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### Electronic Ordering and its Effect on Tendering Process Efficiency in Public Universities in Kenya

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#### Date Published: ABSTRACT

23 July 2024 E-procurement, indicated as an emerging trend in procurement, promises various benefits including cost reduction, improved efficiency, and transparency. However, its uptake and effectiveness within the tendering processes of public institutions in Kenya have been limited. The purpose of the study was to analyze the adoption of electronic ordering and its effect on tendering process efficiency in public universities in Kenya. The study was grounded on the Technology Acceptance Model. The study applied a descriptive research design. The population of the study was 136 employees of thirty-four public universities in Kenya. Slovin's formula was used to determine a sample size of 102 respondents and purposive sampling was employed to select three respondents from each university targeting Heads of Procurement, Finance, and ICT departments because they are responsible for handling the University's day-to-day procurement tasks and ensuring compliance with procurement policies, will constitute the targeted population. They regularly engage with procurement systems and play a key role in managing electronic procurement matters for the University. To assess the reliability of the questionnaire, the researcher applied Cronbach's Alpha formula. Primary data was collected by a structured questionnaire employing a five-point Likert scale. Subsequently, the data was coded and analyzed using the Statistical Package for Social Sciences (SPSS) for descriptive and inferential statistical, and the findings were presented in tables. The results indicated that electronic ordering was found to be statistically significant in predicting tender process effectiveness, with a p-value of 0.000. The study recommends that to enhance the effectiveness of electronic ordering systems, institutions should allocate resources toward training and capacity-building initiatives for individuals involved in procurement activities.

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## INTRODUCTION

The advancement of technology presents African governments with opportunities to transform their procurement practices from traditional paper-based processes to electronic procurement. This transition aimed at improving e-government services for citizens and businesses in the digital economy (Mafini et al., 2020). In South Africa and other African nations, there has been a notable transformation in procurement processes, leveraging e-commerce to replace manual phases of public procurement with digital alternatives.

Implementation of public procurement reforms in Kenya commenced with the inauguration of the Public Procurement and Disposal Act of 2005, which led to the establishment of the Public Procurement Oversight Authority. Subsequently, the public sector has adopted e-procurement (Muinde and Ismael, 2018). More recently, the government amended the public procurement law to align with citizens' needs and aspirations as outlined in the Kenyan Constitution of 2010, introducing the Public Procurement Regulatory Authority 2015 and Regulation 2016 (Muinde and Ismael 2018). Nyongesa and Moronge (2019) affirmed that the Kenyan government established State Corporations to pursue diverse economic and social objectives, including addressing market inefficiencies, achieving social and political goals, providing healthcare and education, wealth redistribution, and developing marginalized areas. According to Kioko and Mwangangi (2017), parastatals have been transformed into influential institutions in Kenya, acting as significant engines for promoting growth. They argue that, through the delivery of public services, parastatals play a vital role in the nation's development.

Approximately 310,000 individuals in Kenya's formal economy and 3.8 million in the informal sector have secured employment opportunities through parastatals, contributing 21% of the country's GDP (Osir, 2016).

Osir (2016) underscores that public procurement accounts for up to 70% of the revenue and operating budget of State Corporations. Citing Osir (2016), government purchases made by public organizations in Kenya constitute over 11% of the GDP, emphasizing the sector's economic significance. However, despite these contributions, persistent public complaints from stakeholders highlight Kenya's inadequate procurement performance. These concerns include prolonged procurement lead times, substandard service delivery, non-compliance with procurement policies, high costs for goods and services acquisition, and apprehensions about corruption and nepotism.

Kenyan government acknowledges the importance of incorporating information communication technology (ICT) in community service delivery, leading to the effective adoption of e-procurement applications by several firms in the country. Recognizing ICT as a significant driver in achieving Vision 2030, there is a requirement to advance an ICT strategy that integrates information technology sectors into nationwide growth efforts (Ministry of Information, Communications and Technology, Kenya, 2019). The government has automated procurement through an Integrated Financial Management Information System (IFMIS). The Supplier Portal is an integral component of the e-procurement method of the IFMIS. It facilitates direct communication of essential information

between public procuring entities and their suppliers. Additionally, it enables individuals who wish to engage in government business to register themselves and provides suppliers with the opportunity to participate in open bids and Requests for Quotations. Contractors interested in bidding for any publicly advertised service goods or works are now able to complete their firm registration on the Kenyan government Supplier Portal.

