

**E-PROCUREMENT AND ENVIRONMENTAL SUSTAINABILITY: A CASE STUDY
OF KAMPALA CAPITAL CITY AUTHORITY (KCCA)**

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DECLARATION

I Nabimanya M. Blessing affirm that this dissertation is my own original work and to the best of my knowledge it has not been presented for examination in any other University or institute of learning.

Signature: 

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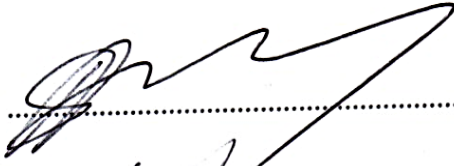
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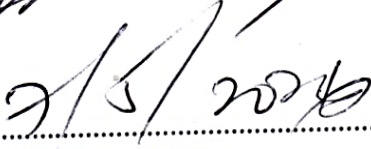
APPROVAL

This research report was completed under my supervision and guidance. It is hereby submitted to the faculty of business in partial fulfilment of The Requirements for The Award of a Degree of Bachelor of Procurement and Logistics Management of Uganda Christian University

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List of Abbreviations

AUM – Assets Under Management

EMP – Environmental Management Plan

e-GP – Electronic Government Procurement

ICT – Information and Communication Technology

ISO – International Organization for Standardization

KCCA – Kampala Capital City Authority

KI – Key Informant

NEMA – National Environment Management Authority

OECD – Organisation for Economic Co-operation and Development

PPDA – Public Procurement and Disposal of Public Assets Authority

SDGs – Sustainable Development Goals

SPSS – Statistical Package for the Social Sciences

UNEP – United Nations Environment Programme

ABSTRACT

This study examined the relationship between e-procurement practices and environmental sustainability at Kampala Capital City Authority (KCCA), Uganda. Specifically, the study assessed the effects of mandatory environmental criteria in e-procurement templates, e-procurement contract management, and supplier compliance monitoring on environmental sustainability outcomes. Anchored in Institutional Theory, the research adopted a quantitative case study design, using a structured questionnaire administered to 80 selected respondents, of whom 57 provided usable responses. Data were analyzed using descriptive statistics, Pearson correlation, and multiple regression analysis with the aid of SPSS.

The results obtained showed that e-procurement practices have a positive relationship with the outcomes of environmental sustainability. Correlation results revealed that among all the three dimensions of e-procurement and sustainability outcomes were strongly correlated and had significant relationships. The regression analysis further revealed that supplier compliance monitoring had the greatest and statistically significant impact on environmental sustainability, with mandatory environmental criteria and contract management showing positive but also marginally significant impacts. In general, the model had a high predictive ability, with 68.2% of the variation in the level of environmental sustainability explained.

The research finds that although KCCA has achieved significant progress towards embedding environmental concern into e-procurement, more can be done in terms of enhancing supplier compliance monitoring efforts to achieve more significant sustainability results. The research suggests to strengthen the enforcement mechanisms, to enhance the digital monitoring system, and to develop the capacity of the procurement employees and suppliers. The results are useful both in policy and practice because they provide empirical evidence of how the use of e-procurement can be exploited to promote environmental sustainability in public sector procurement in Uganda.

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Environmental sustainability has increasingly become a global imperative, shaping and impacting how policies are made, business practices, and institutional reforms worldwide (Choudhury, 2019). This growing emphasis is largely driven by the rising threats of climate change, loss of biodiversity and depletion of resources which has compelled an increased need for organizations to integrate environmental concerns in their operations for long term resilience and a sustainable development. (Aguti, 2014). In developing countries, the effects of environmental degradation are more intense and sustainability is not only a question of policy making, but also a question of social economic survival. Uganda like other countries has also pledged to promote environmental sustainability in its national development strategies and international frameworks like the Sustainable Development Goals. (SDGs)

Environmental sustainability refers to the responsible use and management of natural resources to protect ecosystems and meet the needs of both present and future generations (Goodland, 1995). Uganda's policy initiatives, like the National Environment Act and the Green Growth Development Strategy, focus on sustainable production, consumption and procurement. However, despite these frameworks, many public institutions struggle to mainstream sustainability principles into their operations. Studies show that there are still problems with low awareness, limited capacity to implement and poor integration of environmental criteria into the procurement process (Obicci et al., 2021).

Public procurement is one of the most strategic ways for promoting environmental sustainability. Procurement decisions directly influence patterns of production, consumption and waste generation, and it represent close to 60% of government expenditure (Agaba & Shipman, 2009). Recently, attention has been directed to e-procurement, a technology-based process that uses information and communication systems to conduct purchasing activities more efficiently and transparently (Neupane et al., 2014). E-procurement, besides improving efficiency and accountability, can also help to reduce environmental impacts through reducing paperwork, facilitating green supplier selection, and promoting sustainable sourcing practices.

However, this potential is not fully realized and the actual contribution of e-procurement to environmental sustainability in Uganda is limited and poorly documented. Many public entities continue to use traditional procurement methods that use a lot of paper, delays in transactions and little consideration for environmental criteria. There is little empirical evidence as to the extent to which e-procurement systems are effectively used to further sustainability outcomes. The gap is especially apparent in the case of Kampala Capital City Authority (KCCA), one of the largest procuring entities in Uganda, where the implementation of e-procurement is underway but the alignment with environmental sustainability goals is unclear.

Therefore, this study seeks to examine how e-procurement planning can be leveraged to enhance environmental sustainability within public procurement at KCCA. By exploring the link between technology adoption and the integration of environmental requirements, contract enforcement, and supplier compliance. Chapter One presents the background to the study, including the problem statement, general objectives, research questions, conceptual framework, study scope, significance, and justification of the study.

1.2 Background to the Study

1.2.1 Theoretical Background

This study is theoretically anchored in Institutional Theory. Developed by DiMaggio and Powell (1983), this framework provides a critical lens for understanding how organizations, such as the Kampala Capital City Authority (KCCA), adopt and institutionalize new practices like e-procurement and environmental sustainability in response to pressures from their external environment.

Institutional Theory

The Institutional theory indicates that organizations become similar with regard to their organizational structures and process. This phenomenon is evoked by institutional pressure that is subdivided into coercive, mimetic and normative pressure. Coercive pressure is pressure got from law, regulation and nonprofit organizations, Mimetic pressure is based on uncertainty inducing companies to copy their competitors and imitate activities of others in their sector to achieve legitimacy, Normative pressure is caused by professionalization through similar education background and professional networks and also through learning that take place in sustainable procurement training (Grob & Benn, 2014). This theory was relevant to this study as it mentions that one of the pressures is coercive whereby for organizations to implement sustainability into their

procurement, they must follow the laws and regulations of that country, for the donor organization if money is got to run a project so application of such laws will enable implementation of sustainability considerations. More so implementation of sustainability may originate from the business environment like competitors particularly in Uganda whereby organizations that have embraced sustainability considerations have seen an increase in demand of their goods, works and services and this induces entities like KCCA to benchmark. Finally, normative pressure in this case is from the training about sustainability and increased sensitivity about environmental impact as what people and society purchase has an impact on sustainability implementation.

1.2.2 Conceptual Background

E-procurement refers to the integration of digital platforms in public procurement processes to enhance efficiency, transparency, and accountability. According to (Vaidya et al., 2006) e-procurement encompasses activities such as e-tendering, e-contract management, supplier performance monitoring, and electronic catalogues. In the Ugandan context, the Public Procurement and Disposal of Public Assets Authority (PPDA) has championed the adoption of e- Government Procurement (e-GP) to improve procurement efficiency and curb corruption (PPDA, 2021).

According to the OECD 2020 report, e-procurement optimizes operations and allows for environmental criteria to be integrated into the tender process, supplier appraisal and contract enforcement. Environmental sustainability refers to the sustainable use of natural resource in a manner that meets present requirement without compromising the ability of future generations to meet their requirements (Meehan & Bryde, 2011). Inside the procurement field, green procurement, eco-efficiency and complying with environmental standards are all examples of environmental sustainability (Walker & Phillips, 2009).

KCCA and other urban authorities are facing huge environmental sustainability challenges such as poor waste management, air pollution, and unsustainable use of resources in service delivery. According to Testa et al. (2016), green procurement practices refer to buying goods, services and works which result in the least damage to the environment. Public involvement in the procurement of green products generates commercial demand for the manufacture of green products, creates less waste, and assists in achieving general environmental policy objectives.

Compliance to environmental regulations is another key indicator. Compliance involves adherence to the country's environmental regulations particularly NEMA and international regulations especially ISO 14001 by suppliers and contractors in executing the projects (McGuire, 2014). At last, resource efficiency is when energy, water and materials usage are optimized in procurement and service delivery. Sustainable procurement is increasingly recognized for its potential to promote resource efficient behaviors that can reduce environmental footprints and increase urban resilience (UNEP, 2017).

This study focusses at looking into the interplay between e-procurement practices and environmental sustainability. With mandatory environmental criteria integrated into e-procurement templates, suppliers will be selected with an eye toward sustainability. Efficient execution of contracts ensures that environmental commitments are enforced throughout the project's implementation. Monitoring supplier compliance creates accountability for sustainability indicators including resource efficiency, corporate compliance and green procurement. The conceptual background shows that procurement practices which were conventionally cost and efficiency-oriented are increasingly reconfigured to include environmental objectives. Public procurement has evolved over time from a transactional function to an instrument for sustainable development

1.3 Problem Statement

In Uganda almost 60 per cent of Government spending is on public procurement, and if well managed, it has the potential of being a driver of environmental sustainability Agaba and Shipman 2009. Despite this, public institutions' procurement systems prioritize minimizing costs and providing quality service, without much integration of green criteria, such as eco-sourcing, waste reduction, energy-efficient systems (Kagoya & Gilbert, 2020a). This results in a significant conflict between the country's environmental sustainability goals and procurement policies.

