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Role of Information Technology Infrastructure on Adoption of Electronic Procurement in State Corporations in Kenya

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Abstract:

The aim of this study was to assess the role played by information technology infrastructure in enhancing the adoption of electronic procurement in state corporations in Kenya. The study focused on ICT software infrastructure and hardware infrastructure. Using a descriptive research approach, the study surveyed 187 procurement managers from the 187 state corporations in Kenya. A structure questionnaire was used to collect the data which was analyzed using descriptive and inferential statistics. The findings revealed that ICT infrastructure was essential in enhancing the adoption of electronic procurement in state corporations. It was revealed that through the ICT software infrastructure such as the operating systems, it becomes viable to integrate procurement functions in the systems. ICT hardware on the other hand promotes the use of procurement systems thus enabling embrace of electronic procurement. The study recommended the need for the government to support the state corporations in integrating and adopting electronic procurement through funding them to acquire the appropriate ICT hardware and software infrastructure that is essential for the integration of e-procurement.

Keywords:
information technology infrastructure; electronic procurement; state corporations, procurement performance

I. Introduction

In the increasing competition, to sustain and to compete against the potential competitors, organizations need to excel at their processes and improve upon their efficiencies through technological adoption. To increase the business volume the consistency in the sales is dependent upon large base of satisfied customers, which in turn allows organizations to deliver better value to internal as well as external customers (Nani & Ali, 2020). Suppliers of resources or services are the better source of knowledge and support for business development hence integration with suppliers is another way out for the business organizations to develop strategic advantage. Enhanced relationships with the suppliers allow constant supply as well as availability of the required resources. Traditional procurement process was time consuming and involving huge paper work and manpower. Incorporation of ICT for electronic procurement increases the speed of business transactions as well as improved transparency which allows the development of trust with the suppliers (Chen, Bretschneider, Stritch, Darnall, & Hsueh, 2022). Adoption of e-Procurement is proving to be beneficial to the organizations. Companies that have adopted the e-Procurement technology were found to save up to 30% in purchasing transactions costs due to simplification of the process as well as reduction in purchasing cycle time (Nurdin, 2021), which in turn increases the flexibility and provides more up-to-date information at the time of placing of purchasing orders.

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Adoption of e-procurement usually involves using advanced communication technologies such as email and the Internet. Having an online presence creates important new methods of procurement for public organizations. Public institutions have the role to create e procurement platforms in which stakeholder in the procurement department can sign up without having to adopt them (Afolabi, Ibem, Aduwo, & Tunji-Olayeni, 2022).

Information Communication Technologies consists of a combination of hardware and software technologies. Hardware components are important for knowledge management system because they have the role of platform for the software and transfer of knowledge (Hamma-adama & Ahmad, 2021). Some of the hardware requirements include personal computers, work stations, servers, and optic fibre for network which are integral in facilitating the access to knowledge and information sharing for promoting e-procurement (Ramkumar, Schoenherr, Wagner, & Jenamani, 2019). Software technologies have important role in facilitating application of knowledge in e procurement. The large number of suppliers requires efficient and reliable software technologies to identify and manage all the dimensions related to organization's supply chain needs.

E-procurement usually involves encouraging ICT adoption over an entire procurement system. This can only be possible if the organization has ICT infrastructure that favours adoption of e-procurement. According to Brandon-Jones and Kauppi (2018), organizations are more likely to adopt ICT if their peers, suppliers, and clients are adopting ICT as well. The common functionality of software infrastructure includes managing contract documents, tracking metrics, providing dashboard views and alerts, issue tracking/management, and analytics/reporting.

