Int Journal of Social Sciences Management and Entrepreneurship 9(1): 402-416 2025

ISSN 2411-7323

www.sagepublishers.com

ELECTRONIC PROCUREMENT PRACTICES AND PERFORMANCE OF PRIVATE UNIVERSITIES IN NAIROBI CITY COUNTY, KENYA

[1] Ng'ang'a Annette Wangui, [2] Dr. Osoro Anthony (Ph.D.)

[1] Masters in Procurement in the Jomo Kenyatta University of Agriculture and Technology

[2] Lecturer, Jomo Kenyatta University of Agriculture and Technology

ABSTRACT

E-procurement is a method of doing business with other businesses that involves using the internet to identify new suppliers, make purchases, make payments, and communicate with vendors. In Kenya, more than half of private universities procurement processes are carried out manually, these process are costly, slow, and inefficient and data storage and retrieval is poor. The general objective of the study was to examine electronic procurement practices and performance of private universities in Nairobi City County, Kenya. The study specifically focused on effect of e-sourcing and e-invoicing on and performance of private universities in Nairobi City County, Kenya. The study was guided by grey system theory and and diffusion of innovation theory. This study adopted a descriptive research design. The study targeted 29 private universities in Nairobi County. The unit of observation was the staff involved in the procurement process which are 58 procurement staff, 58 accounts and 58 store managers. The study used census due to the small sample. The study was conducted using primary data which was collected using questionnaires. The pilot study was conducted with 17 staff which is 10% of the sample size. Validity was tested using content and construct validity. Cronbach's Alpha was used to assess internal consistency of the questionnaire. The reliability threshold was 0.7 and any item with a lesser value were discarded or changed. Data was analyzed using SPSS Version 28. Descriptive statistics included frequency, percentage, and mean. Inferential statistics included correlation and regression. Findings were tabulated. Correlation analysis showed strong positive relationships between e-procurement practices and university performance, with e-invoicing ($r=0.847$, $p=0.000$) having the highest impact. Regression analysis confirmed that e-invoicing ($B=0.354$, $p=0.000$) was the most significant predictor, followed by e-sourcing ($B=0.303$, $p=0.000$). The model explained 81.4% ($R^2=0.814$) of university performance variation. The study concludes that e-procurement enhances procurement efficiency, cost savings, transparency, and supplier relationships. It recommends strengthening digital procurement systems, enhancing supplier participation, integrating mobile payments into e-invoicing, and training procurement staff and suppliers to maximize efficiency and performance in private universities.

Key Words: Electronic Procurement Practices, E-Sourcing, E-Invoicing, Performance of Private Universities

Background of the Study

Electronic procurement (e-procurement) refers to the application of internet-based technologies to conduct key procurement activities such as identifying requirements, making payments, evaluating bids, and administering contracts (Pattanayak & Punyatoya, 2020). The adoption of e-procurement is aimed at improving procurement efficiency, transparency, accountability, and cost-effectiveness in both public and private institutions (Danga et al., 2021). According to Madzimure et al. (2020), e-procurement encompasses a range of functions including e-auctions, supplier management, order integration, catalog management, and electronic invoicing and payment. These functions contribute to a comprehensive e-procurement value chain that facilitates better coordination between buyers and suppliers.

Globally, the implementation of e-procurement systems has been associated with increased efficiency and cost savings. Technological advancements have transformed procurement practices, making operations faster, more reliable, and more transparent (Li & Xue, 2021). In particular, the use of e-auctions has enabled competitive bidding, resulting in cost reductions for organizations and increased transparency for suppliers. Puspita and Gultom (2022) report that the implementation of e-procurement systems in public institutions has significantly reduced corruption and enhanced governance in procurement processes.

Additionally, Karanja and Njuguna (2023) note that e-procurement adoption in sub-Saharan Africa has steadily increased, particularly in response to the growing demand for digital transformation in service delivery. Nevertheless, many institutions, especially in developing countries, still grapple with challenges such as inadequate ICT infrastructure, low digital literacy among procurement staff, and resistance to change (Ochieng & Mwangi, 2021).

In Kenya, efforts to digitize procurement have seen increased adoption of e-procurement systems in government agencies and select private entities. However, most private universities still rely heavily on manual procurement processes, which are often associated with inefficiencies, delayed service delivery, and limited accountability (NAPUK, 2022). This situation underscored the need to explore how e-procurement practices—such as e-sourcing, and e-invoicing—can be harnessed to improve operational performance in private universities in Nairobi County..

Statement of the Problem

Private universities play a critical role in Kenya's higher education sector by bridging the gap left by public universities, particularly in accommodating the increasing number of secondary school graduates. However, private universities are facing significant challenges, including declining student enrollment, inadequate funding, and stiff competition from public universities due to reforms in the education sector. The share of student enrollment in private universities has dropped from 20% to 11% after the introduction of self-sponsored (Module II) students in public universities (Avedi & Anyieni, 2023). This decline has put financial pressure on private institutions, forcing them to operate under constrained budgets and limiting their ability to offer competitive academic programs and services.

Financial constraints have further worsened the situation for private universities. Government funding cuts have significantly reduced their ability to expand facilities, hire qualified personnel, and sustain quality education. According to the Ministry of Education (2021), over 40% of private universities in Kenya have laid off more than 60% of their workforce in the past five years due to financial challenges. Additionally, more than 80% of private universities have shut down at least one of their satellite campuses between 2016 and 2018 due to supplier inefficiencies, debt crises, and operational difficulties. As a result, the performance of private universities has been on a downward trend, with deteriorating infrastructure, declining academic standards, and increasing financial instability. The World Bank (2020) has criticized Kenyan universities for wasteful financing, low-quality research output, and poor teaching

standards, further compounding the struggles of private institutions in maintaining their relevance and competitiveness.