To enhance transparency and efficiency, Uganda introduced e-procurement in all government institutions. Research has shown it to contribute to increasing accountability, reducing corruption, and increasing cost-effectiveness in public procurement (Croom & Brandon- Jones, 2005). Still, there has not been much study on using e-procurement for environmental sustainability. Studies link e-procurement to green supply chains and less paper use (Sarkis, 2003); however, Ugandan research hardly studies its ability to bring about better environmental or social outcomes.

This is evident by the fact that existing studies on e-procurement in Uganda have mainly focused on efficiency, corruption control and service delivery improvements, with limited attention to whether e-procurement can support sustainable procurement practices (Nabata, 2015). As a result, there is little empirical evidence on how e-procurement tools such as electronic tendering, supplier databases, or digital evaluation systems shape environmental outcomes in public entities

Understanding this relationship is critical because environmentally sustainable procurement practices not only ensure compliance with international standards but also promote long-term economic and ecological resilience. Therefore, this study seeks to investigate how e-procurement influences environmental sustainability practices with in KCCA, focusing on how different e- procurement components influence environment sustainability outcomes

1.4 General objective of the study

To examine the relationship between e-procurement practices and environmental sustainability at KCCA.

1.5 Specific Objectives

- i To assess the effect of mandatory environmental criteria in KCCA's e-procurement templates on the uptake of green procurement practices
- ii To assess the effect of e-procurement contract management on compliance with environmental management plans at KCCA.
- iii To analyze the effect of supplier compliance monitoring in e-procurement on environmental sustainability outcomes at KCCA.

1.6 Research Questions

- i What is the relationship between e-procurement practices and environmental sustainability at KCCA?
- ii What is the effect of mandatory environmental criteria in KCCA's e-procurement templates on the uptake of green procurement practices?
- iii How does e-procurement contract management influence compliance with environmental management plans at KCCA?
- iv How does supplier compliance monitoring in e-procurement affect environmental sustainability outcomes at KCCA?
- v What challenges and opportunities are associated with implementing e-procurement for environmental sustainability in KCCA?

1.7 Hypotheses

- i Mandatory environmental criteria in KCCA's e-procurement templates have a significant positive effect on the uptake of green procurement practices.
- ii E-procurement contract management has a significant positive effect on compliance with environmental management plans at KCCA.
- iii Supplier compliance monitoring in e-procurement significantly enhances environmental sustainability outcomes at KCCA.

1.8 Justification of the Study

(Trkman & McCormack, 2010) Environmental sustainability is a critical concern for national development, as unsustainable procurement practices contribute to waste generation, pollution, and inefficient use of public resources. In Uganda, Public procurement is one of the largest areas of government spending, accounting for over 60% of the national budget (PPDA, 2021). This means it has a crucial role in promoting environmental sustainability by influencing waste reduction, energy efficiency, and sustainable sourcing. Although Uganda has embraced e-procurement to boost transparency and efficiency, there's been limited research on how it impacts environmental outcomes, particularly in urban authorities like the Kampala Capital City Authority (KCCA), which is grappling with serious waste management and pollution issues (Vaidya et al., 2006).

Most existing studies have concentrated on the benefits of e-procurement in terms of cost savings, accountability, and efficiency (Trkman & McCormack, 2010), leaving a significant gap in understanding its role in promoting green procurement and adherence to environmental standards. This study aims to fill that gap by exploring how e-procurement practices at KCCA influence environmental sustainability. It offers practical insights for policymakers and regulators, especially the Public Procurement and Disposal of Public Assets Authority (PPDA), to enhance guidelines that incorporate environmental criteria into e-procurement processes. For KCCA, it sheds light on the key opportunities and challenges in enforcing environmental compliance, improving contract management, and fostering sustainable urban development.

Beyond practical implications, this study enriches academic literature by connecting e-procurement research with sustainability studies in Uganda's public sector. The insights gained will benefit policymakers, practitioners, and scholars, while also serving as a valuable resource for future research on sustainable public procurement in developing countries.

1.9 Significance of the Study

The findings from this study will support different people such as the policymakers, regulators, and public institutions, offering solid evidence on how e-procurement practices can boost environmental sustainability. For instance, organizations like the Public Procurement and Disposal of Public Assets Authority (PPDA) and KCCA can use these findings to refine procurement guidelines, enhance contract management, and ensure they meet environmental standards.

On a community level, the study plays a vital role in improving urban service delivery and fostering a healthier environment through more sustainable procurement practices. This, in turn, builds public trust in KCCA's operations and encourages citizen support for green initiatives. For the academic community, this research adds to the sparse literature on the link between e-procurement and environmental sustainability in Uganda and similar developing countries, serving as a valuable resource for future scholars interested in sustainable public procurement.

For practitioners and development managers, the findings offer practical strategies to weave environmental considerations into procurement processes, leveraging the benefits of e-procurement while tackling existing challenges.

1.10 Scope of the Study

1.10.1 Geographical Scope

The study was conducted at Kampala Capital City Authority (KCCA) City Hall, situated on Apollo Kaggwa Road. KCCA is the public institution mandated to manage the administration and development of Kampala City. It was selected because it is among the leading procuring and disposing entities (PDEs) in Uganda that has embraced e-procurement under the PPDA framework, making it an appropriate setting for examining the link between e-procurement and environmental sustainability.

1.10.2 Content Scope

The study focused on e-procurement practices, specifically the integration of environmental criteria in tender templates, contract management, and supplier compliance monitoring. The research also examined the opportunities and challenges faced by KCCA in implementing e-procurement for green procurement practices. The central theme is to assess how e-procurement contributes to environmental sustainability in the country

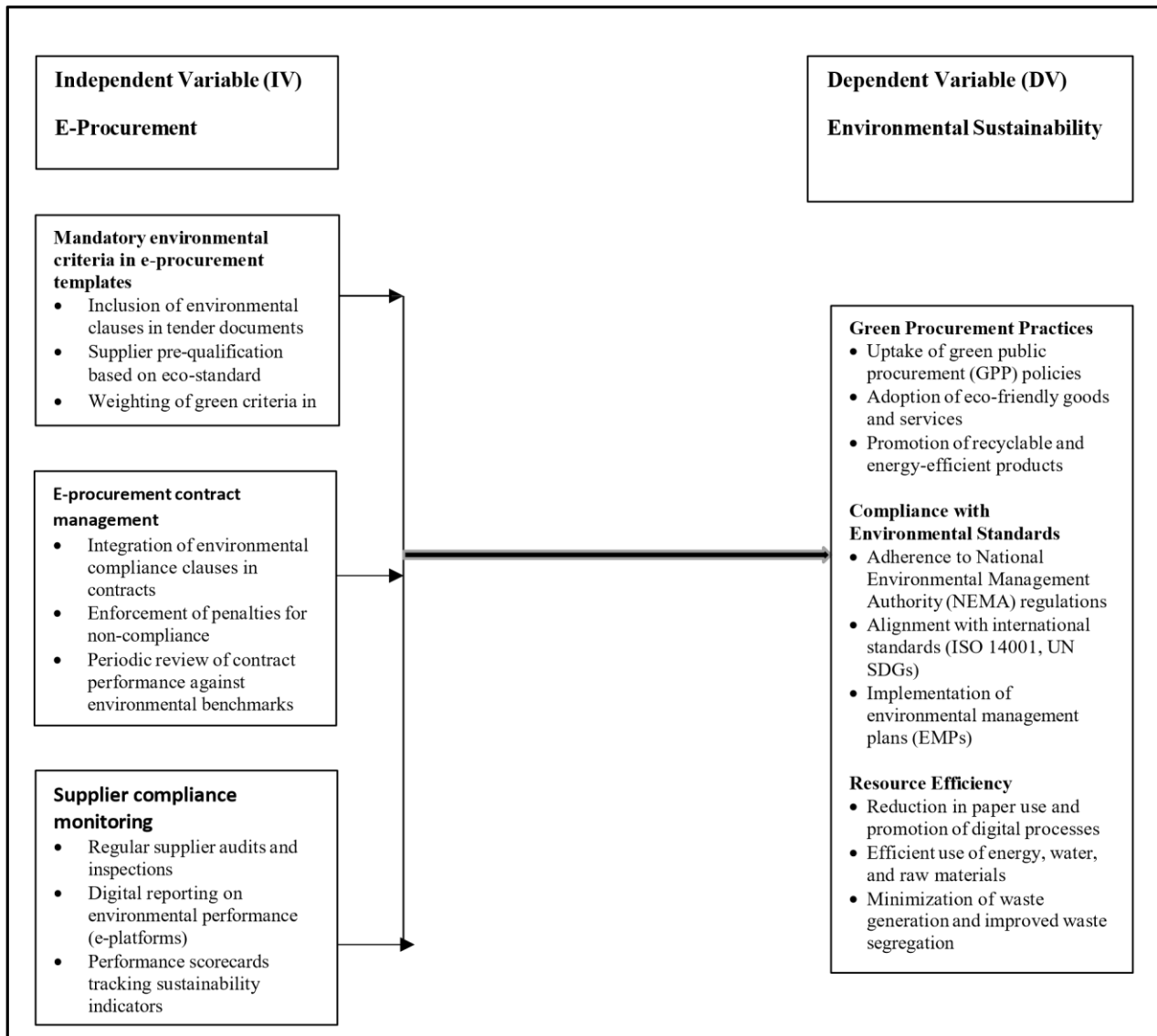
1.10.3 Time Scope

The study covered the period from 2021 to 2025, when the adoption of e-procurement was formally rolled out and implemented across PDEs in Uganda. This timeframe was relevant because it reflects the most recent reforms in Uganda's procurement systems and allows the study to capture early experiences, outcomes, and lessons in aligning e-procurement with environmental sustainability at KCCA.