Tendering is a vital process in the supply chain that enhances competitiveness, reduces waste, and boosts accountability and transparency in the procurement process. The Kenyan government introduced reforms in public procurement through the enactment of the Public Procurement and Disposal Act 2015, Regulations and Circulars to provide guidance and procedures for carrying out the tendering process, contract award, and feedback. The government has operationalized the Public Procurement and Disposal Regulations in 2020, which authorizes all public entities in Kenya to advertise tender opportunities on an institutional website and on the public procurement information portal (PIIP) to enhance transparency and accountability. Therefore, this study examines electronic ordering adoption and its effect on the tendering process of public universities.

As indicated by Songok (2015), the prevalence of electronic procurement or e-procurement is on the rise in universities globally, including those situated in Kenya. Universities may opt for different e-procurement approaches tailored to their specific needs and demands. Typical e-procurement methods that Kenyan universities employ: electronic sourcing, electronic tendering, electronic marketplace, electronic catalog, electronic payment, electronic contract management, electronic reverse auctions, electronic ordering, electronic invoicing, electronic supplier relationship management (SRM), and electronic expense management. It is crucial to acknowledge that the particular e-procurement techniques and tools embraced by Kenyan universities can vary based on their size, budgetary constraints, and the nature of their

procurement necessities. The integration of electronic ordering in the educational sector is generally motivated by the pursuit of enhanced efficiency, cost-effectiveness, and transparency within the procurement processes

### *Statement of the Problem*

Although several public sector organizations are vigorously pursuing e-tendering, evidence from the business press reveals that many of these efforts do not meet the original expectations. Components of e-procurement such as the electronic tendering process, an emerging trend in procurement, offer various advantages such as cost reduction, enhanced efficiency, and transparency. However, the uptake and effectiveness of e-tendering processes of public institutions in Kenya have remained limited. One key factor is the lack of awareness and understanding of technology and its potential benefits among procurement professionals and administrators. Many individuals may not grasp how e-tendering can streamline procurement processes, mitigate corruption risks, or enhance overall efficiency. According to Davila et al. (2013), the development and application of information technology business models, such as a procurement portal in entities, is a problem that goes beyond ordinary technological functionality. Top executive support, organizational adaptation, and employee training are examples of crucial issues for the successful implementation of any IT system.

Research conducted by the UN., 2011 on efficiency and transparency in public service delivery revealed that e-tendering saved over six million dollars by outsourcing the manual duplication and distribution documents of the federal government. The study revealed that e-awarding, e-selection, and e-notices were the main determinants of the application of e-procurement accomplishments in procurement process performance. Boakye H M, Asante D, Dadzie E B., (2019) established that the initiation of information technology meant that firms started turning their supply chain undertakings towards the Internet since it would help them if all

procurement operations were carried out correctly, efficiently, and appropriately. E-tendering is one of the restructurings that has been embraced by the government of Kenya to enhance transparency, accountability, reduction of waste, and cost by initiating the public procurement information portal (PPIP) vide Public Procurement Regulatory Authority (PPRA) circular No.01/2020, which enforced publishing of the details of tendering processes from advertisement to the end process of contract management. Ninety percent of public universities have embraced electronic applications such as e-tendering in their processes to increase efficiency in supply chain performance, and less than ten percent have not implemented practices associated with e-procurement applications (Songok, 2018).

### ***Objective of the Study***

To analyze the effect of electronic ordering on tendering process efficiency in public universities in Kenya

### ***Research hypothesis***

*H<sub>0i</sub>*: Adoption of electronic ordering has no statistically significant effect on tendering process efficiency in public universities in Kenya

## **LITERATURE REVIEW**

### ***Theoretical Review***

#### ***Technology Acceptance Model (TAM)***

The Technology Acceptance Model (TAM) emerged in response to the increasing demand for technology in the 1970s and growing concern over the failure of system adoption within organizations. Consequently, predicting system usage has become a significant area of interest for numerous researchers, and the majority of studies conducted in this field were unable to generate dependable actions that could effectively expound the acceptance or rejection of systems. Fred Davis F., (1989) proposed the Technological Acceptance Model (TAM) in his doctoral thesis at MIT Sloan School of Management in 1985. In this model, Davis suggests that system usage can be

clarified or forecasted by user incentives, which are directly determined by external stimuli comprising the real features and competencies of the system, which was established and authenticated by Davis (1986, 1989, 1993) to clarify the tools that impact and shape handlers' acceptance of emerging information technology.

As per the Technology Acceptance Model (TAM), two key variables significantly influence users' attitudes toward adopting technology and their real usage of the system: perceived usefulness and perceived simplicity of use with the design features of the new information system. Perceived usefulness denotes the extent to which individuals believe that employing a system enhances their overall effectiveness. Conversely, perceived simplicity of use pertains to the extent to which a user perceives that the advantages of using the system outweigh the efforts involved in using it (Davis, 1993).