1.1 Statement of the Problem

There is increased determination in the world to enhance the quality of public financial management among both developed and developing countries and the use of e-procurement systems has emerged as one of the leading techniques of enhancing the operational effectiveness and efficiency within the procurement function (Hendriks, 2012). As a management tool e-procurement enables government entities to control aggregate spending and deficit, prioritize expenditure across policies, programmes and projects to achieve efficiency, prudency and equity in allocation of resources, to achieve outcomes and produce outputs at the lowest possible cost and to enhance transparency and accountability in utilization of public resources (Nurdin, 2021). However, despite their prominence, existing evidence from various empirical studies seems to suggest that e-procurement has mixed results with regard to its effect on organizational performance (Karani, 2016). For instance studies by Vaidya (2016) in Australia, Mohammed (2015) in Egypt, Makafui and Ackah (2015) in Ghana and Avedi (2016) in Kenya reported a positive relationship between e-procurement and firm's financial performance. However, studies by Agaba (2013) in Uganda, Chipiro (2014) in Zimbabwe and Mutuku (2016) in Kenya reported a negative relationship between e-procurement and firm's organizational performance while studies by Shalle *et al.* (2013) in Kenya and Prasad (2014) in India reported no significant changes in firm's organizational performance following implementation of e-procurement.

Local studies done on e-procurement and organizational performance include Amin (2012) and Chepng'etich (2016) - state corporations, Avedi (2016) – manufacturing firms, Karanja (2015) - banking, Barngetuny and Kimutai (2015) and Ndiiri (2016) – county governments in Kenya. All these studies have focused on how e-procurement affects performance of the organizations, but they have not elaborated on what is required in terms

of ICT infrastructure to enable the adoption of E-procurement, particularly in state corporations. This study therefore seeks to fill the gaps by assessing the role played by ICT infrastructure on the adoptions of e-procurement in state corporations in Kenya.

1.2 Objectives of the Study

1. To assess the role of ICT hardware infrastructure on the adoption of e-procurement in state corporations in Kenya.
2. To examine the role of ICT software infrastructure on the adoption of e-procurement in state corporations in Kenya.

1.3 Research Questions

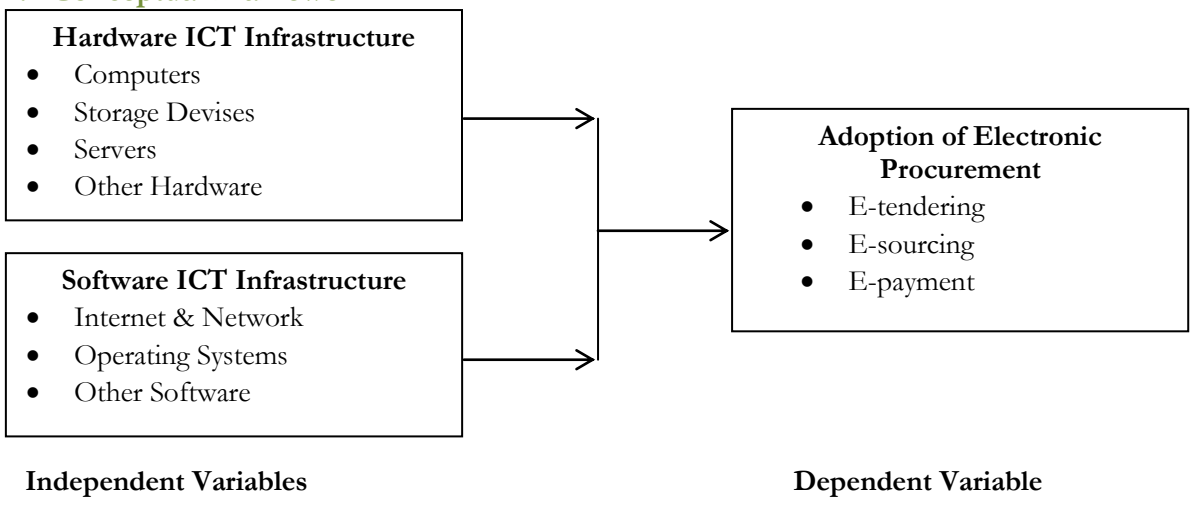
1. What is the role of ICT hardware infrastructure on adoption of e-procurement in state corporations in Kenya?
2. How does ICT software infrastructure influence the adoption of e-procurement in state corporations in Kenya?