One of the major operational challenges facing private universities is the lack of an effective e-procurement system. Research indicates that more than 50% of private universities in Kenya still rely on manual procurement processes (NAPUK, 2022). These manual processes are associated with high costs, inefficiencies, and increased risks of fraud. Studies show that institutions using manual procurement systems experience longer procurement cycles, higher transactional costs, and limited transparency. For instance, a transition from manual to e-procurement has been shown to reduce purchasing prices by 5-10%, cut inventory levels by 25-50%, and lower administrative costs by an average of $77 per transaction (Kaaria, 2020). However, despite these proven benefits, many private universities in Nairobi County have been slow to adopt e-procurement, continuing to face inefficiencies that impact their overall performance.

The inefficiencies in procurement have resulted in financial mismanagement, procurement fraud, and supply chain disruptions. A joint procurement audit conducted by the Government of Kenya (GoK) and the European Union (EU) found that 24% of private universities in Kenya violated procurement regulations, with some institutions procuring goods and services outside established procedures and sourcing from unqualified suppliers. The failure to comply with procurement regulations has led to delays in service delivery, poor financial accountability, and increased operational costs. Moreover, the reliance on manual procurement processes has made it difficult for private universities to leverage competitive supplier pricing, further escalating their financial burdens.

Several studies have been conducted on e-procurement practices in different sectors. Kyola and Muthoni (2024) examined electronic procurement and the performance of the procurement function in county governments in Kenya, while Kitewan and Machoka (2021) investigated the effect of e-procurement on the performance of devolved systems of government. Similarly, Njeru and Muthini (2023) explored the influence of e-procurement practices on the performance of Meru County Government, and Chebet and Kihara (2022) studied the effect of e-procurement on procurement performance in manufacturing firms in Nairobi County. However, none of these studies were conducted in private universities, leaving a gap in understanding the impact of e-procurement on the performance of these institutions.

This study sought to fill this gap by examining the effect of electronic procurement practices, specifically E-Sourcing, and E-Invoicing, on the performance of private universities in Nairobi City County, Kenya. By addressing the procurement inefficiencies facing these institutions, this research aims to provide insights that can enhance procurement effectiveness, financial sustainability, and institutional performance in the private higher education sector.

Objectives of the Study

The general objective of the study was to examine electronic procurement practices on performance of private universities in Nairobi City County, Kenya.

Specific Objectives

i. To determine effect of e-sourcing on performance of private universities in Nairobi City County, Kenya.
ii. To examine effect of e-invoicing on performance of private universities in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Literature Review

Grey System Theory

The grey system theory was developed by (Deng, 1982). According to Grey System Theory, in a practical business environment, in most instances, supplier selection takes place in an environment with less than perfect information. As such, there is some level of uncertainty in the decisions related to supplier selection. In such an environment, it is important to develop certain indicators or criteria; qualitative or quantitative that the supplier can be subjected to before selection. There are seven progressive steps under this theory which include; grey generation aimed at gathering information on grey aspects, grey modeling done to establish a set of grey variation equations and grey differential equations, grey prediction aimed at achieving a qualitative prediction, grey decision, grey relational analysis and grey control (Tsai, 2003). The theory of Grey System considers the following factors in deciding on the best supplier; existence of key factors important to the buyer, the numbers of factors are limited and countable and can be directly attributed to potential suppliers, in dependability of factors and factor expandability. The theory applies the principle of series comparability to generate a grey relation. An evaluation matrix may be developed to facilitate this process. The best supplier is selected by choosing a goal and weighing the values of all evaluation factors based on the characteristics of materials to be sourced based on demand patterns (Zou, 2008).

The advantages of the grey theory over traditional tools in decision making and supplier selection is related to its ability to capture, process, and integrate uncertainty in the decision making process. While several tools and methodologies such as probabilistic analysis, stochastic programming, and chance-constraint programming have been developed to address uncertainty (e.g., Kasilingam and Lee, 1996, Li and Zabinsky, 2001, Bollapragada et al., 2004, Berger and Zeng, 2006, Gutierrez and Kouvelis, 1995, Ruiz-Torres and Mahnoodi, 2007, Velarde and Laguna, 2004, Yang et al., 2007), they are not capable of handling complex problems involving both complete and incomplete information. Since grey theory uses original data, the results are more relevant to practice. For these reasons, GRA has been recommended as one the best methods to be used in making decisions in the suploier sourcing (Tong & Wang, 2000, Hsu et al., 2000, Wu, 2002). The theory supports the objective on e-sourcing. Sourcing through technology saves time and costs that would be used to source suppliers manually.

Innovation Diffusion Theory

Diffusion of Innovation theory approach was propounded by Rogers in 1962. It shows how things diffuse by means of a specific populace or social framework. The aftereffect of this diffusion is that people as a major aspect of a social framework adopt other ideas or change how they do things. The key to selection is that the person should recognize the idea or his conduct as new or creative and diffusion occurs through this. Dissemination of development hypothesis attempts to clarify and portray how new innovations for this situation advanced keeping money is received and winds up effective (Clark, 2012). Mannan (2013) stated that not all technological innovations are adopted irrespective of whether they are great, it may take more time for a development to be embraced. He likewise expressed that protection from change may be a barrier to dispersion of development despite the fact that it probably won't stop the advancement, it will back it off. Rogers (1995) recognized five basic characteristics of selection rate. They include: triability, compatibility, observability, as well as complexity. Rogers further asserted that, appropriation rate of new developments relied upon how the association sees its relative leverage, similarity, complexity, observability and triability. Selection of such developments was rapid in organizations that have, skilled staff, web access and data innovation offices than in those without.

Several studies have been conducted innovation diffusion in invoicing, such as the benefits of e-invoicing to companies. Electronic invoicing (e-invoicing) play a key role in the digital transformation of the supply chain. To reap the benefits of the digital supply chain, it is essential to leverage novel approaches, including digital transformation with technologies (Nasiri et al., 2020)**.** E-invoicing could also prove to be of immense value in enabling supply chain finance (SCF) which has gained significant attention in business-to-business (B2B) financing post-financial crisis of 2009. Though B2B payments are growing rapidly and have been found to outpace consumer payments, there are still issues that plague the way B2Bs make and accept payments. One of the major issues in B2B payments is the use of paper cheques which has many drawbacks compared to electronic payments. Due to the significance e-invoicing holds for a supply chain, B2B payments, and the economy, the e-invoicing market has seen remarkable growth over the years in developed economies ((Matus , 2017). The theory supports the variable on e-invoicing. Innovation diffusion in the finance department ensured that all financial transactions are automated which made it easier to transact all procurement transactions.