The implementation of e-procurement necessitates alterations that involve reforming the current system inside an institution, which will finally influence how duties are carried out (Lobong P. & keji J., 2020). The execution of e-procurement can cause significant changes in the major procurement operations conducted within a state corporation. One such operation is the purchasing process, which encompasses duties such as preparation of the order, approval of the order and transmission of the order to the contractor. Hence, the view of both buyers and sellers regarding the utility and user-friendliness of e-procurement systems plays a crucial role in realizing the complete advantages of e-procurement implementation, particularly in the electronic ordering process. In their study, Aman and Kasimin (2011) investigate the application of e-procurement among suppliers in Malaysia. They employed the Technology Acceptance Model to analyze how suppliers in the country utilize web-based e-procurement applications, and effective training of suppliers is expected to yield favorable outcomes in terms of e-procurement system usage. This, in turn, can assist organizations in reducing the need for extensive supplier search, improving early supplier development, and

ultimately enhancing buyer-supplier relationships, particularly within the realm of e-supplier management. Therefore, this model was deployed to answer electronic ordering research queries related to the adoption of electronic ordering and its effect on the tendering process at Kenyan public universities.

The relevance of this study is that the Technology Acceptance Model (TAM) provides valuable insights into factors influencing the acceptance and adoption of e-tendering technology in the tendering process of public universities in Kenya. By understanding and addressing users' perceptions of usefulness, ease of use, attitudes, and external influences, universities can promote successful adoption and integration of e-tendering systems, leading to improved efficiency, transparency, and effectiveness in procurement operations.

### ***Electronic ordering***

Electronic ordering involves initiating and approving purchasing requisitions (Kim, 2002) as well as the process of placing orders and receiving the products. To utilize electronic ordering, a company must utilize software based on Internet technology. The items ordered typically include indirect goods and services, with all employees accessing an ordering catalog integrated with the software system. Firms using enterprise resource planning (ERP) are required to order goods and services that align with their products. Individuals ordering direct items should recognize that they are part of a strategic plan, (Mahesh Gupta, & Amarpreet Kohli., 2018). Organizations looking to implement automated purchasing systems often opt for EDI electronic ordering. By eliminating repetitive manual processes, organizations can cut costs, increase efficiency, and improve customer service.

Order processing is a main aspect of the order-achievement cycle. Order processing related to the usage of clean methods is a core component in logistics operations. It starts with the receipt of the purchase requirement. Corporations can receive more than one order. However, the suitable

method is file transfers, which can be used at agreed daily slot times. For example, the procurement department can obtain information in the morning or afternoon. Because the documents continually are available in a pre-agreed layout, the team of workers can add them to the gadget without the risk of manipulation. In this way, the process eradicates or limits human mistakes and streamlines the order cycle, which is essential for ensuring that the device is the best (Mutangili, 2014).

### ***Empirical Review***

#### ***Electronic ordering and Tendering process efficiency***

Previously, the ordering process between buyers and vendors was ordered via electronic data interchange (EDI), mail, fax, and phone. Electronic ordering has progressed in the utilization of information communication technology to modernize and facilitate the ordering processes of an institution. The advantage of electronic ordering has added to significant cost reductions in terms of the overall procurement costs of numerous businesses globally; therefore, electronic technology practice is a substantial tactic in most institutions' strategies for e-business operations.

According to Munyao and Moronge (2018), organizations that adopt electronic ordering practices can achieve a reduction in procurement costs ranging from 8 to 15 percent. Munyao and Moronge (2018) investigated with the specific objective of determining the effect of e-procurement applications on procurement performance at Kenyan public universities. The research focused explicitly on examining the function of electronic ordering in improving procurement performance in these institutions. The findings of the study indicated a notable correlation between the operation of e-order processing practices and procurement performance. Drawing from the assumptions of the exploration, it can be inferred that the adoption of e-order processing practices positively enhances procurement performance. The analysis

intends recommendations for public universities in Kenya should consider implementing e-requisition and e-receipting systems as a means to decrease operation costs and expedite the purchasing process.

