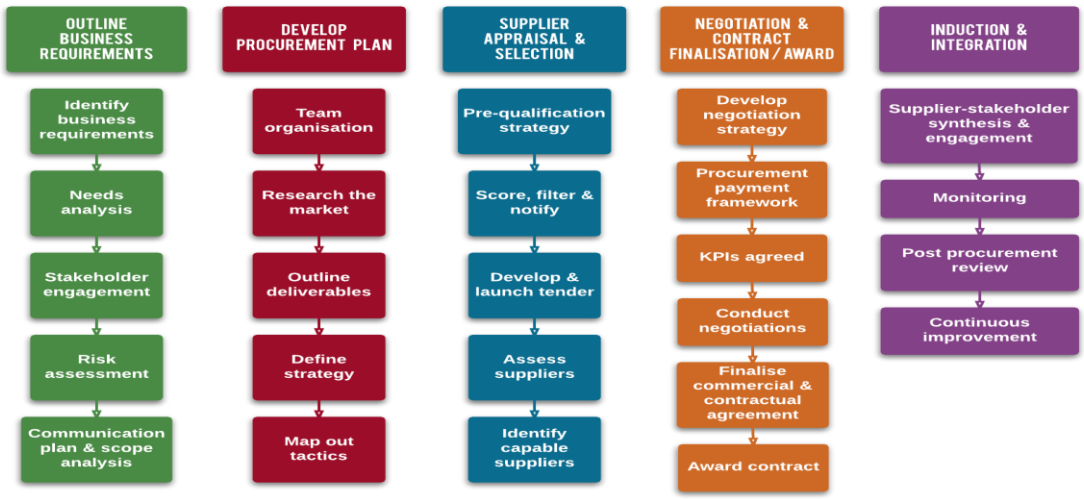

Fig. 1. Generic Procurement Process

III. E-Procurement

E-procurement is typically viewed as a policy tool aimed at improving public procurement operations, transparency and integrity [4]. However, e-procurement offers far greater benefits to industry, including: reduced transaction costs; improved decision making processes; and increased value for money. Moon [1] defined e-procurement as a comprehensive process in which organisations use IT systems to establish agreements for the acquisitions of products and services. Researchers [1] suggest that e-procurement facilitates the automation of the procurement process, while some [6] argue that e-procurement helps organisations reduce the amount of paper work that traditional purchasing methods generate.

A. Theoretical framework for the adoption of e-procurement

In 2008, Gunaserekan et al. [7] proposed a theoretical framework for the successful implementation of E-Procurement systems. Their framework incorporated four key components: 1) Perceived benefits; 2) Perceived barriers; 3) Critical success factors in e-procurement; and 4) Organisational performance with e-procurement. These components will be used for examination and measurement during this study. Additionally, we will explore the impact of e-procurement on curtailing corruption in public sector procurement.

B. Barriers to e-procurement Adoption

Hawking et al. [8] stated that barriers to e-procurement adoption include: lack of e-procurement knowledge, lack of a recognised legal framework, lack of data exchange standards and lack of business relationships with suppliers *inter alia*. Liao et al. [9] further divided the barriers to adoption into behavioral and infrastructural barriers, while Gunasekaran et al. [10] extended barriers to include: security concerns, lack of organisational priority and insufficient financial support.

C. Benefits of e-procurement

How organisations perceive the benefits of e-procurement will determine the level of adoption of the systems. According to Ash and Burn [11], e-procurement benefits include: increased cash flow through accuracy of invoicing; cash discounts; better pricing as suppliers' working capital requirements are reduced; improved expediting by enhanced tracing and tracking of goods through the supply chain; integrated and automated logistics activity and reduced emergency shipments; lower total cost of ownership; and reduced risk of non-supply by transacting through a stable and secure market place. Davila, Gupta, Palmer [12] listed e-procurement benefits as: reduction in transaction times, price visibility and access to global markets, while Gunasekaran et al. [10] added included: increased customer satisfaction, increased market share and reduction in operational tasks.

D. Critical success factors for the adoption of e-procurement

Gunasekaran et al. [10] explained that e-procurement Critical Success Factors (CSFs) are those entities that are essential to the successful adoption and use of e-procurement. Fu et al. [13] listed some of the CSFs as: step by step transformation, promotion incentives, government support, commitment of top management, while Gunasekaran et al. [10] added: use of prototype, close collaboration with suppliers, communication between participants, centralised control and management of procurement initiatives. Vaidya, Sajeev, Callendar [14] extended this for the adoption of e-procurement in the public sector by including: supplier adoption, business case, security, change management, end user training.