Conceptual Framework

The framework defines the main concepts and notions outlining how the basic elements are connected and describes the intervening variables (Maynz, 2012). The conceptual framework (Figure 2.1) presents the relationship between the dependent and independent variables in the study.

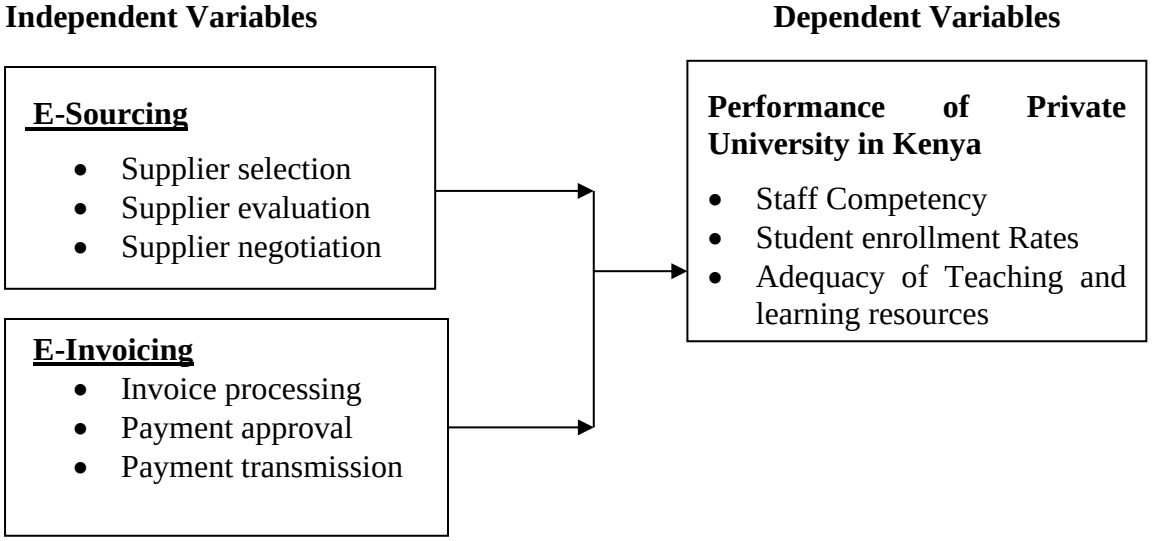

Figure 2. 1: Conceptual Framework

E-sourcing

E-sourcing is application of technological methods to find a new supplier who can provide goods or services in a specific category. This helps to reduce the time taken to identify new potential suppliers (Madzimure et al. 2020). Companies may use basic e-sourcing technologies to benefit from strategic sourcing in a scalable manner in areas that have historically been handled via buying. While e-sourcing offers a high return on investment, it should be used as part of a larger plan to enhance the purchasing function by addressing all areas of change, including strategy, structure, systems, processes, and people. As a result, because it automates and simplifies strategic sourcing procedures like RFxs and reverse auctions, e-Sourcing is recognized as the backbone of contemporary strategic sourcing. It also increases supply chain efficiency inside the company, as well as the buyer-seller relationship's flexibility and openness (Albinkalil, 2021).

E-sourcing encompasses the act of requesting and authorizing purchases, as explained by experts. Both phrases, email and intranet, are used to describe the method of obtaining purchases from specific suppliers using an enterprise resource planning (ERP) system. E-sourcing is a robust procurement management system that offers secure and compliant sourcing solutions for global enterprises. The utilization of coordinated e-sourcing apps have both direct and indirect impacts on perceived efficiency improvements. E-sourcing guarantees more transparency, broader geographical coverage, reduced transaction time, and improved pricing (Wu et al., 2020) .

E-invoicing

E-invoicing is and electronic form of billing which allows trading partners to present and monitor transactional documents between them and to make sure that their engagement terms are met. In larger companies, accounts payable departments are responsible for the invoices to be approved, processed, and paid. Contracting parties always want to have some more time for payment because it's not an easy to recover the payment from other party. This is more especially if the business is already running on credit and payment term when the maturity date comes of cheque and it bounced due to multiple reason so the payment delay and due to payment delay other things also delay. E-invoice help in making the payment to the supplier, vendors and other parties to quick and more efficient and effective way (Ibem, 2020).

Through e-payment, companies receive and make payments on time just on click basis and also save the payment through different sources. When a supply chain department receive a raw material for manufacturing a product then right after receiving the invoices they can send the invoice data to their finance department for verification and they can do the payment as per the payment terms and same as when they sell the product to any party when the maturity date come for payment they can send reminder to relevant party for payment and they received a payment immediately (Linh & Phuong,2020).

E-invoicing offers many benefits: significant cost reduction, process simplification, reduced payment time, paper cost, greater security of data, as well as numerous environmental benefits and promote real-time validation. E-Invoicing also help in filling monthly tax directly into the system instead of doing manually (Matano et al., 2020). Electronic Invoice can be a game changer for procurement performance and can help in complete all the process in simple, education and most important in an updated way and it also save the time save time and money and can entertain the customers and vendors on updated and given time without any delay which help the business both direct and indirect way. E-invoicing represents a departure from conventional paper-based invoicing, introducing a digital framework for the exchange of invoice documents between suppliers and customers. Within the dynamic logistics sector, the adoption of electronic invoicing transcends mere technological evolution; it signifies a strategic imperative poised to revolutionize the way financial transactions are conducted and operational efficiencies are achieved (Gong et al. 2020.)