In a study conducted by Gichuhi, R. W. (2021) titled "The Influence of Electronic Ordering on performance procurement at Geothermal Development Company in Kenya," it was discovered that there is a notable correlation between electronic ordering and procurement performance. This indicates that the electronic ordering process plays a vital role in boosting procurement performance. The study advocates that companies should leverage online platforms to place their orders with suppliers to improve order efficiency and general supply chain performance. Based on the discoveries of the examination, there is a robust and statistically significant relationship ( $r=.634$ ,  $p=.000$ ) between the electronic ordering process and the accomplishment of procurement. This demonstrates that electronic ordering plays a key role in determining the procurement performance level within a Geothermal Development Company. Therefore, electronic ordering is a significant factor influencing procurement performance in the company.

Oteki, Namusonge, Sakwa, and Ngeno, (2018) research examined the impact of e-order processing on the performance of sugar processing industries in Kenya. A mixed research design was used in this study, with a target group consisting of 12 Kenya sugar refining companies. To ensure representation from various segments, the researchers utilized a stratified random sampling methodology, resulting in a sample size of 367. Data were assembled through the utilization of an individual administration of a questionnaire that involved dropping off and picking up the questionnaire, as well as through interviews and observations, which demonstrated a strong correlation between e-order applications and overall supply chain performance. Ultimately, the analysis suggests that adopting electronic ordering practices improves supply chain performance.

In a study conducted by Nafula and Namusonge in 2017, which investigated the impact of e-procurement practices on the efficiency of the Kakamega County government, it was found that the county faced challenges in terms of the availability and utilization of websites for e-procurement. This low availability of online platforms could potentially hinder the efficiency of procurement processes in Kakamega County. Additionally, the study revealed that online orders for supplies within the county are limited. Furthermore, there was a noticeable lack of e-procurement platform utilization and practices in the electronic ordering process, leading to reduced efficiency in the overall procurement function of Kakamega County. To address these issues, the study recommended that procurement departments in county governments, specifically Kakamega, implement user-friendly information systems accessible to all suppliers, irrespective of their technological proficiency. This inclusive approach aims to reduce biases in electronic procurement use, encourage widespread adoption, and foster procurement staff competencies.

Nancy and Chepkwony's (2017) research examined electronic ordering and e-informing on the supply chain performance of state corporations in Nairobi County, Kenya. This study employed an explanatory model to investigate the association between electronic ordering and supply chain performance. A sample of 262 supply chain officers working in one hundred and twelfth state corporations in the country was utilized. The results of the multiple regression design revealed a noteworthy and positive impact of electronic ordering on supply chain performance, establishing that electronic ordering, as an integral component of procurement, enhances supply chain fulfillment.

Samoei and Ndede, (2018) study examined the influence of electronic ordering on the monetary performance of the Kenya Ministry of Education, Science, and Technology and utilized a descriptive research design to explore the effects of electronic ordering on the monetary performance of the Ministry. A sample of 120 ministry personnel was included in this study. The

verdicts of the multiple regression examination demonstrate a notable and positive influence of electronic ordering on financial performance, revealing an important and positive association between electronic ordering and financial performance. This relationship was established through statistical analysis, where the obtained p-value of 0.003 was below the predetermined alpha value of 0.005 at the 95 percent of the significance level and confidence level.

### ***Tendering process efficiency***

Tendering is an e-procurement practice in which potential bidders are requested to submit a clear and binding proposal regarding the price and circumstances under which they will offer specific goods, works and services. On acceptance, this proposal becomes the foundation for the next contract (Lyons and Farrington, 2006). In Kenya, the dissemination and advertisement of tender notices are widespread, reaching a broad audience through various print and electronic media platforms. Bidders are provided with a 14-day timeframe during which they can either obtain bid documents from public organizations or download them directly from the website. The information regarding government tenders can be accessed through various sources, including the Public Procurement Information Portal (PPIP). The PPIP serves as a comprehensive online platform that delivers extensive information on procuring firms, vendors, bid notices, and even awarded contracts. Procuring entities are responsible for uploading information to the Public Procurement Information Portal (PPIP) on a monthly basis, typically by the 15th of the subsequent month. The Government Tenders Opportunities website offers specific admission to tenders that have been reserved for persons with disabilities, women and youth. Furthermore, individual public procurement entities often advertise tender opportunities on their respective websites. If you are interested in supplying a particular Ministry, Division, Agency or county