E. *Organisational performance*

Gunasekaran et al. [10] asserts that the successful adoption of e-procurement is dependent upon the support of top management. Therefore it is crucial that there is an awareness of the potential impact of e-procurement on organisational performance both in the short and long term. Some of the benefits associated with organisational performance post e-procurement implementation include: short term organisational performance, long term organisational performance, improved cost performance, organisational competitiveness, operational efficiency, and process integration and automation [10].

IV. METHODOLOGY

Based on the preceding review, a questionnaire was developed to collect data relevant to the outlined objectives of this research. The study employed a cross-sectional field survey. The questionnaires were circulated to 174 procurement professionals operating in Nigerian public sector organisations. In total, 74 responses were received, representing a 43% response rate. 11 of the questionnaires were incomplete and were therefore discounted from the study. Specifically, the research tested for the following variables: 1) barriers to e-procurement, 2) benefits of e-procurement, perceived critical success factors to the successful adoption of e-procurement, 3) organisational performance after e-procurement implementation and 4) impact of e-procurement on corruption. In terms of the demographic of respondents, 50.1% hold the position of Procurement Officer/Analyst; 25.4% are Managers, while 15.8% of the respondents indicated that they are E-procurement/IT specialists. With regard to the organisational setting in which respondents work, 52.38% indicated that they operate in government parastatals, 38.1% work in federal government ministries, 7.94% in Presidential departments and 1.59% in the SPU/Office. Finally, with regard to the length of service of each participant, 41.27% have 1-2 years' experience, 23.81% have less than a years' experience, 17.46% have 2-5 years' experience, while 7.94% have 5 years + experience.

V. RESULTS

A. *Ease of using e-procurement systems*

The research measured the ease and difficulty participants experienced in using e-procurement systems in their organisations. Table 1 shows that the measures for each of the variables. The mean range is from 2.6 to 2.71. Results show that respondents largely disagree that learning to use e-procurement software is easy: 52.4% disagreed while 12.7% strongly disagreed. 46% also disagree that it is easy to get e-procurement to do what the organisation wants. 50.8% of the respondents indicated that they agreed that e-procurement is flexible to interact with, while 14.3% strongly disagreed.

TABLE I. MEAN RATING FOR EASE/DIFFICULTY OF USING E-PROCUREMENT SYSTEMS

Variable	*n*	*x*	*Std. D*	*Var*
Learning to operate e-procurement systems is easy.	63	2.6	1.19	1.41
It is easy to get e-procurement systems to do what our organisation wants it to do.	63	2.71	1.17	1.38
E-procurement systems are flexible to interact with.	63	2.61	1.23	1.51
It is easy to become skilful at using e-procurement systems.	63	2.63	1.19	1.41
E-procurement systems are easy to use.	63	2.65	1.24	1.54

B. *Drivers of e-procurement adoption*

This section tested for the drivers for the adoption of e-procurement. Table 2 shows the results of the research.

TABLE II. MEAN RATINGS FOR THE DRIVERS OF E-PROCUREMENT ADOPTION

Variable	*n*	*x*	*Std. D*	*Var*
Procurement compliance.	63	3.54	0.97	0.95
Procurement centralization	63	3.43	1.01	1.01
Procurement standards	63	3.51	1.02	0.98
Optimizes sourcing strategy	63	3.29	1.03	1.06
Auditable data	63	3.29	1.01	1.03
Procurement spend analysis	63	3.27	1.04	1.09
Facilitates buying leverage	63	3.21	1.07	1.07
Monitor savings targets	63	3.27	1.04	1.15
Transactional cost reduction	63	3.43	1.01	1.09
Facilitates a common organizational process	63	3.16	1.07	1.01
Procurement standardization	63	3.33	1.02	1.15
Spend visibility	63	3.01	1.11	1.05
Procurement knowledge sharing	63	3.32	1.01	1.24
Leads to procurement value added activities	63	3.32	1.01	1.01
Increased productivity	63	3.24	1.03	1.01
Reduction in number of suppliers	63	3.22	1.07	1.07
Supplier management and selection process	63	3.16	1.05	1.09
Supplier integration	63	3.03	1.04	1.09

As may be seen, 69% of the respondents agreed that e-procurement facilitates procurement compliance. 57.1% agreed that e-procurement enables procurement centralization, while 6.3% strongly agreed with this statement. 60.3% of the respondents agreed that e-procurement allows for auditable data. 52% concurred that e-procurement facilitates spend analysis while 4.8% strongly agreed. 46.7% agreed that e-procurement leads to transactional cost reduction while 20.6% disagreed. 42.9% of the respondents agreed that e-procurement enables supplier integration, while 36.55% disagreed.