II. Review of Literature

2.1 Theoretical Framework

This study was informed by the Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) was developed by Davis (1989). This model relates the individuals' behavioral intentions and his/her ICT use. It is suggested that, the actual behavior of a person is determined by his behavioral intention to use, which is in turn influenced by user's attitude toward and perceived usefulness of the technology. However attitude and perceived usefulness are both determined by ease of use (Chuttur, 2012). The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, and most notably perceived usefulness which is the degree to which a person believes that using a particular system would enhance his or her job performance. Adopting the TAM model requires the understanding of end-users requirements regarding usefulness and user friendliness (Chuttur, 2012). This theory is relevant to the current study given that e-procurement systems are ICT supported and hence automation is at the epicenter of modern day procurement processes. This theory thus provides an appropriate framework of understanding the adoption of e-procurement systems in the local public sector.

2.2 Conceptual Framework



2.3 Review of Empirical Literature

E-procurement is the business to business or business to customer purchase and sale of supplies, work and services through internet as well as other information and networking systems , such as electronic data interchange and enterprise resource planning (Sellahewa, 2021). Explaining the nature of e-procurement Adjei-Bamfo, Maloreh-Nyamekye and Ahenkan (2019) indicated that e-procurement Web sites allow qualified and registered users to look for buyers or sellers of goods and services. Depending on the approach, buyers or sellers may specify costs or invite bids. Transactions can be initiated and completed. Ongoing purchases may qualify customers for volume discounts or special offers. E-procurement software may make it possible to automate some buying and selling (Baránek, Musolff & Titl, 2020). Companies participating expect to be able to control inventories more effectively, reduce purchasing agent overhead, and improve manufacturing cycles. E-procurement is expected to be integrated into the wider Purchase-to-Pay (P2P) value chain with the trend toward computerized supply chain management (Lemar, 2018).

E-procurement can provide real-time business intelligence to the vendor as to the status of a customer's needs. For example, a vendor may have an agreement with a customer to automatically ship materials when the customer's stock level reaches a low point, thus by passing the need for the customer to ask for it (Wulandari, 2020). A study by Mohungoo, Brown, and Kabanda (2020) shows that companies can track purchases being made in all departments and ensure compliance to standards with use of e-procurement. For example, a marketing agent might want to purchase a new laptop for his business trip. In a manual setup, the agent might be instructed to go to a local supply chain store, purchase the laptop and submit the receipt back to the company for reimbursement. Such purchases are difficult to track. With an electronic procurement system in place, the entire purchase runs through approval work flows and the person who approves of such requests ensures the laptop is bought only for the configuration needed in a business use (Osei-Tutu et al, 2019).

E-procurement ICT include e-procurement software, Business to Business (B2B) auctions, B2B market exchanges and purchasing consortia that aim to automate workflows, consolidate and leverage organizational spending power and identify new sourcing opportunities online (Davila et al. 2006). Future advances would extend these ICT to create collaborative Supply Chain Management (SCM) tools (Masudin, Aprilia, Nugraha, & Restuputri, 2021). E-procurement's benefits include: lower administration costs, lower inventories and purchasing prices; shorter order-cycle time; enhanced cooperation with suppliers, performance and multi-chain operations (Mélon, 2020). Although these advantages may suggest a rapid migration from traditional to e-based procurement models, some firms are slow in adopting e-procurement. Actually, current studies revealed that this tremendous expected growth rate has been revised downwards (Lancioni et al., 2003). However, prior studies on e-procurement have primarily focused on the evaluation of its benefits (Gupta, 2008) or its adoption in specific industries.

Despite the great benefits of e-procurement technologies, their adoption is still at their early stages (Sánchez-Rodríguez, Martínez-Lorente, & Hemsworth, 2019). A variety of factors may affect a firm's decision to adopt and implement a particular ICT. In consolidating prior studies examining innovation, Belisari, Binci, and Appolloni (2020) classified variables that potentially influence ICT adoption into five broad categories: individual, task and innovation related, organizational and environmental characteristics. Masudin et al. (2021) also showed that the following organizational and environmental factors positively affected the adoption of ICT in SCM: organizational size; decentralized organizational structure; supply chain strategy integration; transactional climate and supply chain member pressure, and environmental

uncertainty. Belisari, Binci, and Appolloni (2020) also suggested that these factors may be important to differing degrees depending on the context or technology. For example, individual factors such as age or education are often more relevant with individual adoption of technology rather than organizational innovation whereby decisions are made by committees.