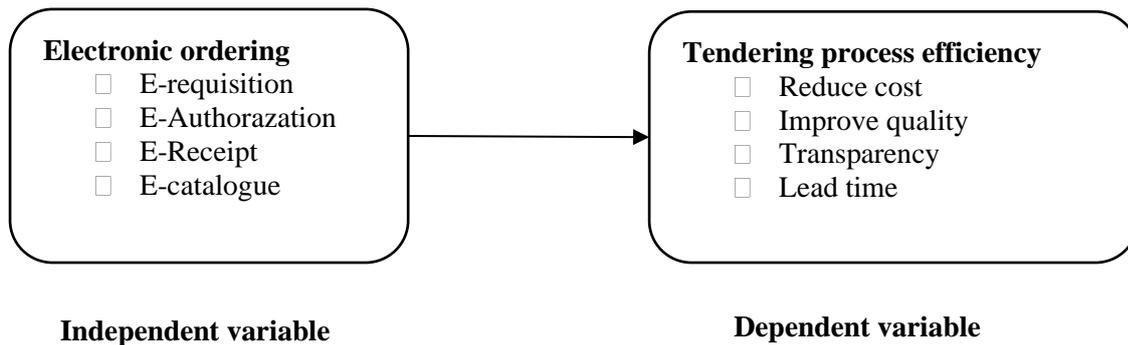
government, you can straight visit their website to search for bid opportunities. Online platforms and local websites, including Tendersoko and Tendersunlimited, serve as additional sources of information for all open tenders. Additionally, notice boards are commonly used for government tenders that fall below certain thresholds. These notices are typically posted at the procuring institutions, national and county government offices, as well as the chief's office.

Based on the auditor general report on public procurement in Kenya, the primary phases of tendering processes can be categorized as follows: Pre-tendering, Tendering, and Post-award stage. The pre-tendering stage primarily involves essential preparatory steps such as needs assessment, planning, and budgeting, which are crucial for initiating a procurement process. An examination of the procurement transactions within the Ministry of Education indicates that, out of the 43 instances of procurement violations identified between 2013/14 and 2015/16, the majority (63%) occurred during the post-award stage. Approximately 29% of the violations occurred during the tendering phase, while the remaining violations took place during the pre-tendering stage.

### **Conceptual Framework**

A conceptual framework refers to a collection of overarching concepts and values derived from pertinent areas of study. It serves as a structural framework for organizing and presenting subsequent discussions or presentations. During the study, it was necessary to construct a conceptual framework that would illustrate the association between independent variables and the dependent variables. In this research, the dependent variable is the tendering process and the independent variables examined in this research include e-procurement, specifically electronic ordering, e-sourcing, e-payment, and e-supplier management.

**Figure 1.1: Conceptual Framework**



**Electronic ordering**

Electronic ordering is an order generated and submitted in electronic format by the purchasing firm or an individual to suppliers, for example, an electronic purchase order that serves as proof of request for goods and services from suppliers following conditions agreed by both purchaser and supplier that involve in transactions using electronic data interchange that facilitate the seamless transmission of electronic messages that automate the purchasing procedure, including ordering, delivery updates, and invoicing. E-requisition refers to a procurement request for goods, works, and services, outlining the requirements and including additional information such as the necessary specifications, desired timeline, and designated location. E-authorization is a technique of authentication and approval of procurement documents online that can be limited by the approval depending on the budget and priority of goods, works and services. An e-receipt is an electronic receipt that generates transaction details for confirmation of proof of payment of goods, works and services for both buyers and sellers. E-catalogue is an online publication that displays suppliers’ products and services with detailed prices and specifications. E-tendering will revolutionize the tendering process in public universities in Kenya by improving efficiency, reducing administrative burdens, enhancing transparency and accountability, increasing supplier participation, improving bid evaluation and compliance, and generating cost savings. By embracing e-tendering technologies, universities can modernize their procurement

practices, drive greater value for money, and deliver better outcomes for stakeholders.

**Tendering Process efficiency**

The tendering process is bid solicitation, bid submission, bid selection, bid evaluation, and contract awarding of goods, work, or services by ensuring the best-fit supplier is selected in consideration for value for money and minimization of wastage. A supplier fitting this description is expected to be financially stable, possess technical expertise, have a strong commercial reputation, and be considered the most suitable choice for the given task. It is believed that the adoption of e-procurement will revolutionize the tendering process in public universities in Kenya by digitizing and automating procurement activities, enhancing transparency and accountability, improving supplier participation, reducing costs, ensuring compliance, and enabling data-driven decision-making. By embracing e-procurement, universities can modernize their procurement practices, achieve greater efficiency and effectiveness, and ultimately deliver better value for money in procurement outcomes.

**RESEARCH METHODOLOGY**

This study covered all 34 public chartered universities in Kenya. The target population comprised 136 respondents purposively from those with relevant information for the study from the heads of procurement, heads of stores heads of finance, and heads of ICT, who provided valuable insights based on their expert knowledge and

experience in the application of electronic procurement systems.