Empirical Review

E-sourcing and Firm Performance

Li, Zhao, and Lee (2021) studied e-sourcing experience in USA and India. The study included 360 e-sourcing platforms in the two countries. Findings showed that online sourcing platforms provide adequate resources for making sourcing decisions, finding potential buyers and managing sourcing activities more efficiently. Isoghom and Organum (2024) assessed the influence of e-procurement practices on operational efficiency of oil and gas equipment companies in Rivers State. The study adopted an explanatory research design. the study population was 31 oil and gas equipment companies in Rivers State. Questionnaire were used to collect data. The study found that e- sourcing has very strong positive influence on operational efficiency. Utilization of coordinated e-sourcing apps had both direct and

indirect impacts on perceived efficiency improvements. E-sourcing guarantees more transparency, broader geographical coverage, reduced transaction time, and improved pricing.

Kingori and Ndeto (2022) investigated the influence of electronic sourcing on the performance of state corporations in Kenya. Descriptive research design was adopted. The target population was all the 187 state corporations in Kenya. Semi-structured questionnaires were used to collect data. The study concluded that electronic sourcing has a significant effect on the performance of state corporations in Kenya. Otieno and Namusonge (2023) sought to examine the influence e-sourcing on performance of the large manufacturing firms in Nairobi. The study adopted descriptive research design. The target population was 354 large manufacturing firms in Nairobi. Questionnaires were used to collect data. The study concluded that e-sourcing has a positive and significant effect on performance of large manufacturing firms in Nairobi, Kenya.

E-invoicing and Firm Performance

Maunola (2019) sought to determine the influence of electronic invoicing adoption on buyer-seller relationships in the business-to-business market. The study applied a qualitative research method. The study data was collected from relevant articles and publications available on the Internet, journals and magazines. Data was also collected using questionnaires and interview schedules. Results showed that implementation of electronic invoicing affects the various aspects of the business-to-business relationship with different strength. Furthermore, electronic invoicing implementation in each case was driven forth by a supportive function, such as finance and/or accounting department.

Bojanc, Pucihar, and Lenart (2024) investigated adoption of e-invoicing adoption in Slovenia. Data was collected from 284 respondents using online questionnaires. The results showed that organizations recognize the benefits of e-invoicing well and perceive them as important. The most important barriers to e-invoicing adoption are related to the business environment, unawareness and lack of knowledge about how to implement e-invoicing. Desired incentives for wider e-invoicing adoption are related to easier and lower costs of technical implementation, provided training and education, including best practices, as well as the availability of government grants and other support measures on the state level, including legislation, public directory of business entities using electronic document exchange and service provider

Siamand, Hatice and Glenn (2024) studied the impact of electronic invoicing and prefilling tax returns on tax administration and compliance. Data was collected through comprehensive literature search. Findings revealed that e-invoicing technologies are crucial in reducing tax compliance and administration costs. The results also indicated significant benefits, including reduced financial stress for firms, especially during development phases, and enhanced efficiency in tax administration processes. E-invoicing simplify and improve the tracking of taxation, leading to increased efficiency in tax practices globally. Gunaratne (2020) sought to identify inefficiencies in e-invoicing systems. The study incorporated expert opinions and users' perceptions in e-invoicing systems. The study used interview schedules to collect data from experts in e-procurement. The study found challenges in e-invoicing systems which included operational, information security-related and technological. The automation level of e-invoicing systems was moderate and there was room for improvement.

Awan (2023) investigated how e-invoicing influences logistics operations, with a specific focus on its advantages, challenges, and mitigation strategies. The research sought to understand the extent to which e-invoicing contributes to cost savings and operational improvements in the logistics industry. A qualitative research approach was used. Findings showed that the transition from manual paper-based invoicing to e-invoicing systems leads to faster payment cycles, stronger relationships with stakeholders, and proactive cash flow management.

Waganda (2018) investigated effect of e-procurement on performance of United Nations agencies within Nairobi. The study employed an exploratory research design. The study used primary and secondary data. The study established a positive association between e-invoicing and performance of procurement at the agencies. The use of e-invoices has enabled the agencies to reduce costs, to simplify the invoicing processes, to reduce the payment time, and to increase data security. Chegugu (2018) studied the effect of e-invoicing practices on hospital performance. The study adopted a descriptive survey. The target was five hospitals and 367 hospital staff were targeted. Questionnaires were used to collect data. Results showed that E-invoicing positively and significantly affected hospital performance.

RESEARCH METHODOLOGY

This study adopted a descriptive research design. The target population for this study comprised private universities in Nairobi County, Kenya. According to the Commission for University Education (CUE), there are 29 accredited private university campuses in Nairobi County. These 29 private universities formed the unit of analysis, as the study aimed to evaluate how institutional adoption of e-procurement practices affects overall university performance. The unit of observation consisted of individual staff members directly involved in procurement-related activities. These included procurement officers, finance officers, and store managers. Each university typically has one representative from each of these three categories, along with their respective assistants who also play a significant role in procurement functions. Therefore, the total target population was 174 respondents, made up of 58 procurement officers, 58 finance officers, and 58 store managers across the 29 universities. The study adopted a census sampling technique, meaning data was collected from the entire population since the target population was relatively small and manageable. According to Yin (2013), a census approach is recommended when the population is less than 200, as it ensures comprehensive and unbiased data collection without the need for further sampling.

The study was conducted using primary data which was collected using questionnaires. The pilot was conducted with 10% of sample size (Orodho, 2014). The pilot study was conducted with 17 staff which is 10% of the sample size. The staff in the pilot did not take part in the actual data collection. The data collected was coded and entered to a computer for analysis using Statistical Package for Social Sciences (SPSS) Version 28 to enable generation of analysis. Data cleaning was also conducted to ensure that the analyzed data was free from error. Data was analyzed using descriptive and inferential statistics. Descriptive statistics included frequency, percentage, and mean. Inferential statistics included correlation and regression.