1.11 Conceptual framework

Below is the Conceptual Framework of the study, for which E-Procurement is the independent variable and Environmental Sustainability is the dependent variable

Figure 1: Conceptual Framework showing the independent variable (E-Procurement) and Dependent variable (Environmental Sustainability)



Source: Developed by the research

1.12 Limitations and Delimitations

Like any other research, the study had the following limitations. First, the research was limited in terms of geographical scope to Kampala alone with Kampala Capital City Authority (KCCA) as a single case study, which makes generalizability of results to other local governments or public institutions in Uganda difficult.

Secondly, the study used data provided procurement officials, suppliers, and other stakeholders, which could have been prone to bias. This risk was minimized by using data from different sources.

Finally, limited time and lack of fund limited the research in terms of reaching to a wider range of participants to take part in the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature on the relationship between e-procurement and the environmental sustainability performance in the public sector with reference to KCCA. It is analyzed in terms of concepts, structures and evidence and the limitations and the gaps in the current literature analysis. To facilitate the comparison of the international best practices and the Ugandan situations, the analysis is structured based on the study questions.

2.2 Key Definitions

E-Procurement: Does the integration of digital technologies and platforms to automate, standardize, and manage the entire lifecycle of public procurement, including electronic tendering, electronic contract management, supplier relationship management, and performance monitoring systems (Appolloni et al., 2021).

Mandatory Environmental Criteria in Templates: Mandatory sustainability requirements embedded in digital procurement documents that suppliers must meet to be considered when submitting bids, such as specifications on the energy efficiency standards, recycled material content, emission limits, and certified environmental management systems (Cantele et al., 2023)

E-Procurement Contract Management: The systematic implementation of digital tools to manage, monitor, and enforce contractual obligations throughout the implementation of the procurement, including milestone tracking with electronic milestones, automated compliance checking, and payment mechanisms linked to the environmental performance implementations deliverables. (Achmad et al., 2025)

Supplier Compliance Monitoring: Digital tools to monitor and assess supplier compliance with environmental standards, through electronic performance dashboards, automated reporting systems, digital audit trails, and real-time compliance verification. (Shatta et al., 2020)

Environmental Sustainability: Organizational attitudes and practices that ensure ecological stability through effective use of resources, minimization of pollution, and maintenance of the ecology whilst satisfying the current needs without reducing the ability of future generations (Dienagha et al., 2025)

Green Procurement Practices: This is a systematic acquisition of goods, services and works that minimize environmental impact throughout their entire lifecycle and includes energy efficient products, recycled materials, non-toxic materials and services with proven environmental management credentials (Appolloni et al., 2021).

Resource Efficiency: The optimization of input materials, energy, and water to maximize output and minimize waste, emissions, and environmental degradation, with a focus on the principles of a circular economy and sustainable material flows (Tukker et al., 2018)

2.3 Theoretical Review

Application and Relevance of the Institutional Theory.

In this research, the Institutional Theory, which was developed by DiMaggio and Powell (1983) and refined by Scott (2014), was used to examine the implementation and institutionalization of the e-procurement in environmental sustainability in KCCA. The organizational isomorphism concept of the theory that explains why institutions develop certain digital procurement practices even when implementation is challenging offers a solid framework to explain the reasons why institutions pursue particular digital procurement practices.

Specifically, three isomorphic mechanisms can be identified: (1) Coercive pressures emitted by Ugandan Public Procurement and Disposal of Public Assets Act and National Environment Act which mandate sustainable procurement practices; (2) Mimetic pressures as the result of benchmarking with successful digital procurement implementations in peer institutions such as the e-procurement system in Rwanda and the integrated financial management system in Kenya; and (3) Normative pressures as the result of professionalization initiatives by PPDA and international development partners that promote environmental sustainability standards (Olupot, 2023)

Although the Institutional Theory is an effective tool in explaining initial adoption decisions, it has important shortcomings in explaining the outcome of implementation in developing contexts such as Uganda. First, the focus of the theory of the ceremonial adoption (Scott, 2005) lacks the ability to sufficiently address what (Obicci et al., 2021) term as the digital policy-practice decoupling where institutions such as KCCA adopt e-procurement systems on record to achieve legitimacy but continue to practice traditional, paper-based approaches internally. Recent research by (Chrisnos & Bu, n.d.) records how Ugandan governmental organization entities show symbolic compliance with

digital procurement requirements and still practice familiar and relationship-based procurement processes.

Second, the Institutional Theory does not adequately take into consideration the constraints of technological capacity. As (Cantele et al., 2023) remark, the simple adoption of digital systems does not necessarily result in successful use, especially in the areas with limited technical knowledge, unstable electricity, and insufficient internet connection. This digital readiness gap (Kagoya & Gilbert, 2020a) generates obstacles to implementation that institutional thinking tends to ignore.

Third, the theory does not provide sufficient explanations on the dynamics of corruption during digital transitions. Recent studies (Samuel et al., 2025) indicate that e-procurement systems in Uganda can generate new corruption opportunities by sharing credentials, manipulating bids in e-procurement systems, and digital exclusion of smaller suppliers with low technological capacity. These forces question institutional beliefs regarding digital systems as automatic anti-corruption systems.

2.4 Conceptual Review

The Importance of Having a Compulsory Environmental Requirement on E-Procurement Templates on Green Procurement Adoption.

The latest international sources showcase subtle conclusions about the obligatory environmental standards in digital procurement systems. It is shown that the European public agencies, which employ e-procurement with integrated environmental requirements, increase their purchases of sustainable products by 38-45% in comparison with the traditional procurement methods (Appolloni et al., 2021). The paper owes this success to "digital enforcement mechanisms" that minimize discretionary interpretation and standardize sustainability assessment. Equally, the OECD 2021 guidelines highlight that mandatory requirements in digital templates are powerful isomorphic mechanisms, that instil sustainability expectation directly in procurement processes.

Nevertheless, new critical studies find that there are serious drawbacks. They warn of so-called algorithmic rigidity with excessively specific digital requirements potentially squandering the innovation and creativity of suppliers in environmental solutions. Worse still, (Adjei-Bamfo et al., 2020) (Silva et al., 2023) report instances of what has been termed as digital greenwashing, whereby suppliers manipulate electronic submissions in order to appear compliant whilst engaging in

unsustainable practices a phenomenon that is particularly common when the verification mechanisms are weak.

The African experience demonstrates that there are significant implementation gaps despite the development of the policies. According to (Adjei-Bamfo et al., 2020), although Ghana e-procurement system integrated environmental criteria, its implementation was not consistent due to the lack of technical capacity among the procurement officers. This is in line with the Ugandan findings by (Emmanuel et al., 2025) who discovered that only 32% of the environmental clauses in environmental templates of e-procurement of KCCA were systematically enforced, with the gaps in enforcement being attributed to conflicting priorities of procurement, and lack of proper monitoring systems.

The comparison of regional studies brings about contradictory findings. Although (Singh et al., 2020) reported a gradual integration of environmental criteria in the e-procurement system of Kenya, research by (Emmanuel et al., 2025) revealed that Ugandan government agencies tended to symbolically incorporate environmental requirements in the bid assessment process without sufficient weighting. This mismatch implies that institutional leadership, technical capacity and monitoring structures are crucial in determining the success or failure of implementation.

There are still critical conceptual gaps to understand the effectiveness of mandatory environmental criteria in Uganda. First, the research is inconclusive on the optimal criteria specificity between broad sustainability principles and more detailed technical specifications give better environmental results in capacity-constrained situations. Second, the interplay between environmental considerations and the preference of the Ugandan government towards the lowest-rated bidder procurement has not been thoroughly investigated. According to the 2022 Annual Report of PPDA, environmental criteria generally have a lesser impact on the scores of bid evaluation, which may restrict their impact on the procurement decision.

These challenges result in what this research paper identifies as the digital compliance paradox where a lack of oversight mechanisms by technology systems can create new opportunities to be non-compliant.

The impact of E-Procurement Contract Management on Environmental Compliance Global Evidence with Comparative Analysis.

European public entities with integrated e-contract management systems that automated milestone tracking and performance-based payments resulted in a reduction in environmental violations by 52% (Oruezabala and Rico,2022) document that the European public entities had divergent perspectives on the environmental effectiveness of digital contract management systems. Likewise, the 2021 evaluation conducted by the World Bank shows that digital contract management in Latin America enhanced the level of compliance with environmental management plans due to the increased level of transparency and accountability mechanisms.