The determination of sample size employed by Slovin., (1960), is expressed as,  $n=N/ [(1+N (e) 2)]$ . Here  $n$  represents the sample size,  $N$  is the population size, and  $e$  denotes the level of precision. Applying this formula to a population of 136 resulted in the equation,  $n= 136/ [1+136(0.05)^2] = 102$  where a sample size of 102 was arrived at. Primary data for the research was predominantly obtained through the utilization of structured questionnaires. Data collected was scrutinized for consistency, accuracy, completeness, and uniformity in preparation for analysis. Descriptive investigation emphasized summarizing data set using numerical measures inform of mean and standard deviation and the data was presented in the form of tables. Simple regression was carried out to investigate the association between the dependent variable and independent variable. The regression model for prediction is,  $Y = \beta_0 + \beta_1 X_1 + \varepsilon$ , Where  $Y$  = Tendering process (Dependent variable),  $\beta_0$ ,  $\beta_1$ , are regression slopes that need to be projected,  $X_1$ = electronic ordering and  $\varepsilon$  = residual error.

## DATA ANALYSIS, RESULTS AND DISCUSSION

### Electronic ordering

Table 1.1 presents the mean and standard deviation for various statements related to electronic ordering in the context of the study. To find out the effect of e-ordering, the researcher asked whether e-catalogue decreases sourcing and operational cost where results show that respondents perceive e-catalogues positively in terms of reducing sourcing and operation costs with a high mean score of 4.28 indicating a favorable perception of e-catalogues' effectiveness in cost reduction. The study also wanted to find out whether the e-requisition system had enhanced easy approvals of purchase

orders online where results show that respondents generally perceive the e-requisition system positively in terms of facilitating easy approvals of purchase orders online where the high mean score (Mean = 4.54) suggests a strong agreement among respondents regarding the effectiveness of the e-requisition system in streamlining approval processes. The researcher further enquired whether e-authorization reduces order approval processing time and similarly, respondents perceive e-authorization positively in terms of reducing order approval processing time with a mean score of 4.44 indicating a high level of agreement among respondents hence suggesting that e-authorization is effective in expediting the approval process for orders. Finally, the research also wanted to establish the delivery of goods and services by asking whether e-receipts improved order execution and efficiency and the results reflect a positive perception of e-receipts and their impact on order execution and efficiency. The mean score of 4.46 suggests strong agreement among respondents regarding the benefits of e-receipts in improving the execution of orders and overall efficiency. Overall, the analysis of Table 1.1 suggests that respondents have a positive perception of various aspects of electronic ordering systems, including e-requisition, e-authorization, e-receipt, and e-catalogue. These findings highlight the perceived benefits of adopting electronic ordering systems in terms of streamlining processes, reducing processing time, improving efficiency, and lowering costs within the context of the study. The finding presented in the table below shows that all respondents obtained a mean score above 4, meaning all are in concurrence with the statements on the scale. This indicates that the adoption of electronic ordering is an important aspect of the effectiveness of the tendering process. This is supported by the study by Munyao and Moronge (2018), that electronic ordering practices on procurement performance in Kenyan public universities significantly reduce procurement costs, ranging from 8 to 15 percent.

**Table 1.1 Electronic ordering**

Statement on Electronic ordering	Mean	Std. D
E-requisition system has enhanced easy approvals of purchase orders online	4.54	0.74
E-authorization reduce order approval processing time	4.44	0.82
E-receipt improves order execution and efficiency	4.46	0.77
E-catalogue decreases sourcing and operation cost	4.28	0.89

### Tendering Process efficiency

The respondents were asked to indicate the extent to which effectiveness of tendering process effect on adoption of electronic ordering in public universities. The responses were given a score ranging from one to five, where 1 meant Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree, and 5= Strongly Agree. Mean and Standard deviation were calculated as shown in Table 1.2. The respondents indicated that, to a great extent, Effective and efficient tendering process reduces cost (M=4.59, SD=0.62), Effective and efficient Tendering process improves quality of goods, work and services (M=4.44, SD=0.72), Effective and efficient Tendering process enhances transparency (M=4.62, SD=0.57), and Effective and efficient Tendering process reduce lead time of procurement of goods, work and services (M=4.48, SD=0.67). The finding presented below showed that most of the respondents obtained a mean score above 4, indicating that majority of the them were in agreement with the statement on the scale. This shows that the adoption of electronic ordering applications enhances efficiency and effectiveness of supply chain performance specifically tendering process as supported by