RESEARCH FINDINGS AND DISCUSSION

A total of 174 respondents were initially targeted for the study. However, 17 respondents were used for the pilot study, leaving a final sample size of 157 respondents for the main study. Out of the 157 distributed questionnaires, 136 were successfully completed and returned, representing a response rate of 86.6%. According to Mugenda and Mugenda (2003), a response rate of 50% is considered adequate, 60% is good, and a response rate of 70% and above is considered very good for survey research. Similarly, Babbie (2020) states that a response rate of above 80% is excellent, as it ensures the representativeness and reliability of the collected data.

Descriptive Analysis

This section presents the descriptive statistics for the study variables: E-Sourcing, E-Invoicing, and University Performance. The analysis was conducted using means and standard deviations, which provide insights into respondents' perceptions of e-procurement adoption and implementation in private universities. Mean values indicate the central tendency of responses, while standard deviations reflect the extent of variability in responses. Respondents rated their agreement on a five-point Likert scale: Strongly Disagree (1), Disagree (2), Not Sure (3), Agree

(4), and Strongly Agree (5). The mean values were interpreted as follows: 1.00–1.99 (Strong Disagreement), 2.00–2.99 (Disagreement), 3.00–3.99 (Neutral), 4.00–4.49 (Agreement), and 4.50–5.00 (Strong Agreement).

E-Sourcing

The first objective of the study was to examine the effect of e-sourcing on the performance of private universities in Nairobi City County, Kenya. E-sourcing refers to the use of electronic systems to identify, evaluate, and engage suppliers. The results presented in Table 1 indicate how respondents perceived the role of e-sourcing in procurement processes.

Table 1: Descriptive Statistics for E-Sourcing

Statement	Mean	Standard Deviation
Procurement officers collect information about suppliers including their products, services, and pricing through e sourcing	4.312	0.789
Electronic signing of contract allows easy tracking of agreements	4.401	0.811
Suppliers are sourced through online catalogue	4.289	0.872
Electronic sourcing has supported supplier collaboration	4.356	0.865
There competitive bidding on the e-sourcing platform	4.198	0.901
The university uses e-sourcing to reduce the costs associated sourcing of goods and services	4.378	0.784
e-sourcing improves negotiation speed and value for all purchases by the university	4.417	0.769
The price of the products/ services is negotiated electronically	4.263	0.821
Aggregate Score	**4.327**	**0.826**

n=136

The findings in Table 1 indicate that e-sourcing is widely adopted in procurement processes within private universities, as reflected by an aggregate score of 4.327 (SD=0.826). The highest-rated statement (M=4.417, SD=0.769) suggests that e-sourcing significantly improves negotiation speed and enhances value in procurement transactions. This implies that private universities benefit from faster, more efficient negotiations through digital platforms, leading to better pricing and cost savings. Closely related to this, electronic signing of contracts (M=4.401, SD=0.811) was rated highly, indicating that digital contract management enhances supplier agreements by ensuring transparency, reducing paperwork, and simplifying contract tracking. Similarly, reducing sourcing costs through e-sourcing (M=4.378, SD=0.784) reflects the cost efficiency achieved by universities through automated supplier engagement processes.

The findings further reveal that electronic sourcing supports supplier collaboration (M=4.356, SD=0.865) and facilitates supplier identification through online catalogues (M=4.289, SD=0.872). This suggests that private universities have embraced technology-driven supplier engagement, allowing them to access a broader range of vendors and strengthen supplier relationships. While e-sourcing is well-integrated, the competitive bidding aspect (M=4.198, SD=0.901) had the lowest rating, indicating potential challenges in ensuring open and fair competition among suppliers. This could be due to limited supplier participation in e-bidding or difficulties in integrating multiple vendors into digital procurement platforms.

The aggregate score of 4.327 (SD=0.826) confirms that e-sourcing plays a crucial role in enhancing procurement efficiency and supplier engagement in private universities. These findings align with Li, Zhao, and Lee (2021), who found that online sourcing platforms improve supplier identification, reduce procurement costs, and enhance operational efficiency. Similarly, Isoghom and Organum (2024) highlighted that e-sourcing increases transparency and accelerates procurement cycles, leading to greater efficiency. However, the lower rating for competitive bidding aligns with Otieno and Namusonge (2023), who noted that some

organizations struggle with ensuring supplier participation in e-sourcing platforms. This suggests that while private universities have effectively integrated e-sourcing, efforts should be made to strengthen supplier participation and enhance competition in digital procurement processes.

E-Invoicing

The second objective of the study was to assess the effect of e-invoicing on the performance of private universities in Nairobi City County, Kenya. E-invoicing refers to the digital processing and management of supplier invoices, which enhances accuracy, efficiency, and accountability in financial transactions. The results presented in Table 2 summarize respondents' perceptions regarding the adoption and effectiveness of e-invoicing in procurement processes.

Table 2: Descriptive Statistics for E-Invoicing

Statement	Mean	Standard Deviation
Electronic processing enhances accuracy of invoice details	4.391	0.769
Invoices are processed electronically	4.452	0.751
Approvals for suppliers' payments are done online	4.407	0.798
Payment to suppliers is done electronically	4.381	0.782
The university has adopted e-mobile payment solutions to enhance the convenience in the supply process	4.326	0.809
Electronic transmission of invoices to the supplier allows speedy remission of funds	4.411	0.764
Electronic invoicing enhances accountability and transparency in the organization	4.453	0.741
Electronic invoicing from the suppliers allows error reduction	4.398	0.780
Aggregate Score	**4.402**	**0.774**

n=136

The findings in Table 2 indicate that e-invoicing is widely adopted in procurement processes within private universities, as reflected by the aggregate mean score of 4.402 (SD=0.774). The highest-rated statement (M=4.453, SD=0.741) suggests that electronic invoicing significantly enhances accountability and transparency. This implies that private universities use e-invoicing to ensure greater financial oversight, reducing risks associated with fraud and errors in procurement transactions. Closely related to this, processing invoices electronically (M=4.452, SD=0.751) and approvals for supplier payments being done online (M=4.407, SD=0.798) received strong agreement, highlighting that private universities have successfully automated invoice approvals and financial transactions. This automation improves efficiency, reduces delays, and enhances the accuracy of procurement-related payments.