On the other hand, critical studies reveal implementation issues. They claim that digital contract management may produce a cycle of so-called compliance theater, whereby contractors are motivated to focus on reportable metrics, as opposed to substantive environmental improvement (Achmad et al., 2025). More problematic, recent studies by (Appolloni et al., 2021) reveal how the digital systems can be compromised through falsified electronic submissions and collusion with the monitoring officials especially when the institutions are weak in terms of institutional oversight.

African studies have mixed results of implementation. According to (Adjei-Bamfo et al., 2020), the e-contract management in Ghana increased the efficiency of the administration system but reported little integration with the environment, because of the limitations in the design of the system. This is consistent with the Ugandan results presented by (Shamim et al., 2025) who found that the e-procurement contract modules at KCCA were mainly used in financial tracking with environmental milestones being tracked by parallel, often inconsistent manual tracking.

There arises contradictory evidence on the issue of enforcement capacity. Although (Emmanuel et al., 2025) reported that KCCA was making progress in the digital adoption of contract management, an independent audit by Office of the Auditor General (2023) revealed that 68% of the environmental contract management clauses had not been integrated with digital monitoring mechanisms, but instead relied on sporadic physical checks that could be easily manipulated and did not always deliver consistent results.

There are still huge conceptual gaps in the literature on digital contract management. To begin with, even the most ideal relationship between the traditional environmental management tools (such as Environmental Impact Assessments) and the digital contract systems needs further development of the theoretical framework. Second, the relationship between automated monitoring and the needed level of human monitoring is also underresearched, especially in the context of a different level of digital literacy.

The implementation of the program in Uganda is faced with certain barriers: (1) Infrastructure gaps, which restrict real time monitoring in remote project sites; (2) technical capacity constraints between different contract managers; and (3) system interoperability challenges between various digital platforms (Kagoya & Gilbert, 2020b). These obstacles are part of what this research has found to be the problem of digital enforcement fragmentation wherein the technological capabilities exist independently but are unable to integrate into consistent environmental management systems.

Supplier Compliance Monitoring Effect on Environmental Sustainability Outcomes International Research with Critical Evaluation.

The existing global literature offers the sophisticated views on monitoring of digital suppliers. (Appolloni et al., 2021) demonstrate that European public agencies using integrated supplier monitoring systems achieved 41% greater improvement in environmental performance compared to those using conventional methods. The OECD (2021) guidelines highlight that electronic monitoring can increase accountability by decreasing discretion in environmental performance assessment.

Nevertheless, new critical research finds unwanted consequences. (Hardinata et al., 2025) records the effects of monitoring burden, where the huge digital reporting requirements can be a deterrent to small and medium enterprises to take part in the public procurement. More importantly, the recent research by (Kagoya and Gilbert, 2020a) indicates that digital monitoring systems may contribute to the perpetuation of existing inequalities by giving preference to technologically advanced suppliers and excluding smaller local providers that may be more sustainable.

Implementation experiences in Africa have shown that there are challenges in adapting. In Ghana, (Adjei-Bamfo et al., 2020) discovered that digital supplier monitoring was more effective at enhancing standards compliance than traditional methods, but had a limitation of low supplier technological capacity. This is similar to the Ugandan study by (Kagaya & Gilbert, 2020b), who found that supplier monitoring by KCCA was largely focused on delivery schedules and cost compliance, with environmental indicators receiving minimal systematic consideration.

Inconsistent results are obtained concerning the effectiveness of monitoring. Some of the studies find that there is some digital monitoring adoption progress. Others such as the PPDA Annual Report (2023) suggest that less than 35% of the procuring entities in Uganda systematically monitor the environmental performance of suppliers digitally, rather than relying on paper-based assessments that can be manipulated and lack consistency. Significant conceptual gaps are still evident in the literature on monitoring supplier compliance. First, the connection between monitoring intensity and supplier innovation is theoretically underdeveloped whether rigorous monitoring creates environmental innovation or motivates minimization of compliance. Second, conceptual innovation is necessary in integrating the informal sector that is very large in Uganda into the digital monitoring systems.

The Ugandan systemic constraints are issues of digital divide that do not allow smaller suppliers to monitor systems, capacity constraints of verification that limit the ability to assess data authenticity, and institutional fragmentation among various monitoring agencies (Ahimbisibwe et al., 2018). These constraints help to explain what this paper describes as the monitoring-implementation gap in which there are formal monitoring requirements but which do not translate into better environmental practices.

Recent international literature presents nuanced findings regarding mandatory environmental criteria in digital procurement systems. (Appolloni et al., 2021) demonstrate that European public agencies that use e-procurement with integrated environmental requirements increase purchases of sustainable products by 38-45% compared to conventional procurement methods. The study attributes this success to "digital enforcement mechanisms" that reduce discretionary interpretation and standardize sustainability assessment. Similarly, the OECD's 2021 guidelines emphasize that mandatory criteria in digital templates serve as powerful isomorphic mechanisms, embedding sustainability expectations directly into procurement workflows.

However, emerging critical research identifies significant limitations. (Samuel et al., 2025) caution against "algorithmic rigidity," where overly specific digital criteria may stifle supplier innovation and creativity in environmental solutions. More concerning, (Adjei-Bamfo et al., 2020) (Silva et al., 2023) document cases of "digital greenwashing," where suppliers manipulate electronic submissions to appear compliant while maintaining unsustainable practices a phenomenon particularly prevalent when verification mechanisms are weak.

The African experience reveals substantial implementation gaps despite policy advancements. (Adjei-Bamfo et al., 2020) found that while Ghana's e-procurement system incorporated environmental criteria, enforcement remained inconsistent due to limited technical capacity among procurement officers. This aligns with Ugandan findings by (Emmanuel et al., 2025) who discovered that only 32% of environmental clauses in KCCA's e-procurement templates were systematically enforced, with enforcement gaps attributed to conflicting procurement priorities and inadequate monitoring systems.

Contradictory findings emerge when comparing regional studies. While (Singh et al., 2020) reported progressive integration of environmental criteria in Kenya's e-procurement system, contrasting research by (Emmanuel et al., 2025) revealed that Ugandan public entities often included environmental requirements symbolically without adequate weighting in bid evaluation processes. This discrepancy suggests that implementation success depends heavily on institutional leadership, technical capacity, and monitoring frameworks.

Critical conceptual gaps persist in understanding mandatory environmental criteria effectiveness in Uganda. First, research lacks consensus on optimal criteria specificity whether broad sustainability principles or detailed technical specifications yield better environmental outcomes in capacity-constrained contexts. Second, the interaction between environmental criteria and Uganda's preference for the lowest-evaluated bidder procurement remains underexplored. As documented in PPDA's 2022 Annual Report, environmental criteria typically account for less than 20% of bid evaluation scores, potentially limiting their influence on procurement decisions.

2.5 Research Gap

The literature reviewed showed that there are some gaps in the literature in understanding the environmental role of e-procurement in Uganda. First, there is a theoretical-application gap whereby the Institutional Theory is found wanting to explain implementation issues that are unique to digital procurement in resource constrained settings. Second, an international-local translation gap arises in which international results on the environmental positive aspects of e- procurement fail to take into consideration the unique institutional, infrastructural, and capacity realities of Uganda. Third, there remains a methodological-comprehensiveness gap in which the current research is mainly descriptive, as opposed to analytical frameworks which evaluate causal relationships between particular e-procurement features and the quantifiable environmental impacts.

In the case of mandatory environmental criteria, the gap is how to achieve optimal specificity and evaluation weighting within the procurement regulations and capacity constraints of Uganda. In the case of e- procurement contract management, the gap is the ability to effectively combine the traditional environmental management practices with digital systems under the conditions of technical and institutional constraints. To ensure supplier compliance monitoring, the gap would be to create inclusive and context-appropriate digital monitoring that ensures environmental integrity without locking out smaller suppliers or creating excessive administrative burdens.

The study bridged the identified gaps by incorporating a critical institutional analysis to examine the substantive implementation challenges beyond mere adoption, and by investigating specific contextual factors in Uganda such as limiting digital infrastructure access, corruption, and capacity constraints that mediate the environmental effectiveness of e-procurement, utilizing a mixed-methods approach to establish evidence-based relationships between e-procurement practices and environmental outcomes at KCCA, and ultimately developing contextually appropriate recommendations that balance technological potential against institutional realities and sustainable development priorities.

The research therefore transcended descriptive accounts of the adoption of e-procurement to provide analytical insights into the mechanisms and barriers of the implementation to offer evidence-based strategies of leveraging digital procurement to enhance the environmental sustainability in the specific institutional setting and development goals of the Uganda context.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction.

This chapter introduces and explains methods which were used to gather and analyze data. It involves the data sources, sampling design which included determination of the sample size and selection of the respondents and data analysis where both descriptive analysis and hypothesis testing which were done.

3.2 Research Design.

This was a cross-sectional study in which quantitative data was gathered by semi-structured questionnaires. The sample population was the employees of KCCA who are directly connected with procurement. The study included only those participants who had provided informed consent and were willing to take part in the study.

3.3 Target Study Population.

The participants of the study were all the procurement and contract management employees of KCCA directly involved in the e-procurement processes and environmental compliance activities. In particular, the officers of the Procurement and Disposal Unit, the Contracts Management Unit, the Environment and Natural Resources Department, and the Finance Department. The reasons behind selecting them include their direct involvement and influence in the implementation process of e-procurement in the procurement process of the organization.