2.4 Research Gaps

The reviewed studies have shown diverse results on the need for e-procurement and how it can be utilized to enhance the effectiveness of the procurement process. The studies, however, have majorly focused on how e-procurement can be implemented to strengthen the procurement process, but not on how the major driver of e-procurement (ICT infrastructure) comes into play to enhance its adoption. Moreover, the contexts of most of these studies are in other jurisdictions where the approaches of e-procurement and the extent to which the governments and other stakeholders have focused on investing in ICT infrastructure could differ. Most of the studies also have utilized varied methodologies, thus the need for a study to bring a different methodology, context and concept in order to assess the influence of ICT infrastructure on adoption of e-procurement in state corporations in Kenya.

III. Research Methods

3.1 Research Design

This study used a case study design to investigate the role of ICT on adoption of e procurement in Kenya's state corporations. A case study is an in depth study of a particular situation. The study focused on the state corporations, thus making the design most appropriate to narrow down a very broad field of research into one easily researchable topic.

3.2 Target Population

The target population for this study was employees working in the procurement department of State Corporation in Kenya. There are 248 state corporations in Kenya as at June 2022 (Government of Kenya, 2022).

3.3 Sampling

This study used a purposive sampling technique where procurement managers in the 248 state corporations were sampled. This ensured that only the respondents that are aware of the procurement functions and procedures in their respective corporations were included in the sample. Therefore, the sample size for the study was 248 respondents comprising of procurement managers from all the 248 state corporations in Kenya.

3.4 Data collection and Analysis

A structured questionnaire was used to collect data for the study. The questionnaire was distributed through drop and pick method. The obtained data was analysed using both descriptive and inferential statistics. A regression model was used to assess the relationship between variables in the study.

IV. Discussion

4.1 Response Rate

The study had a response rate of 48.9%. This was after 121 respondents out of the sampled 248 fully filled and returned the questionnaires for analysis. This was considered adequate for analysis.

4.2 Role of ICT Software Infrastructure on Adoption of E-Procurement

The study sought to establish the role of ICT software infrastructure on the adoption of E-procurement in state corporations in Kenya. The findings from the study as shown in Table 1 revealed that most of the respondents disagreed that their respective organizations had installed appropriate operating systems in the computers that could run procurement functions and that the internet supply was reliable enough to facilitate E-procurement. The respondents further disagreed that there was adequate supply of software to facilitate e-procurement in the corporations and that the technology used was the latest one that could perform several tasks including e-procurement functions. The respondents disagreed that the ICT skills in their respective organizations were appropriate to stimulate adoption of electronic procurement.

Table 1. Role of ICT Software Infrastructure on Adoption of E-procurement

Statements	Mean	Std. Dev.
a. The organization has installed appropriate operating systems in the computers that can run procurement functions	2.80	1.49
b. The internet supply is reliable enough to carry to facilitate e procurement	2.45	1.65
c. We are well supplied with enough software to facilitate e-procurement	2.48	1.59
d. We are using the latest ICT software to carry out procurement functions	2.69	1.56
e. The ICT software available is efficient enough to facilitate e procurement	2.60	1.28
f. The organization has reliable skills to support ICT efficiency	2.83	1.35

4.3 Role of ICT Hardware Infrastructure on Adoption of E-Procurement

The study sought to establish the role played by hardware ICT infrastructure of adoption of electronic procurement in state corporations in Kenya. The findings revealed that most of the respondents were in disagreement that their respective organizations had enough computers to facilitate e-procurement and that the computers were capable of running the required procurement functions. The respondents further disagreed that they had adequate storage devises to store data regarding procurement activities and processes and that the procurement staff were familiar with the available hardware used in running procurement functions. They further disagreed that the ICT hardware infrastructure was efficient enough to facilitate e-procurement adoption in their respective organizations and that the organizations has reliable ICT hardware support tools such as electricity and UPS to support ICT efficiency. The findings imply that the hardware ICT infrastructure in most of the state corporations were not adequate to facilitate effective adoption of e-procurement.