(Croom & Brandon, 2005) e-procurement offers an efficient approach to decrease both material costs and transaction costs by utilizing competitive bidding and online negotiation. Through these methods, e-procurement facilitates the identification of high-quality products and services at the most favorable prices, often accompanied by discounts. Moreover, companies can strategically streamline their supplier pool to a select few, leading to reduced legal expenses associated with supplier management, substantially inventory savings, and reduced instances of unauthorized dealings. According to the participants, the pre-bidding phase, encompassing activities like supplier identification and documentation access, along with the bidding stages, involving online submission, real-time communication, and automated evaluation, are well-suited for electronic automation. Additionally, the post-bidding stages, such as contract finalization, performance monitoring, and payment processing, were also emphasized. The prevailing viewpoint among respondents is that automating the entire tendering process is crucial for establishing a seamless end-to-end procurement process.

**Table 1.2 Tendering Process**

Statement of Tendering Process	Mean	Std. D
Effective and efficient tendering process reduce cost	4.59	0.62
Effective and efficient Tendering process improve quality of goods, work and services	4.44	0.72
Effective and efficient Tendering process enhances transparency	4.62	0.57
Effective and efficient Tendering process reduce lead time of procurement of goods, work and services	4.48	0.67

### Inferential Results

The research employed regression techniques, specifically model summaries, ANOVA, and regression coefficients to assess the impact of various variables on the effectiveness of the

tendering process. The regression model summary was utilized to gauge the degree to which the tendering process is influenced by the adoption of electronic ordering, while the coefficients were utilized to demonstrate how changes in the values

of the e-ordering variables correlate with changes in the tendering process.

**Model Summary Electronic ordering and its effect on Tendering Process efficiency**

The coefficient of determination (R Square) was 0.279, indicating that approximately 27.9% of the

variability in the effectiveness of the tendering process can be explained by the predictor variable. The model suggests that Electronic Ordering has a moderate, positive linear correlation relationship between the adoption of electronic ordering and its effect on the tendering process. The findings are shown in Table 1.3.

**Table 1.3 Model Summary Electronic ordering and its effectiveness on Tendering Process**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528 <sup>a</sup>	.279	.271	1.650

a. Predictors: (Constant), Electronic Ordering

**ANOVA**

ANOVA divides the total observed variation within a dataset into distinct elements: variance between groups and variance within groups. This comparison between the group variances determines whether the discrepancies noticed among the group means surpass what might occur randomly.

**ANOVA for Electronic ordering and its effectiveness on Tendering Process**

The analysis utilized a linear regression model to examine the association between the dependent variable, Tendering Process, and independent variable, Electronic ordering. The ANOVA

Table 1.4 shows that the regression model is statistically significant ( $F(1, 88) = 34.077, p < .001$ ), indicating that the predictor variable (Electronic Ordering) significantly contributes to explaining the variability in the effectiveness of the tendering process. The regression model accounts for a substantial portion of the variance, as evidenced by the large sum of squares attributed to the regression (92.816). This suggests that the model is a good fit for the data. The mean square for the regression is 92.816, indicating that the variance explained by the model is much greater than the residual variance (2.724). Overall, this ANOVA analysis suggests that Electronic Ordering has a significant impact on the effectiveness of the tendering process.

**Table 1.4 ANOVA for Electronic ordering and its effectiveness on Tendering Process**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	92.816	1	92.816	34.077	.000 <sup>a</sup>
	Residual	239.684	88	2.724		
	Total	332.500	89			

a. Predictors: (Constant), Electronic Ordering

b. Dependent Variable: Tendering Process

**Regression for Electronic ordering and its effect on Tendering Process**

The regression equation is expressed as follows: The tendering process equals 10.385 plus the value of electronic ordering. This equation suggests that when electronic ordering equals zero, the tendering process is predicted to be

10.385. Furthermore, for each unit increase in electronic ordering, the tendering process is expected to improve by 0.437 points. Statistical analysis indicates that electronic ordering exhibits a moderate association with a p-value of 0.000 at a significance level of 5% and a confidence level of 95%. This suggests a moderate relationship between electronic ordering and other variables.

By observing variations in the predictor's value and its impact on the response variable, it becomes apparent that incorporating electronic ordering into the model would be advantageous. Additional information regarding electronic ordering is available in Table 1.5. This equation represents a simple linear regression model, demonstrating the relationship between the effectiveness of the tendering process and electronic ordering. According to the equation, the effectiveness of the

tendering process (dependent variable) is influenced by a constant term of 10.385, in addition to 0.437 multiplied by electronic ordering (independent variable). The coefficient of 0.437 indicates a 43.7% strength in the relationship between electronic ordering and the effectiveness of the tendering process. A higher coefficient value suggests that greater electronic ordering is associated with increased effectiveness in the tendering process.