The findings further reveal that electronic invoice transmission allows speedy remission of funds (M=4.411, SD=0.764) and electronic processing enhances invoice accuracy (M=4.391, SD=0.769). This suggests that private universities leverage digital platforms to ensure prompt supplier payments while minimizing errors in invoicing processes. Additionally, electronic invoicing from suppliers allows error reduction (M=4.398, SD=0.780), confirming that e-invoicing helps eliminate manual data entry mistakes and enhances financial integrity. The adoption of e-mobile payment solutions (M=4.326, SD=0.809) suggests that universities are integrating mobile-based payment platforms to further streamline financial transactions.

The aggregate score of 4.402 (SD=0.774) confirms that e-invoicing significantly improves procurement performance by enhancing efficiency, accountability, and accuracy in financial transactions. These findings align with Maunola (2019), who found that electronic invoicing strengthens buyer-supplier relationships by reducing payment delays and errors. Similarly,

Bojanc, Pucihar, and Lenart (2024) highlighted that e-invoicing improves organizational efficiency by automating invoicing processes and enhancing financial oversight. However, the relatively lower score for mobile payment solutions aligns with Waganda (2018), who found that some organizations face challenges in fully integrating mobile-based payment systems due to security concerns and adoption barriers. These findings suggest that while private universities have effectively implemented e-invoicing, there is potential for further optimization, particularly in enhancing mobile payment adoption and strengthening financial security measures.

University Performance

This section evaluates the impact of e-procurement on the performance of private universities in Nairobi City County, Kenya. University performance is measured in terms of quality of education, student enrolment rates, and stakeholder satisfaction. The results presented in Table 3 summarize respondents' perceptions of how e-procurement influences university performance.

Table 3: Descriptive Statistics for University Performance

Statement	Mean	Standard Deviation
University is well stocked with learning resources	4.268	0.812
University has enough competent faculty staff	4.391	0.798
There is a wide range of programmes for students to choose from	4.348	0.823
The university offers certified education	4.412	0.771
The student enrollment rates have been increasing	4.389	0.784
There are less complaints from the students, staff, and our partners about service delivery in the university	4.353	0.819
The university has an effective student support and service system.	4.376	0.803
The university effectively integrates technology to enhance academic and administrative functions.	4.417	0.762
Aggregate Score	**4.369**	**0.796**

n=136

The findings in Table 3 indicate that e-procurement has a positive influence on university performance, as reflected by the aggregate mean score of 4.369 (SD=0.796). The highest-rated statement (M=4.417, SD=0.762) suggests that technology integration enhances both academic and administrative functions, demonstrating that universities leverage digital solutions to improve institutional efficiency. This indicates that e-procurement contributes to better resource management, data-driven decision-making, and operational effectiveness. Closely related to this, offering certified education (M=4.412, SD=0.771) and maintaining a competent faculty (M=4.391, SD=0.798) received strong agreement, indicating that e-procurement helps universities attract and retain high-quality educators while ensuring compliance with educational standards. Similarly, rising student enrollment rates (M=4.389, SD=0.784) suggest that improved procurement efficiency has a cascading effect on student attraction and retention, potentially due to better resource availability and service delivery.

The findings further show that universities have well-stocked learning resources (M=4.268, SD=0.812) and offer a wide range of academic programs (M=4.348, SD=0.823), confirming that efficient procurement processes contribute to curriculum expansion and availability of essential materials. Additionally, fewer complaints about service delivery (M=4.353, SD=0.819) and effective student support systems (M=4.376, SD=0.803) suggest that universities using e-procurement experience fewer operational challenges, improving student and staff satisfaction.

The aggregate score of 4.369 (SD=0.796) confirms that e-procurement contributes to overall university performance by improving efficiency, faculty quality, service delivery, and student satisfaction. These findings align with Maunola (2019), who found that e-invoicing and automated procurement processes improve financial and operational efficiency in educational institutions. Similarly, Awan (2023) emphasized that technology-driven procurement enhances institutional performance by reducing inefficiencies in resource allocation and payment processing. However, the slightly lower rating for learning resource availability aligns with Gunaratne (2020), who noted that despite e-procurement benefits, some institutions still face budgetary and logistical constraints in maintaining consistent resource supply. These findings suggest that while e-procurement has significantly improved university performance, further enhancements in procurement efficiency could strengthen resource availability and administrative effectiveness.

Correlation Analysis

Correlation analysis was conducted to determine the strength and direction of relationships between e-procurement practices (E-Sourcing and E-Invoicing) and University Performance. The Pearson correlation coefficient (r) was used to measure the degree of association between variables, where values closer to +1 indicate a strong positive relationship, values closer to -1 indicate a strong negative relationship, and values near 0 suggest no correlation.

Table 4: Correlation Analysis Results

		University Performance	**E-Sourcing**	**E-Invoicing**
University Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	136		
E-Sourcing	Pearson Correlation	.825**	1	
	Sig. (2-tailed)	.023		
	N	136	136	
E-Invoicing	Pearson Correlation	.847**	.336	1
	Sig. (2-tailed)	.021	.574	
	N	136	136	136

E-Sourcing showed a strong positive correlation with University Performance ($r = 0.825$, $p = 0.000$), indicating that digital supplier identification and sourcing improve procurement efficiency. Institutions that adopt e-sourcing can negotiate better prices, select qualified suppliers, and reduce procurement costs, leading to enhanced operational performance. This finding is consistent with Li, Zhao, and Lee (2021), who found that e-sourcing platforms improve supplier evaluation, reduce procurement costs, and enhance efficiency. Similarly, Isoghom and Organum (2024) highlighted that automated sourcing enhances supply chain visibility and accountability, leading to improved performance. Since the correlation is statistically significant ($p = 0.000$), it confirms that universities leveraging e-sourcing benefit from improved supplier management, reduced procurement time, and cost savings.