3.4 Sampling Technique.

The research made use of the simple random sampling technique to make sure that all individuals in the target population had an equal opportunity of being chosen. This method was chosen due to the simplicity of the method and the opportunity to obtain objective results (Creswell, 2012). The sampling process was conducted in the following manner: First a population was defined and this was followed by a compilation of a sampling frame where all possible officers were listed. Each person on the list was allotted a distinct number and 80 respondents were randomly chosen using random number generator.

3.5 Sample Size Determination

The sample size was calculated by the formula of sample size provided by Yamane (1967), which is a well-known formula and a statistically sound method of finite populations. This formula guaranteed a representative yet a reliable sample that would be used to make inferences about the population.

Formula:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

N= 100 (Population Size)

e = 0.05

n =required sample size

$$n = \frac{100}{1 + 100(0.05)^2}$$

$$n = \frac{100}{1 + 100(0.0025)}$$

$$n = \frac{100}{1 + 0.25}$$

$$n = \frac{100}{1.25}$$

$$n = 80$$

Sample size: 80 respondents

A sample of 80 respondents was used in the study which was randomly selected from the population of 100.

3.6 Operationalization of Variables

Independent Variables Measurement

Each of the three independent variables is measured by a set of five Likert-scale items that together were used to measure a variety of dimensions of implementation. These items were used to assess the presence and integration of each practice within the e-procurement system at KCCA, the extent to which requirements are enforced and mandatory, the specificity and clarity of the criteria or procedures, the perceived impact on the behavior and decision-making of procurement, and finally, the direct contribution to the desired sustainability outcomes. This multidimensional design was used to guarantee a comprehensive evaluation of each independent construct, as well as, consistency of measurements across variables.

Dependent Variable Measurement

The dependent variable, which was environmental sustainability, was operationized as a composite construct as three interrelated dimensions, including green procurement practices, compliance with environmental standards, and resource efficiency. Each of the dimensions was measured by objects which could be observed and which can represent the actual practices and results of an organization. These were behavioral indicators such as routine production of environmental compliance report, practice-based indicators such as increased procurement of environmentally friendly goods and services and outcome-based indicators such as reduced paper use and more efficient consumption of energy and water in service provision. This will enhance measurement validity since the reported practices will be related to tangible and measurable results.

The table below demonstrates how key variables in this study are translated into measurable questionnaire items:

Variable	Type	Theoretical Definition	Operational Definition	Measurable Indicators
Mandatory Environmental Criteria	Independent	Inclusion of compulsory environmental requirements in e-procurement templates	The extent to which environmental clauses are included, enforced, and weighed in e-procurement documents	<ul style="list-style-type: none"> • Environmental criteria are included in KCCA's e-procurement templates • Suppliers must meet these criteria to bid • Criteria are clearly defined and measurable • Environmental criteria carry significant weight in evaluation • Inclusion of criteria increases green procurement uptake
E-Procurement Contract Management	Independent	Use of digital systems to monitor and enforce environmental compliance throughout contract execution	The integration of environmental clauses in e-contracts and digital tracking of compliance	<ul style="list-style-type: none"> • Environmental compliance clauses are integrated into e-contracts • Digital tracking of environmental milestones is enabled • Non-compliance leads to enforcement actions • Staff receive adequate training on digital compliance • E-contract management improves EMP compliance

Supplier Compliance Monitoring	Independent	Electronic tracking of supplier environmental adherence to environmental requirements	Digital monitoring, reporting, and auditing of supplier environmental performance	<ul style="list-style-type: none"> • E-procurement system monitors supplier environmental performance • Suppliers submit digital environmental reports • Electronic scorecards evaluate supplier performance • Regular digital supplier audits are conducted • Digital monitoring enhances sustainability outcomes
Environmental Sustainability Outcomes	Dependent	Organizational practices and results that maintain ecological integrity through responsible resource use	Measurable outcomes in green procurement Practices, regulatory compliance, and resource efficiency	<ul style="list-style-type: none"> • Routine generation of environmental compliance reports • Increased procurement of eco-friendly goods/services • Improved adherence to NEMA regulations • Reduced paper usage in procurement • More efficient use of energy/water

3.7 Data collection methods and Sources

3.7.1 Data Sources.

Primary data

Primary data can be defined as data or raw facts that have been gathered the first time to the selected sample respondents through interviews and questionnaires on how the targeted population performs the procurement process in the organization using e-procurement. Primary data were gathered using a structured questionnaire which was given to the 80 officers who were selected. The questionnaire contained closed ended Likert-scale questions in line with the operationalized variables and open-ended questions to provide contextual information.

Secondary data.

This is information that has been research and developed before the study by other researchers and sources. Primary findings were supplemented and triangulated by a secondary data gathered through the records of procurement in KCCA, PPDA and NEMA reports, audit documents, and published literature.

3.7.2 Data collection Methods Questionnaire.

A structured questionnaire was designed and was administered to the sampled procurement officers, contract managers, environmental officers, and finance officers in the Kampala Capital City Authority (KCCA). The instrument was mainly composed of closed-ended Likert-scale questions aimed at quantitatively measuring the constructs mentioned in the operationalization table. These items evaluated the perception and experiences of the respondents on the integration of environmental requirements in the e-procurement templates, how environmental compliance is undertaken using the digital contracts and how the compliance of suppliers to the requirements of sustainability is monitored.

The questionnaire had a few open-ended questions in order to supplement the quantitative data. These enabled the respondents to expound on issues, situational aspects, and viable ideas connected with the implementation of e-procurement regarding environmental sustainability at KCCA.

3.8 Data Analysis

We analyzed quantitative data with the help of SPSS version 26. Descriptive statistics (frequencies, means, standard deviations) was used to summarize the data. To analyze the relationships between variables, Pearson correlation was used and to test the hypotheses, multiple regression analysis was conducted. These statistical methods were suitable and had enough statistical power to make meaningful analysis in this context of the case study.

3.9 Data validity and reliability.

In order to achieve validity, the content validity has been determined by pilot-testing the questionnaire among 10 procurement experts and reviewing the interview guides with academic supervisors. Further, factor analysis was used to ensure that the measurement constructs are clear and relevant to research objectives and discussions with field experts were also conducted to ascertain the clarity and relevance of research objectives.

To provide reliability, the internal consistency of the questionnaire was measured with the help of Cronbach's Alpha where the acceptable level is 0.7 0.7. Test-retest reliability was also done by administering the similar questions to a set of respondents at two different times. A pilot study was conducted before full scale data collection to determine and clarify the ambiguities in the research instruments. In the case of qualitative data, triangulation with multiple sources was applied to increase credibility and dependability of the results.

3.10 Ethical Considerations.

The concept of ethics which is used in Aquinas and Helen, 2002 refers to ethics as a form of discipline that is concerned with the moral principles, norms and standards that govern ones judgment such as right versus wrong, good versus evil during interactions with other people. Ethically, every participant involved in the study had equal opportunities and their identities kept anonymous to ensure privacy and confidentiality. Participants did not have to provide any data or do anything that would be out of their own free will, plus each participant was treated with utmost respect and all questionnaires were asked and answered to the best of the participant's knowledge and experience without any external influence.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter reports the findings of the field data collected to carry out the research on e-procurement and environmental sustainability at Kampala Capital City Authority (KCCA). The chapter discusses: univariate analysis of the characteristics of respondents and the variables of the study; bivariate analysis of the relationships between key variables; multivariate analysis through regression; and qualitative analysis of the open-ended responses on challenges, opportunities and recommendations. The design of the study was based on three major dimensions of e-procurement that include mandatory environmental criteria in e-procurement templates, e-procurement contract management, and supplier compliance monitoring with environmental sustainability outcomes as a dependent variable.

Though the study expected 80 respondents, only 57 respondents returned the research questions and the analysis in this chapter is therefore done on 57 actual cases. They were cross-tabulations, chi-square tests, t-tests, ANOVA, correlation analysis, multiple regression and thematic analysis.

4.2 Response Rate and Data Preparation

The research targeted 80 selected officers though 57 responded to the questionnaire, representing a response rate of:

$$\frac{57}{80} * 100 = 71.25\%$$

This response rate was adequate for analysis and a sufficient representative of the sampled respondents at KCCA.

The Likert-scale items were coded as follows:

1 = Strongly Disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly Agree

The interpretation scale applied in the analysis was:

1.0–1.8 = Strongly Disagree

1.8–2.6 = Disagree

2.6–3.4 = Neutral

3.4–4.2 = Agree

4.2–5.0 = Strongly Agree

4.3 Reliability of Study Constructs

The study stated that Cronbach’s Alpha would be used to assess internal consistency, with a threshold of 0.70 considered acceptable. The reliability analysis of the questionnaire constructs produced the following results:

Table 1:reliability analysis

Construct	Number of items	Cronbach’s Alpha
Mandatory environmental criteria	5	0.843
E-procurement contract management	5	0.821
Supplier compliance monitoring	5	0.826
Environmental sustainability outcomes	5	0.869

All the alpha values were above 0.70, indicating that the research questions were consistent and reliable for measuring the study variables.