**Table 1.5 Regression for Electronic ordering and its effect on Tendering Process**

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
1 (Constant)	10.385	1.344		7.724	.000
Electronic Ordering	.437	.075	.528	5.838	.000

a. Dependent Variable: Tendering Process

### Hypothesis test

To test hypothesis regarding the effect of e-ordering on tendering process, the researcher employed quantitative results of Table 1.5 for regression Model.

Hypothesis postulated that,

**H<sub>01</sub>:** Adoption of electronic ordering has no statistically significant effect on tendering process efficiency in public universities in Kenya.

The results of simple linear regression, reveal that e-tendering adoption has a p-value = .000. Since the p-value is less than 0.05, the null hypothesis was rejected. It was concluded that adoption of electronic ordering has a statistically significant effect on tendering process efficiency in public universities in Kenya.

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### Summary of Electronic ordering and its effectiveness on the tendering process

Results reveal a positive perception among respondents regarding various aspects of electronic ordering systems in the context of the

study. Respondents perceive e-catalogues positively in terms of reducing sourcing and operational costs, indicating a favorable perception of their effectiveness in cost reduction. The e-requisition system is viewed positively, with respondents agreeing that it enhances easy approvals of purchase orders online. This suggests that the system is effective in streamlining approval processes. Similarly, respondents perceive e-authorization positively in terms of reducing order approval processing time, indicating its effectiveness in expediting the approval process for orders. The study finds a positive perception of e-receipts and their impact on order execution and efficiency. Respondents strongly agree that e-receipts improve the execution of orders and overall efficiency. Hence for electronic ordering, the responses indicate that respondents have a favorable view of electronic ordering systems, including e-requisition, e-authorization, e-receipt, and e-catalogue. These findings highlight the perceived benefits of adopting electronic ordering systems in terms of streamlining processes, reducing processing time, improving efficiency, and lowering costs within the context of the study.

### Conclusions for electronic ordering

The respondents emphasized that electronic ordering automates the procurement process, reducing manual intervention and expediting the entire tendering cycle. Automated workflows efficiently handle orders from tender initiation to contract finalization, establishing real-time communication channels for prompt updates. This transparency facilitates timely responses, reduces communication delays, and provides stakeholders with clear visibility into the tendering stages, eliminating extensive paperwork and reducing costs. Electronic ordering systems widen access to potential suppliers, fostering healthy competition, and resulting in improved bids and favorable pricing. The quicker evaluation process enabled by electronic ordering ensures an objective assessment based on predefined criteria, and detailed audit trails prove valuable for post-tender analysis, compliance audits, and performance evaluations.

### Recommendations for electronic ordering

In order to enhance the use of electronic ordering systems in public universities in Kenya, it is crucial to identify and address potential areas for development, notwithstanding the positive opinions expressed by the respondents. Institutions should invest resources in awareness campaigns and training programs to promote a more profound comprehension and wider acceptance of these systems among stakeholders.

Considering the statistically insignificant results of multiple regression from the hypothesis test on the influence of electronic ordering on the tendering process, it is necessary to do additional investigation and analysis to determine the underlying causes. Institutions have a responsibility to investigate and overcome any barriers that may prevent the smooth integration of electronic ordering systems into the tendering process. They should develop specific methods to effectively overcome these issues.

Institutions should implement a plan of ongoing assessment and improvement of their electronic ordering systems to correspond with the ever-

changing needs and expectations of stakeholders. This involves improving user interfaces to optimize usability, enhancing functionality to simplify procedures, and resolving any technical obstacles or limitations that may occur.

The explanation of the benefits of transparency enabled by electronic ordering systems highlights its importance. Therefore, institutions should emphasize the necessity of transparency and accountability during the procurement process. Utilizing electronic ordering systems to provide transparent visibility, maintain comprehensive audit trails, and guarantee compliance with regulations and standards is crucial.

Public institutions should proactively foster interaction with potential suppliers and utilize electronic ordering systems to expand access and encourage robust competition. One can consider implementing strategies like supplier outreach programs, online vendor platforms, and performance-based evaluations to encourage suppliers to participate and enhance the attractiveness of electronic ordering systems.

To enhance the effectiveness of electronic ordering systems, institutions should allocate resources toward training and capacity-building initiatives for individuals involved in procurement activities. This includes thorough training on how to use the system effectively, sharing the best practices for procurement, and explaining the criteria for compliance. The goal is to enable efficient and careful use of electronic ordering systems.

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