C. Benefits of e-procurement

This section measured the benefits that organisations gain from the implementation and use of e-procurement systems. The mean range for this category was from 2.4-3.01. Respondents were asked if e-procurement led to better utilisation of staff, 31.7% indicated that this was somewhat realised, 12.7% said that it had not been realised while 23.8% indicated that they had realised this benefit. When respondents were asked if e-procurement had led to increased efficiencies, 28.6% of the respondents stated that it had not been realised, while 23.8% said it had been somewhat realised. 31% of the respondents indicated that e-procurement has not facilitated a reduction in maverick spending in their organisations. 27% said they had somewhat realised this benefit while 9.5% indicated that they were just beginning to realise it.

D. Barriers to e-procurement implementation

This section examines the barriers to e-procurement implementation, exploring the bottlenecks organisations face when implementing e-procurement. Table 3 shows the mean, standard deviation and the variance of the variables tested for.

As may be seen, 79.4% of respondents agreed that fear of change to a new system was a barrier to e-procurement implementation. 58.7% indicated that insufficient financial support was a barrier; 6.3% strongly agreed while 11% of the respondents strongly disagreed. 68.3% indicated that of interoperability and standards with legacy IT systems was an obstacle while 6.3% strongly agreed. 60.3% of respondents cited the lack of skills and knowledge of e-procurement as a key barrier, while 11.1% strongly agreed and 15.9% disagreed. The research also sought to establish if the lack of top management support was an obstacle. In total, 57.1% agreed while 12.7% strongly agreed.

TABLE III. MEAN RATING FOR THE BARRIERS TO E-PROCUREMENT IMPLEMENTATION

Variable	*n*	*x*	*Std. D*	*Var*
Fear of change to a new system	63	3.71	0.93	0.87
Immaturity of technology	63	3.48	1.04	1.07
Insufficient financial support	63	3.59	1.06	1.13
Lack of interoperability and standards with traditional IT systems	63	3.56	1.02	1.04
Lack of skills and knowledge of e-procurement	63	3.54	1.08	1.17
Lack of top management support	63	3.51	1.14	1.3
Security concerns	63	3.46	1.07	1.14
Organizational culture	63	3.43	1.12	1.26
High cost of e-procurement technology	63	3.38	1.12	1.25

E. CSFs

This section explored the CSFs of successful e-procurement implementation. Table 4 shows the results of the survey. As can be seen, 79.4% of respondents attributed a clear and achievable implementation phase as a critical success factor, 4.8% strongly agreed while 7.9% disagreed. 60.3% indicated that user training was a key factor while 11% strongly agreed. 39.7% of the respondents cited business process re-engineering as a factor while 25.4% disagreed. 55.6% indicated that a clear business case was a critical factor while 20.6% disagreed.

TABLE IV. MEAN RATING FOR THE CRITICAL SUCCESS FACTORS

Variable	*n*	*x*	*Std. D*	*Var*
Clear and achievable implementation phase	63	3.68	0.92	0.85
Close collaboration with suppliers	63	3.35	1.03	1.05
Content management	63	3.1	1.11	1.23
Involvement of stakeholders	63	3.49	1.01	1.01
Top management involvement and support	63	3.65	1.04	1.08
Government support	63	3.56	1.1	1.14
End user training	63	3.56	1.07	1.14
Business process re-engineering	63	3.21	1.06	1.12
A clear business case	63	3.44	1.07	1.14

F. Organisational performance

This section examined organisational performance post e-procurement implementation. Respondents were asked if successful implementation improves organisational performance in the short term. Table 5 shows that 46% agreed that it did while 25.9% disagreed and 19% were uncertain. When asked if successful implementation improves long term

performance, 58.7% agreed, while 7.9% strongly agreed. 14.3% disagreed and 14% were uncertain. 60% of respondents indicated that successful e-procurement implementation improves competitiveness in the organisation and 60.3% specified that it leads to more strategic alliance. 52.4% indicated that it improves supplier relationships, while 58.7% stated that it improves operational efficiency.

TABLE V. MEAN RATING FOR ORGANISATIONAL PERFORMANCE

Variable	*n*	*x*	*Std. D*	*Var*
Improves organizational performance in the short term	63	3.14	1.04	1.07
Improves long-term organizational performance	63	3.51	0.99	0.98
Improves cost performance in the organization	63	3.43	1.02	1.04
Improves competitiveness in the organization	63	3.38	1.02	1.06
Leads to more strategic alliance	63	3.38	0.98	0.97
Improves supplier relationship	63	3.32	1.05	1.11
Improves operational efficiency	63	3.4	1.06	1.13

G. E-procurement and public procurement corruption

This section explores the impact of e-procurement implementation and utilisation in curtailing corruption in the organisations surveyed. We sought to establish if the implementation and utilization of e-procurement systems improves transparency in the procurement process. As is shown in Table 6, 68.3% agreed that it did, while 9.5% strongly agreed. 63.5% agreed that e-procurement implementation helps to improve integrity of the procurement process. 58.7% of the respondents indicated that e-procurement implementation and utilisation helps to reduce corruption; 11% strongly agreed while 19% disagreed.