4.4 Univariate Analysis

4.4.1 Demographic Characteristics of Respondents

Gender of respondents

Table 2: Gender Distribution of Respondents

Gender	Frequency (n)	Percentage (%)
Female	25	43.9
Male	23	40.4
Prefer not to state	9	15.8
Total	57	100

Out of the 57 respondents, the majority, 25 of them (43.9%) were female, followed by 23 (40.4%) who were male, and 9 respondents (15.8%) preferred not to state their gender.

Age group

Table 3: Age Distribution of Respondents

Age Group	Frequency (n)	Percentage (%)
25–30 years	34	59.7
31–40 years	8	14
41–50 years	10	17.5
51 years and above	5	8.8
Total	57	100

Table 3 shows the age distribution where majority of the respondents (59.7%) were aged 25–30 years, 8 respondents (14.0%) were aged 31–40 years, 10 respondents (17.5%) were aged 41–50 years, and 5 respondents (8.8%) were aged 51 years and above.

Table 4: Department or unit

Department/Unit	Frequency (n)	Percentage (%)
Procurement and Disposal Unit	26	45.6
Finance Department	13	22.8
Environment and Natural Resources Department	12	21.1
Contracts Management Unit	6	10.5
Total	57	100

The majority of respondents (26) were in Procurement and Disposal Unit (under department or unit). This was followed by the Finance Department which had 13 respondents (22.8%), Environment and Natural Resources Department with 12 respondents (21.1%), and the Contracts Management Unit with 6 respondents (10.5%).

Table 5: Distribution of Respondents by Years of Experience

Years of Experience	Frequency (n)	Percentage (%)
Less than 2 years	16	28.1
2–5 years	25	43.9
6–10 years	10	17.5
More than 10 years	6	10.5
Total	57	100

In terms of experience, 28.1% 25 respondents (43.9%) had 2–5 years of experience, 16 (28.1%) had less than 2 years, 10 (17.5%) had 6–10 years, and 6 (10.5%) had more than 10 years. This implies that the sample of respondents was primarily comprised of personnel with an average practical experience of procurement work.

4.4.2 Awareness and Use of the E-Procurement System

Awareness of KCCA's e-procurement system

The vast majority of the respondents 49 out of 57 (86.0%) claimed to be familiar with the e-procurement system at KCCA, with 7 (12.3%) reported to not be familiar with it, and one response was not given.

This implies that respondents are very aware about the system

Frequency of system use

Regarding frequency of use, 29 respondents (50.9%) said they use the system daily, 13 (22.8%) use it weekly, 5 (8.8%) use it monthly, and 10 (17.5%) use it rarely. This demonstrates that not only is the system known to many respondents, it is also actively used by many respondents, with the most common pattern of use being daily.

Perceived effect on transparency

When questioned how much e-procurement has enhanced transparency, 27 respondents (47.4 per cent) said high, 18 (31.6 per cent) said very high and 12 (21.1 per cent) said moderate. None of the respondents chose low or very low. This is an indication that there is a good perception that e-procurement is enhancing transparency in KCCA.

4.4.3 Analysis of Likert-Scale Items

Mandatory Environmental Criteria in E-Procurement Templates

The measurement of this objective was done using items on whether mandatory environmental criteria are part of templates, whether suppliers are required to meet them, whether they are clearly defined and whether they are weighted on evaluation.

Table 6: Mandatory Environmental Criteria in E-Procurement Templates

Item	Mean	Std. Dev.
E-procurement templates include mandatory environmental criteria	3.74	0.74
Suppliers must meet environmental criteria to be eligible for bidding	4	0.82
Environmental criteria in e-templates are clearly defined and measurable	3.58	0.84
Environmental criteria carry significant weight in bid evaluation	3.77	1.02
Increased uptake of green procurement due to mandatory criteria	3.79	0.92

In the case with the mandatory environmental criteria, the overall mean of the respondents was 3.77 and the standard deviation was 0.69, which means that the overall mean of the respondents was close to that of the average respondent. The most rated item was that the suppliers are required to meet the environmental criteria to be eligible to offer bids (M = 4.00), indicating that respondents found the environmental requirements to be an important entry requirement in procurement. The fact that the mean on the criterion of environmental clarity and measurability was relatively low (M = 3.58) suggests that even the availability of environmental criteria, they still may need to be narrowed down to make them more specific and easier to evaluate.

In general, the descriptive results indicate that KCCA has succeeded in making visible the progress it has made in ensuring environmental requirements are integrated into e-procurement templates, and respondents generally believe this has contributed to increasing green procurement uptake.

E-Procurement Contract Management

This was aimed at integrating environmental compliance provisions, electronic monitoring of environmental achievements, imposition of penalties on non-conformance, and employee training.

Table 7:E-Procurement Contract Management

Item	Mean	Std. Dev.
Environmental compliance clauses are integrated into e-contracts	3.82	0.73
Digital tracking of environmental milestones is enabled	3.68	0.87
Non-compliance leads to enforcement actions	3.65	0.79
Contract managers receive adequate training on compliance monitoring	3.68	0.85
E-procurement contract management has improved compliance with EMPs	3.72	0.84

The mean of the composite score of e-procurement contract management is 3.71 with a standard deviation of 0.61, which is considered moderate to strong agreement. Most positively, the respondents were about the implementation of environmental compliance clauses in the contracts (M = 3.82). The enforcement measures and training of the staff were slightly lower, however, indicating that the formal controls that the system has are there but still the operationalization of the controls may still need to be stepped up. These results suggest that KCCA is performing well in terms of contract management which is contributing to environmental compliance but the effectiveness of enforcement and training is not yet ideal.

Supplier Compliance Monitoring

This objective explored whether e-procurement system is applied to monitor supplier environmental performance, whether suppliers report online, whether scorecards are applied, and whether periodic online audits are done.

Table 8:Supplier Compliance Monitoring

Item	Mean	Std. Dev.
E-procurement system monitors supplier environmental performance	3.7	0.82
Suppliers submit digital environmental performance reports	3.56	0.96
Electronic scorecards are used to evaluate suppliers	3.75	0.85
Regular digital supplier audits are conducted	3.58	0.92
Digital supplier monitoring enhances sustainability outcomes	3.74	0.88

The composite mean of supplier compliance monitoring was 3.65 with a standard deviation of 0.72, indicating overall agreement, but this was less than the three independent-variable constructs. Based on the results, electronic scorecards and system-based monitoring are relatively established areas, whilst digital reporting by suppliers and regular audits are relatively weak areas.

This indicates that KCCA has already started institutionalizing supplier monitoring using e-procurement, yet supplier-side reporting discipline and regular digital auditing is an area already in need of further consolidation.

Environmental Sustainability Outcomes

The proposal outlined the outcomes of environmental sustainability in terms of environmental compliance reporting, eco-friendly procurement, improved compliance with environmental standards, reduced paper consumption and more efficient use of energy and water.

Table 9: Environmental Sustainability Outcomes

Item	Mean	Std. Dev.
Routine generation of environmental compliance reports	3.58	0.84
Increased procurement of eco-friendly goods and services	3.77	0.89
Improved adherence to NEMA regulations and other standards	3.91	0.93
Reduced paper usage in procurement processes	3.98	0.95
More efficient use of energy and water in service delivery	3.77	1.09

The overall environmental sustainability outcomes composite mean was 3.80 with a standard deviation of 0.76 giving an overall positive rating. The perceived outcome that was found to be the strongest was the reduced paper usage (M = 3.98), and then the improved adherence to NEMA regulations and other environmental standards (M = 3.91). The relative lower mean of routine generation of environmental compliance reports (M = 3.58) indicates that although the environmental performance is on the rise, the reporting systems might not be firmly institutionalized.

These findings demonstrate that the respondents think that e-procurement positively impacts sustainability, particularly by decreasing administrative waste and assisting in regulatory compliance.

4.5 Bivariate Analysis

Correlation Analysis

Pearson correlation analysis was done to ascertain the correlation between the independent variables and environmental sustainability.

Table 10: Correlation Analysis

Variable	R with Environmental Sustainability	p-value
Mandatory environmental criteria	0.717	0.000*
E-procurement contract management	0.742	0.001*
Supplier compliance monitoring	0.779	0.003*

These findings show that there were strong, positive and statistically significant relationships between each of the e-procurement dimensions and environmental sustainability results. The strongest relationship with environmental sustainability was found with supplier compliance monitoring ($r = 0.779$), followed by e-procurement contract management ($r = 0.742$), and mandatory environmental criteria ($r = 0.717$).

It implies that any improvement in any of these dimensions by KCCA is likely to make environmental sustainability outcomes better. The most significant bivariate correlation being supplier monitoring implies that continuous digital follow-up on supplier performance can be particularly significant when it comes to translating intentions of procurement into actual sustainability results.

Regression Analysis by Study Objective

Effect of Mandatory Environmental Criteria on Green Procurement Uptake

A simple linear regression was implemented on the composite score of mandatory environmental criteria as the predictor and the green procurement uptake item as the dependent variable to test the first hypothesis.

Statistic	Value
R	0.63
R Square	0.397
Adjusted R Square	0.386
F-statistic	36.17
Significance	0.001*

Beta coefficient	0.837
t-value	6.014

Compulsory environmental requirements positively influenced the green procurement adoption with statistically significant 0.837 positive association with 0.001 level of significance. The model accounted 39.7% of the difference in uptake of green procurement. This implies that a one-unit change in the strength of mandatory environmental criteria would be linked with a 0.837-unit change in perceived green procurement uptake. The initial hypothesis was thus accepted.