Table 2. Role of ICT Hardware Infrastructure on Adoption of E-procurement

Statements	Mean	Std. Dev.
a. The organization has enough machines (computers) to facilitate e-procurement	2.80	1.33
b. The computers in our department are capable of running the required procurement functions	2.90	1.41

c. We have adequate storage devises to store data regarding procurement activities and processes	2.31	1.18
d. The procurement staff are familiar with the hardware used in running procurement functions	2.78	1.07
e. The ICT hardware available is efficient enough to facilitate e-procurement	2.91	1.18
f. The organization has reliable hardware support tools such as electricity and UPS to support ICT efficiency	2.77	1.09

4.4 Adoption of E-Procurement in State Corporations

The study sought to establish the adoption of e-procurement among state corporations in Kenya. The findings as shown in Table 3 revealed that majority of the respondents disagreed that their respective corporations advertised most of their tenders through electronic means (Mean = 2.80) and that the organizations received tender documents from suppliers through online/electronic means (Mean = 2.90). The respondents further disagreed that their respective corporations made most of the payments to their suppliers through electronic systems and that most of the suppliers invoiced the corporations on the supplied goods or services through electronic means (Mean = 2.31; 2.78). It was further revealed that the corporations did not effectively use electronic sourcing means to look for the appropriate suppliers of key products and services.

Table 3. Adoption of E-procurement

Statements	Mean	Std. Dev.
a. The organization advertises most of its tenders through electronic means	2.80	1.33
b. The organization receives tender documents from suppliers through online/electronic means	2.90	1.41
c. Our corporation makes most of the payments to its suppliers through electronic systems	2.31	1.18
d. Most of the suppliers invoices the corporation on the supplied goods or services through electronic means	2.78	1.07
e. The corporation uses electronic sourcing means to look for the appropriate suppliers of key products and services	2.91	1.18
f. Through e-procurement the corporation is able to enhance the effectiveness of its procurement processes	2.77	1.09

4.5 Regression Analysis

A regression analysis was carried out to establish the relationship between ICT infrastructure (hardware and software) and adoption of e-procurement in state corporations in Kenya. The findings as shown in Table 4 revealed that ICT software had a Beta coefficient of 0.674 ($t= 8.168$; $P=0.000<0.05$) implying that ICT software had a significant influence on the adoption of e-procurement in state corporations in Kenya. Further, ICT hardware had a Beta coefficient of 0.581 ($t= 6.307$; $P=0.000<0.05$), implying that ICT hardware had a significant influence on the adoption of e-procurement in state corporations in Kenya.

Table 4. Regression Model Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.151	.169		.892	.374
	ICT Software	.674	.082	.524	8.168	.000
	ICT Hardware	.581	.092	.429	6.307	.000
	F-Statistic (P-value)	533.163 (0.000<0.05)				
	Adjusted R-Square	0.750				

a. Dependent Variable: Adoption of Electronic Procurement

4.5 Discussion

Continued use of electronic procurement is an essential strategy towards enhancing the effectiveness of procurement function of the public entities. In Kenya, although the Public Procurement and Assets Disposal Act (2015) uphold the need for embrace of e-procurement, the state agencies have been slow in embracing it. However, the findings have shown that most of these entities lack the appropriate ICT infrastructure despite this being a prerequisite for effective embrace of E-procurement. The ICT hardware and software are known to streamline and support the procurement functions electronically, thus without these, achieving e-electronic procurement would not be viable. The study has also established that the uptake and adoption of electronic procurement in state corporations is still low, an indication that the poor performance of these entities and increased spillage of public resources could be as a result of poor embrace of electronic procurement.

V. Conclusion

The findings from the study have shown that the ICT hardware in the state corporations are not adequate to support the procurement operations. This is an indication that the slow rate of embracing e-procurement could be as a result of inadequate ICT hardware, which is essential in ensuring effective integration of systems to discharge e-procurement functions. It is therefore recommended that there is need for the government to invest more in acquiring the appropriate ICT hardware such as computers so as to support the adoption of e-procurement in state corporations.

The results further revealed that ICT software required to electronically carry out procurement functions was not available in most of the corporations. Lack of adequate ICT software infrastructure affects the ability of the state corporations to integrate electronic procurement thus leading to misappropriations and ineffective procurement processes. There is need for the government, therefore to put in place adequate systems and ICT software infrastructure as a way of speeding-up the integration of e-procurement in the state corporations. This will be an essential move to ensure that the procurement processes are effectively carried out with the required transparency.

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