TABLE VI. MEAN RATING FOR E-PROCUREMENT AND PUBLIC PROCUREMENT CORRUPTION

Variable	*n*	*x*	*Std. D*	*Var*
Implementation helps to improve transparency in the procurement process	63	3.63	1.01	1.03
Implementation helps to improve inclusivity in the sourcing process	63	3.27	1.12	1.04
Implementation helps to improve integrity of the procurement process	63	3.6	1.05	1.05
Implementation helps to reduce corruption in the procurement process	63	3.54	1.07	1.04
Implementation helps to identify duplicate contracts	63	3.49	1.07	1.14
Leverages standardized pricing and enables contract compliance	63	3.43	1.01	1.03

VI. DISCUSSION

Table 2 shows that the following factors were regarded as the most important drivers of e-procurement: 1) procurement compliance; 2) procurement centralization; and 3) procurement standards with mean ratings of 3.54, 3.51 and 3.43 respectively. All tested factors had a mean rating >3.0 which means all the factors in table 2 were considered to be important factors by the survey participants.

With regard to the perceived benefits of e-procurement implementation, the results show that organisations are yet to realise the full benefits of e-procurement. All the factors, apart from 'better utilisation of staff', had mean ratings <3.0. The mean ratings for the better utilisation of staff was 3.01, which means that relatively, survey participants agreed with this assertion. The results from this category (perceived benefits) is in consonance with other studies on the adoption of e-procurement. Results from Gunasekeran [10] show that the better utilisation of staff had a mean score of 2.5, other variables such as 1) increased efficiencies; 2) improved relationships with suppliers; 3) increased customer satisfaction and 4) the reduction in transactional costs had mean ratings <3.0. Similarly, Kothari et al. [15] experienced comparable outcomes. This indicates that at an operational level, organisations are yet to attain the benefits of e-procurement.

Results relating to the barriers of adoption show that participants considered fear of change to a new system (3.71), lack of skills and knowledge of e-procurement (3.54), lack of interoperability and standards with legacy systems (3.54) and insufficient financial support (3.56) as the main barriers to implementation. In a study by Gunasekaran et al. [10], the main barrier was that 'e-procurement was not considered a top priority by top management; likewise, in a study by Ngai and Gunasekaran [7], the lack of prioritisation by the organisation was the main barrier. This study did not measure this particular factor, instead a measurement of the 'lack of top management support' was carried out and the results indicate a mean rating of 3.51. Results from other factors such as the lack of interoperability with standard IT systems and the fear of change show a commonality with outcomes in Ngai and Gunasekaran [7] and Gunasekaran et al. [10].

With regard to CSFs, results show that respondents regard 1) a clear and achievable implementation phase; 2) government support; 3) top management involvement and 4) end user training as the main critical success factors; these factors had a mean rating of 3.68, 3.56, 3.65 and 3.56 respectively. These results are analogous to the study by Ngai and Gunasekaran [7]

who reported that 'clear accountability with purchasing and organising structural changes' was the highest scoring factor with a mean of 4.1. This factor was not included in this study due to terminological similarity with an existing factor in the paper's data set – 'clear and achievable implementation phase'. Upon reflection, these factors are essentially dissimilar and its addition could have led to a wider context for deeper analysis.

This study examined organisational performance post implementation. Results indicate that participants regard the 'improved long term organisational performance' as the main factor with a mean rating of 3.51; the second factor was 'improves cost performance in the organisation' with a mean rating of 3.41. These results are similar to [7] with analogous mean ratings, however, the results are dissimilar to [10]; the explanation for this could be that the latter was based on SMEs where the effects of e-procurement implementation on organisational performance might not be realised.

Research relating to the effects of e-procurement on curtailing corruption in the public sector is widely neglected. However, Transparency International [16], provided examples of how countries such as South Korea and Brazil have been able to make huge savings in transaction costs by adopting e-procurement. As stated in the previous section, this study measured the impact of e-procurement implementation and utilisation in controlling corruption; as depicted in Table 6, the results show that that the most important factor is 1) e-procurement implementation helps to improve transparency in the procurement process with a mean rating of 3.63; closely followed by 2) e-procurement implementation helps to improve integrity of the procurement process with a mean score of 3.6; the third most important factor was 3) e-procurement implementation of e-procurement helps to reduce corruption with a mean score of 3.54. The results from the survey show that the majority of the respondents do agree with all the factors measured in the survey as depicted in Figure 6. This indicates that there is a positive outlook that e-procurement could impact in curtailing corruption in public procurement.