Effect of E-Procurement Contract Management on Compliance with Environmental Management Plans

The contract management composite was used as the predictor to test the second hypothesis in which the outcome is the improvement in compliance with environmental management plans.

Statistic	Value
R	0.764
R Square	0.584
Adjusted R Square	0.577
F-statistic	77.24
Significance	0.001*
Beta coefficient	1.055
t-value	8.789

The statistically significant positive impact of e-procurement contract management on compliance with environmental management plans was statistically significant, with $\beta = 1.055$, $p = 0.001$. The model attributed 58.4% of the compliance variability. It was the best single-objective regression model in the paper. It means that the practices of stronger digital contract management, including the environmental management plans, milestones tracking, enforcement, and staff preparedness are strongly related to enhanced compliance with the environmental management plans. The second hypothesis was hence upheld.

Effect of Supplier Compliance Monitoring on Environmental Sustainability Outcomes

Supplier compliance monitoring was used as the predictor and the item on enhanced sustainability outcomes was used as the dependent variable to test the third hypothesis.

Statistic	Value
R	0.508
R Square	0.258
Adjusted R Square	0.245
F-statistic	19.14
Significance	0.001*
Beta coefficient	0.618
t-value	4.375

The statistically significant positive impact on the environmental sustainability outcomes of the monitored supplier compliance was also statistically significant (with 0.618 being the statistically significant 0.618). The model explained 25.8% of the variation in the outcome variable.

Though it was significant, this effect size was lower than that of contract management and mandatory environmental criteria in their respective objective-based models. This means that supplier monitoring is important yet gains can be realized on how regularly digital audits, reporting and scorecards are implemented. The third hypothesis was justified.

Multiple Regression Analysis on Overall Environmental Sustainability

The three-core e-procurement constructs were also estimated together to predict the composite environmental sustainability outcomes variable.

Statistic	Value
R Square	0.682
Adjusted R Square	0.664
F-statistic	37.82
Significance	0.001*

Predictor	Unstandardized Beta	t-value	p-value
Mandatory environmental criteria	0.259	1.89	0.064
E-procurement contract management	0.293	1.777	0.081
Supplier compliance monitoring	0.486	3.441	0.001

The three-core e-procurement constructs were also estimated together to predict the composite environmental sustainability outcomes variable.

The results of the regression model show that the model gives a good and statistically significant explanation of sustainable procurement performance (or the dependent variable under investigation). Its R Square is 0.682, which means that about 68.2% of the variation in the outcome variable can be explained by the three predictors, which are mandatory environmental criteria, e-procurement contract management, and supplier compliance monitoring. The value of the Adjusted R Square, which is equal to 0.664, confirms that this explanatory power is still high after accounting the number of predictors in the model indicating a good model fit with minimal overestimation.

This overall model is statistically significant as the F-statistic of 37.82 with a p-value of 0.001 is less than conventional level of significance of 0.05. This means that, when put together, the independent variables are a significant predictor of the dependent variable and that the model is stable to make inferences.

Supplier compliance monitoring has the most statistically significant impact at the individual predictor level (0.486, $t = 3.441$, $p = 0.001$). This implies that a significant and dramatic increase in sustainable procurement outcomes can be achieved by improving monitoring of supplier compliance. It is the most influential predictor in the model.

Conversely, the mandatory environmental criterion ($\beta = 0.259$, $p = 0.064$) and the e-procurement management of the contract ($\beta = 0.293$, $p = 0.081$) both have a positive relationship with the dependent variable, which means that improvement in these areas is associated with better results. They have however slightly higher p-values than the 0.05 level, meaning that their effects are not statistically significant at the 5% level, though they may be considered marginally significant at the 10% level. This is to imply that they play a role in the model, but with a lesser and less definite impact than the supplier compliance monitoring.

In general, the results mean that although all three factors have a positive effect on sustainable procurement, supplier compliance monitoring is the most influential factor, and its enhancement will have the most significant positive effect. At the same time, the improvement of environmental criteria and systems of contract management could be useful but had to be reinforced or supported by some additional conditions in order to attain statistically significant effects.

Qualitative Findings

The research involved open-ended questions to obtain more profound and contextual insights than the structured quantitative responses. This thematic analysis presented three main aspects; challenges, opportunities and recommendations on how e-procurement can be used to ensure environmental sustainability at KCCA.

When it comes to challenges, respondents always pointed to the constraints in ICT infrastructure as the key barrier. Problems like poor internet connectivity, inefficiency in the system, and unreliable power supply were reported to hamper access and effective usage of the e-procurement platform. In addition to infrastructure, resistance to change became an issue of concern, with some staff and stakeholders still favoring the traditional, paper based procurement processes. Such opposition hinders complete implementation of digital systems and undermines their possible effectiveness. Moreover, the respondents indicated that they are not always aware of the environmental role of e-procurement, and it may be assumed that, although the system is used operationally, the benefits regarding its sustainability are not always well understood. Capacity became also a key feature with staff and suppliers not adequately equipped in technical capabilities to use the system effectively or meet environmental demands. Moreover, laxity in enforcement of green procurement standards was also found as sometimes environmental criteria are only present in documents but not necessarily applied in practice. Lastly, the respondents indicated the lack of alignment between procurement routines and the sustainability goals, with the considerations of costs and efficiency often prevailing over the goals of sustainability.

In spite of these, the respondents noted a number of key opportunities relating to e-procurement. A decrease in paper consumption was one of the most commonly cited advantages, which directly leads to the preservation of the environment and the more efficient use of resources. The respondents also indicated that, e-procurement increases the capability to monitor the performance of the supplier especially in terms of environmental compliance using the digital records and monitoring tools. The system was also viewed to help in integrating environmental requirements in the bid documents and procurement templates to ensure more consistency in applying sustainability standards. Another essential opportunity was higher transparency since digital systems generate more transparent audit trails and limit opportunities to manipulate data, thereby enhancing accountability. Moreover, the respondents emphasized the possibilities of e-procurement data in supporting sustainability reporting and decision-making, specifically, the use of analytics and digital performance tracking.

Based on these revelations, respondents have suggested a number of viable suggestions. The most eminent was the necessity of constant training and capacity building of both the staff, and suppliers to improve their knowledge of e-procurement systems and environmental sustainability requirements. Another significant issue raised by the respondents was the need to make environmental criteria clearer and more mandatory in the processes of procurement to ensure that the environmental criteria are applied consistently across the board. Another important recommendation was to strengthen the enforcement mechanisms which includes the need to have tighter monitoring and enforcement of non-compliance. Moreover, the participants recommended the creation of online dashboards and tools to monitor environmental performance and to deliver real-time information on which a decision can be made. Finally, they emphasized the need to build capacity-building initiatives among suppliers that will allow all parties involved in the procurement process to effectively be engaged in both sustainability standards and digital systems.

Altogether, the qualitative findings can be used to supplement the quantitative findings by demonstrating that even though e-procurement has an undoubted potential of enhancing the environmental sustainability in KCCA, it still requires addressing the challenges of infrastructure, capacity, and enforcement and capitalizing on the opportunities of transparency, efficiency, and data-driven decision-making.

Chapter Summary

The results show that the respondents tend to view the e-procurement system offered by KCCA as a tool that helps promote environmental sustainability. Descriptive findings revealed that there was moderate to a strong agreement on all the key variables. Correlation analysis revealed that all e-procurement dimensions had strong positive correlations with the environmental sustainability outcomes. Regression analysis proved that every objective-specific hypothesis was upheld. Supplier compliance monitoring turned out to be the most powerful unique predictor of environmental sustainability outcomes in the combined model.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter talks about the findings in relation to the study objectives and the hypothesis contained in the proposal, then gives the conclusions, recommendations, limitations and further research proposals.

5.2 Discussion of Findings

5.2.1 Mandatory Environmental Criteria and Green Procurement Uptake

The initial objective was to evaluate the impact of the compulsory environmental requirements in the e-procurement templates of KCCA in the adoption of the green procurement practices. The descriptive results indicated that the respondents believed that the environmental criteria are incorporated in the e-procurement templates and that environmental criteria are required of a supplier in case he or she is to be considered in bidding. More importantly, regression analysis revealed that mandatory environmental requirements had a strong positive impact on the uptake of green procurement.

It translates that the practice of directly incorporating environmental requirements into the tender templates is not a mere token gesture. It can be quantified to have an impact on procurement decisions. With the e-procurement system making it clear what the environmental requirements are, the procurement officers and suppliers will have an increased likelihood of prioritizing goods that are eco-friendly, materials that are sustainable, and sourcing practices that are environmentally responsible. What this means is that digital tender design can be a viable policy tool to drive the procurement behavior towards sustainability.

Nonetheless, the dimension on clarity and measurability was rated low compared to the other dimensions in the same construct. This implies that in as much as there are environmental requirements, they can be too broad, or not sufficiently operationalized. This is important since the sustainability clauses can only affect the outcomes in a meaningful manner, when they are specific enough to be assessed fairly and implemented consistently.

5.2.2 E-Procurement Contract Management and Compliance with Environmental Management Plans

The second objective looked at how e-procurement contracts management influenced environmental management plans compliance. This was the best outcome of the objective-based regressions. The respondents mostly concurred that environmental clauses are incorporated into agreements and that the system enables the computer monitoring of the environmental milestones. The regression model revealed that the positive effect of the management of the contract on compliance is strong and significant.