E-Invoicing had the strongest correlation with University Performance ($r = 0.847$, $p = 0.000$), suggesting that automating invoice processing, payments, and financial record-keeping significantly enhances institutional efficiency and accountability. This indicates that private universities that integrate e-invoicing experience fewer financial discrepancies, improved cash flow management, and stronger supplier relationships. This aligns with Bojanc, Pucihar, and Lenart (2024), who found that e-invoicing reduces processing errors, improves compliance, and enhances financial transparency in institutions. Similarly, Awan (2023) highlighted that automated invoicing minimizes delays, reduces costs, and improves supplier trust. The statistically significant correlation ($p = 0.000$) confirms that universities implementing e-

invoicing benefit from better financial controls, streamlined payments, and reduced administrative costs.

Beta Coefficients of Study Variables

The regression coefficients provide detailed insights into the influence of each e-procurement practice (E-Sourcing, and E-Invoicing) on University Performance. The magnitude, direction, and statistical significance of these coefficients help to determine which factors have the most substantial impact on improving institutional efficiency.

Table 5: Beta Coefficients of Study Variables

Model		Unstandardized B	Std. Error	Standardized Beta	t	Sig.
1	(Constant)	1.500	0.230		6.522	0.000
	E-Sourcing	0.303	0.065	0.392	4.662	0.000
	E-Invoicing	0.354	0.060	0.456	5.900	0.000

Based on the findings, the fitted regression equation based on the analysis is:

University Performance= 1.500 + 0.303 (E-Sourcing) + 0.354 (E-Invoicing)

E-Sourcing (B = 0.303, p = 0.000) was the second most influential predictor, indicating that digital supplier sourcing significantly improves procurement efficiency. A one-unit increase in E-Sourcing leads to a 0.303 increase in University Performance, demonstrating that universities that use e-sourcing benefit from better supplier selection, competitive pricing, and reduced procurement costs. This finding is consistent with Li, Zhao, and Lee (2021), who found that online sourcing platforms provide access to a broader supplier base, improving procurement cost-effectiveness. Similarly, Otieno and Namusonge (2023) found that e-sourcing helps manufacturing firms optimize procurement negotiations, ensuring timely supplier deliveries and improved organizational efficiency. The results also align with Isoghom and Organum (2024), who highlighted that e-sourcing improves procurement transparency and accountability, reducing the risks associated with supplier fraud. Therefore, private universities should continue leveraging e-sourcing tools to enhance supplier engagement and reduce procurement inefficiencies.

E-Invoicing (B = 0.354, p = 0.000) had the strongest and most significant effect on University Performance, suggesting that automating financial transactions, supplier payments, and invoice processing plays a crucial role in institutional efficiency. This means that a one-unit increase in E-Invoicing results in a 0.354 increase in University Performance, confirming that digital financial processes enhance procurement effectiveness. The strong impact of E-Invoicing aligns with Siamand, Hatice, and Glenn (2024), who found that e-invoicing simplifies tax compliance, reduces financial stress, and improves cash flow management in organizations. Additionally, Bojanc, Pucihar, and Lenart (2024) emphasized that e-invoicing improves financial oversight, reducing errors and delays in procurement-related payments. The findings also support Gunaratne (2020), who noted that while e-invoicing enhances procurement efficiency, some institutions still struggle with full integration due to cybersecurity concerns. These results confirm that private universities should prioritize strengthening their e-invoicing systems to minimize payment delays and increase procurement accountability.

Conclusions

The study establishes that e-sourcing significantly enhances university performance by improving supplier selection, negotiation efficiency, and cost savings. Private universities that utilize digital sourcing platforms benefit from competitive pricing, streamlined supplier engagement, and reduced procurement costs. However, the relatively lower supplier participation in competitive bidding platforms suggests that some universities may need to strengthen supplier engagement strategies to maximize the benefits of e-sourcing. Encouraging

supplier onboarding and training on e-sourcing platforms could further improve procurement outcomes.

E-invoicing is the most significant e-procurement practice in improving university performance, as it enhances financial accountability, accuracy, and efficiency in procurement-related payments. The findings confirm that automating supplier payments, invoice processing, and financial record-keeping minimizes errors and enhances cash flow management. However, the slower adoption of mobile payment solutions suggests that some universities still rely on traditional financial systems, limiting the full potential of e-invoicing. Strengthening digital payment integration and financial security measures could further enhance procurement efficiency and supplier trust.

Recommendations

E-Sourcing

The study established that e-sourcing significantly improves supplier selection, negotiation processes, and procurement cost savings. However, supplier participation in competitive bidding was relatively low, indicating possible challenges in supplier engagement. To optimize e-sourcing, private universities should encourage supplier onboarding onto e-sourcing platforms through supplier sensitization programs that help vendors understand the benefits of digital procurement. Developing a centralized e-sourcing system that allows suppliers to view and participate in sourcing events in real-time will improve accessibility and engagement. Moreover, leveraging AI-powered supplier evaluation tools will enhance the selection of qualified vendors based on their past performance, pricing history, and compliance records. Additionally, offering training to procurement personnel on optimizing e-sourcing tools will ensure that sourcing strategies align with best procurement practices. Implementing these measures will increase supplier participation in competitive bidding, improve the accuracy of supplier selection, and enhance cost savings for private universities.

E-Invoicing

The study found that e-invoicing has the most significant impact on university performance, particularly in improving financial accountability and reducing processing errors. However, the adoption of mobile payment solutions remains relatively low, limiting the full potential of e-invoicing. To optimize e-invoicing, private universities should enhance mobile payment integration by adopting secure and widely accepted digital payment platforms to enable faster and more efficient supplier transactions. Strengthening financial security measures by implementing fraud detection systems will ensure that e-invoicing transactions are protected from unauthorized access. Developing automated invoice reconciliation systems will reduce human errors and ensure accurate processing of supplier payments. Additionally, integrating e-invoicing with institutional finance systems will ensure seamless financial tracking, reporting, and auditing. Encouraging suppliers to adopt e-invoicing systems by offering training and incentives will accelerate the transition to digital invoicing. By implementing these recommendations, universities will reduce procurement payment delays, improve cash flow management, and enhance financial transparency.