VII. Conclusion

This paper contributes and extends the current body of literature relating to the adoption and utilisation of e-procurement systems in developing countries. At policy level, this study will help policy makers and practitioners to understand some of the barriers, benefits and drivers of e-procurement adoption. More crucially, it will assist governments to understand the various factors that embody the effect of e-procurement in curbing corruption in public procurement. With regard to limitations of the research, the study could have benefitted from using different research methods to increase validity. It is proposed that future work should explore a deeper understanding of e-procurement than presented in this study using a mixed-method approach. Additionally, it may be argued that the population of the study was low and did not represent fully the public sector in Nigeria. Future work should include a larger population to increase validity and allow for a greater population representation.

References

[1] M.J. Moon, "E-procurement management in state governments: diffusion of e-procurement practices and its determinants," Journal of Public Procurement, vol. 5, no. 1, pp. 54-72, 2005.

[2] B. Wirtz, S. Lütje, and P.G. Schierz, "An empirical analysis of the acceptance of E-procurement in the German public sector," International Journal of Public Administration, vol. 33, no. 1, pp. 26-42, 2009.

[3] S.A. MacManus, "Understanding the incremental nature of e-procurement implementation at the state and local levels," Journal of Public Procurement, vol. 2, no. 1, pp. 5-28, 2002.

[4] S. Croom and A. Brandon-Jones, "Impact of e-procurement: experiences from implementation in the UK public sector," Journal of Purchasing and Supply Management, vol. 13, no. 4, pp. 294-303, 2007.

[5] A.A. Adebiyi, C.K. Ayo and M.O. Adebiyi, "Development of Electronic Government Procurement (e-GP) System for Nigeria Public Sector," International Journal of Electrical & Computer Sciences, vol. 10, no. 6, pp. 69-76, 2010.

[6] P. Baily, D. Farmer, B. Crocker, D. Jessop and D. Jones, Procurement principles and management. Pearson Education, 2008.

[7] A. Gunasekaran and E.W. Ngai, "Adoption of e-procurement in Hong Kong: an empirical research," International Journal of Production Economics, vol. 113, no. 1, pp. 159-175, 2008.

[8] P. Hawking, A. Stein, D.C. Wyld and S. Foster, " E-procurement: is the ugly duckling actually a swan down under?," Asia Pacific Journal of Marketing and Logistics, vol. 16, no. 1, pp. 3-26, 2004.

[9] S.H. Liao, C.H. Cheng, W.B. Liao and I.L. Chen, "A web-based architecture for implementing electronic procurement in military organisations," Technovation, vol. 23, no. 6, pp. 521-532, 2003.

[10] A. Gunasekaran, R.E. McGaughey, E.W. Ngai and B.K. Rai, "E-Procurement adoption in the Southcoast SMEs," International Journal of Production Economics, vol. 122, no. 1, pp. 161-175, 2009.

[11] C.G. Ash and J.M. Burn, "Evaluating benefits of e-procurement in a B2B marketplace: a case study of Quadrem," Journal of Information Technology Case and Application Research, vol. 8, no. 2 pp. 5-23, 2006.

[12] A. Davila, M. Gupta and R. Palmer, "Moving Procurement Systems to the Internet:: the Adoption and Use of E-Procurement Technology Models," European management journal, vol. 21, no. 1, pp. 11-23, 2003.

[13] H.P. Fu, T.H. Chang and W.H. Wu, "An implementation model of an eprocurement system for auto parts: A case study," Production Planning and Control, vol. 15, no. 7, pp. 662-670, 2004.

[14] K. Vaidya, G.C. Callender and A.S.M. Sajeev, "Facilitators of public e-procurement: lessons learned from the UK, US and Australian initiatives" International handbook of public procurement, pp. 473, 2009

[15] T. Kothari, C. Hu and W.S. Roehl, "e-Procurement: an emerging tool for the hotel supply chain management," International Journal of Hospitality Management, vol. 24, no. 3, pp. 369-389, 2005.

[16] Transparency International, "The role of technology in reducing corruption in public procurement" [online] Available from: http://www.transparency.org/files/content/corruptionqas/The_role_of_technology_in_reducing_corruption_in_public_procurement_2014.pdf [Accessed on: 12 September 2015], 2014.