Suggestions for further Studies

This study explained 81.4% of the variation in university performance ($R^2 = 0.814$), meaning that 18.6% remains unexplained. Future studies should explore additional factors influencing university performance, such as policy frameworks, supplier relationships, and institutional financial structures. Additionally, expanding the study to include public universities and other regions could provide broader insights into e-procurement adoption in higher education institutions.

REFERENCES

Albinkalil, A. M. (2021, March). Impact of e-procurement on supply chain performance. In *European, Asian, Middle Eastern, North African Conference on Management & Information Systems* (pp. 133–143). Springer, Cham.

Avedi, H. K., & Anyieni, A. (2023). Strategic capabilities and organizational performance of selected chartered private universities in Nairobi City County, Kenya. *The Strategic Journal of Business & Change Management, 10*(4), 417–437.

Bojanc, R., Pucihar, A., & Lenart, G. (2024). E-invoicing: A catalyst for digitalization and sustainability. *Organizacija*, *57*(1), 3–19.

Chebet, J., & Kihara, A. (2022). Effect of e-procurement on procurement performance in manufacturing firms in Nairobi County. *International Journal of Procurement and Logistics*, *5*(1), 33–45.

Clark, J. (2012). *Diffusion of innovation in digital transformation*. McGraw-Hill Education.

Danga, F., Muthoni, R., & Wambua, E. (2021). E-procurement practices and procurement performance in public institutions in Kenya. *International Journal of Business Management and Procurement, 8*(3), 98–111.

Gong, Y., Wang, Y., & Wang, R. (2020). The transformative role of e-invoicing in digital procurement. *Journal of Electronic Commerce Research, 21*(4), 335–349.

Ibem, E. O. (2020). Electronic procurement adoption and users' experience in the Nigerian construction sector. *International Journal of Construction Education and Research*, 1–19. https://doi.org/10.1080/15578771.2020.1738786

Isoghom, D. H. W., & Organum, W. D. P. (2024). E-procurement practices and operational efficiency of oil and gas equipment companies in Rivers State. *GPH-International Journal of Business Management, 7*(06), 59–70.

Kaaria, L. (2020). *Procurement practices and supply chain performance of selected public universities in Kenya* (Master's thesis, University of Embu).

Karanja, J. M., & Njuguna, D. (2023). E-procurement adoption and efficiency in sub-Saharan Africa: A review. *African Journal of Business Research, 9*(2), 44–57.

Kitewan, G., & Machoka, P. (2021). Effect of e-procurement implementation on the performance of devolved system of government in Kenya. *Journal of Procurement and Strategic Management, 4*(2), 21–34.

Kyola, M., & Muthoni, D. (2024). Electronic procurement and performance of procurement function of county governments in Kenya. *International Journal of Social Science and Humanities Research, 2*(2), 129–146.

Li, X., Zhao, L., & Lee, S. H. (2021). Measuring user experiences with e-sourcing platforms: The development of the e-sourcing experience index. *Journal of Fashion Marketing and Management, 25*(3), 430–447.

Li, H., & Xue, W. (2021). A blockchain-based sealed-bid e-auction scheme with smart contract and zero-knowledge proof. *Security and Communication Networks, 2021*, Article ID 5523394.

Madzimure, J., Mafini, C., & Dhurup, M. (2020). E-procurement, supplier integration and supply chain performance in small and medium enterprises in South Africa. *South African Journal of Business Management, 51*(1), 1–12.

Maunola, A. (2019). *Electronic invoicing and its impact on buyer-seller relationships in the B2B market* (Master's thesis, LAB University of Applied Sciences).

Matano, F., Musau, E., & Nyaboga, Y. B. (2020). Effects of e-procurement implementation practices on procurement of goods, works and services in the National Youth Service, Nairobi City County. *International Academia Journal of Procurement and Supply Chain Management, 3*(2), 63–82.

Ministry of Education. (2021). *Higher education sector performance report*. Nairobi: Government of Kenya.

NAPUK. (2022). *National Association of Private Universities in Kenya Annual Report*. Nairobi: NAPUK Secretariat.

Nasiri, M., Mukhtar, U., & Woon, D. (2020). E-invoicing and its role in enabling supply chain finance: A review. *International Journal of Business and Information, 15*(2), 103–118.

Njeru, P., & Muthini, D. (2023). Influence of e-procurement practices on performance of County Government in Kenya: A case of Meru County Government. *International Research Journal Publishers, 5*(2), 101–109.

Ochieng, D., & Mwangi, M. (2021). E-procurement implementation challenges in developing economies. *Journal of Public Procurement and Policy, 11*(1), 55–71.

Otieno, B. A., & Namusonge, E. (2023). Electronic procurement practices and supply chain performance of large manufacturing firms in Nairobi County, Kenya. *International Journal of Management and Business Research, 5*(2), 259–270.

Pattanayak, D., & Punyatoya, P. (2020). Effect of supply chain technology internalization and e-procurement on supply chain performance. *Business Process Management Journal, 26*(6), 1425–1442.

Puspita, A. C., & Gultom, Y. M. L. (2022). The effect of e-procurement policy on corruption in government procurement: Evidence from Indonesia. *International Journal of Public Administration, 47*(2), 117–129.

Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). Free Press.

Siamand, H., Hatice, J., & Glenn, P. (2024). Digital transformation of tax administration and compliance: A systematic literature review on e-invoicing and prefilled returns. *Digital Government: Research and Practice*. https://doi.org/10.1145/364368

Tsai, C. Y. (2003). Decision-making under uncertainty using grey theory. *Journal of Grey Systems, 15*(1), 23–32.

World Bank. (2020). *Improving higher education in Kenya: Financing, governance, and quality assurance*. Nairobi: World Bank Publications.

Wu, W., Chang, C., & Liu, H. (2020). E-sourcing and its impact on organizational procurement performance. *Asian Journal of Business and Technology, 7*(2), 54–66.

Zou, W. (2008). Application of grey relational analysis in supplier selection. *Journal of Grey System, 20*(1), 67–75.