This implies that e-procurement is not terminated at tendering. Its involvement goes further to the implementation where the contracts may be enforced instruments to ensure sustainability. With the e-contracts in which environmental obligations are being embedded and the tracking of progress being conducted digitally, implementing teams are more likely to be in compliance with environmental management plans. This is particularly critical in a public-sector context such as KCCA, where service delivery and infrastructure operations may directly affect the environment.

Meanwhile, the descriptive findings revealed only moderate ratings on the enforcement actions and staff training. This means that the digital framework exists, but institutional follow-through is still lacking. That is to say that KCCA seems to be on the brink of having a developing compliance infrastructure, yet one that still requires regular enforcement and greater capacity-building in order to turn the digital controls into a full-fledged environmental discipline.

5.2.3 Supplier Compliance Monitoring and Environmental Sustainability Outcomes

The third goal was concerned with the influence of monitoring of supplier compliance on the outcomes of environmental sustainability. The findings indicated the existence of strong positive outcomes in both the bivariate and regression analyses. Actually, in the overall multiple regression model, the supplier compliance monitoring was the only predictor that was statistically significant after adjusting the other variables.

This is a very crucial discovery. It implies that the true sustainability performance is strongly reliant on the post-selection of supplier's happenings. Tender requirements and contract clauses are needed but what makes those requirements visible, trackable and enforceable in practice is supplier monitoring. Provided that the suppliers are obliged to provide the digital report, are evaluated with the help of the scorecards, and have the regular environmental audits, KCCA will be much more likely to achieve the real improvement of environmental compliance, eco-friendly procurement, and resource efficiency.

This is supported by the qualitative responses. The strongest dashboards, more frequent digital audits, and enhanced supplier training were repeatedly recommended by respondents. These recommendations are in line with the statistical outcome that supplier monitoring is the best unique predictor of environmental sustainability in the full model.

5.2.4 Overall Relationship Between E-Procurement and Environmental Sustainability

The overall regression model revealed that the three e-procurement dimensions explain jointly 68.2% of the variability in the outcomes of environmental sustainability. It is a significant percentage which means that e-procurement is not a secondary administrative reform but a major organizational mechanism with the help of which KCCA will be able to achieve the goals of sustainability.

The high correlations among all three constructs suggest that environmental sustainability is influenced by a bundle of associated digital procurement practices and not by a single isolated factor. Environmental standards assist in developing entry criteria. Contract management assists in managing the compliance in the implementation process. Monitoring of suppliers assists in ensuring actual performance. The combination of them creates a chain with the help of which the intentions to become sustainable can be transformed into sustainability outcomes.

5.3 Conclusions

According to the results, the study concludes that e-procurement is significantly and positively related to environmental sustainability at KCCA.

To begin, the use of mandatory environmental requirements in e-procurement templates is an effective way of increasing the uptake of green procurement. The implication of this is that by ensuring that the environmental requirements are incorporated in the tendering process, KCCA stands a higher chance of procuring eco-friendly food and other services.

Second, e-procurement contract management enhances a lot in adherence to environmental management plans. The use of contract clauses and digital tracking, as well as implementation oversight, are thus relevant in ensuring that sustainability promises are not left at policy level alone.

Third, monitoring of supplier compliance greatly improves the outcome of environmental sustainability. This was the most significant unique predictor in the combined regression model, which indicated that continuous digital monitoring of suppliers performance is the center of achievement of practical sustainability gains.

In general, the research concludes that e-procurement is a feasible and practical route towards enhancing environmental sustainability at KCCA, although its full effects can only be realized when it is strongly enforced, the institution has the capacity, and constant monitoring of the suppliers.

5.4 Recommendations

5.4.1 Recommendations to KCCA

KCCA ought to reinforce the particularity of environmental set-ups in electronic procurement forms. Criteria must be well defined, measurable, and tied to scoring levels such that suppliers understand what is required and evaluators can apply the criteria uniformly.

KCCA must also incorporate greater environmental content of e-contracts by providing mandatory reporting requirements, milestone tracking requirements and explicit non-compliance sanctions. Although the contract management had a significant correlation with compliance, it is one of the areas with a distinct practical payoff.

The Authority must give attention to supplier compliance through institutionalization of digital scorecards, regular audits and automated dashboards of sustainability reporting. As supplier monitoring was the strongest unique predictor in the composite model, investment in this area would most likely result in the highest marginal gains.

5.4.2 Recommendations to PPDA and Other Regulators

The PPDA must come up with more clear operational guidelines on how environmental sustainability can be integrated in e-procurement systems, including standard environmental criteria, sample clauses, monitoring templates, and compliance indicators of the public entities.

There is also the need to have a better harmonization between the procurement requirement and the environmental regulatory frameworks in such a way that PDEs do not treat sustainability as an optional add-on but as a core area of compliance.

5.4.3 Capacity-Building Recommendations

KCCA needs to offer regular training to procurement officers, contract managers, finance staff, and environmental officers on the green procurement principles and the ways of using the e-procurement platform as a means of environmental monitoring.

There should also be sensitization and training of the suppliers particularly smaller companies who may not be able to comply with digital reporting or environmental documentation requirements. Unless the suppliers are prepared, the internal systems of KCCA will not produce maximum effects.

5.4.4 Infrastructure and Systems Recommendations

To minimize delays and downtime, the organization should enhance ICT infrastructure, internet reliability, system integration, and so on. The qualitative responses reveal that issues related to operations like the unstable internet and weak infrastructure still affect the effectiveness of the platform. It is also time that KCCA moves towards a more powerful analytics orientation by creating routine environmental compliance reports, exception alerts, and contract-level sustainability dashboards. This would render the platform more helpful in real-time making environment decision.

5.5 Contribution to Knowledge

By demonstrating that e-procurement in the Ugandan public sector is not merely about efficiency and transparency, but also about environmental sustainability, this study adds to the growing body of literature on the subject of digital public procurement. The plan cited this as a gap in the available literature in the context of urban authorities like KCCA. The results contribute to filling that gap by offering empirical data provided by KCCA that can be associated with the green procurement, environmental adherence, and resource efficiency.

5.6 Study limitations

The research was confined to KCCA and therefore, the results may not necessarily apply to all the governmental entities in Uganda. The information was more perception-oriented and therefore this implies that the information is based on the judgment of the respondents as opposed to actual environmental investigations. Moreover, the sample size obtained was 57 as compared to the planned 80 but the response rate was satisfactory.

5.7 Areas for Further Research

Future research may expand the study to various procuring and disposing organizations in Uganda to be compared. Other studies might also investigate objective environmental performance records, which may include procurement logs, compliance audits, and resource consumption data, to supplement results of perception-based surveys. Longitudinal research would also come in handy in demonstrating whether, the benefits of sustainability that come along with e-procurement are sustained in the long run.

5.8 Final Chapter Summary

The findings, conclusions and recommendations have been discussed in chapter five. The facts presented in the uploaded dataset indicate that e-procurement can have a significant purpose in ensuring environmental sustainability at KCCA. Supplier compliance monitoring seems to be the most critical driver of the overall sustainability outcome, however, mandatory environmental criteria and contract management also remain key pillars of the system.

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APPENDIX I

Dear Respondent,

You are invited to participate in this academic research aimed at examining the relationship between e-procurement practices and environmental sustainability at KCCA. Your responses will remain confidential and will be used solely for academic purposes. Participation is voluntary, and you may withdraw at any time.

Consent: By proceeding with this questionnaire, you consent to participate in this study.

Researcher: Nabimanya M. Blessing

Email address: mukundeblessing3@gmail.com

SECTION A: DEMOGRAPHIC INFORMATION

Name of the Respondent:

Position/Role of the Respondent:

Contact Details:

(Please tick [✓] or fill as appropriate)

1. Gender:

Male

Female

2. Age Group:

25–30 years

31–40 years

41–50 years

51 years and above

3. Department/Unit:

Procurement and Disposal Unit

Contracts Management Unit

Environment and Natural Resources Department

Finance Department

4. Years of Experience in Procurement/Related Role:

- Less than 2 years
- 2–5 years
- 6–10 years
- More than 10 years

SECTION B: E-PROCUREMENT AWARENESS & USAGE

(Please select the option that best reflects your experience)

- 5. Are you familiar with KCCA’s e-procurement system?
 - Yes
 - No

- 6. How often do you use the e-procurement system in your role?
 - Daily
 - Weekly
 - Monthly
 - Rarely

- 7. To what extent has e-procurement improved transparency in procurement processes?
 - Very High
 - High
 - Moderate
 - Low
 - Very Low

The following sections (C, D, E, and F) use a five-point Likert scale to measure key aspects of e-procurement and environmental sustainability at KCCA. Please indicate your level of agreement with each statement by selecting the most appropriate number, where:

1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

SECTION C: MANDATORY ENVIRONMENTAL CRITERIA IN E-PROCUREMENT TEMPLATES

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

No.	Statement	1	2	3	4	5
9.	KCCA's e-procurement templates include mandatory environmental criteria (e.g., energy efficiency, recycled content).					
10.	Suppliers must meet these environmental criteria to be eligible for bidding.					
11.	The environmental criteria in e-templates are clearly defined and measurable.					
12.	Environmental criteria carry significant weight in bid evaluation and supplier selection.					
13.	The inclusion of mandatory environmental criteria in e-templates has significantly increased the uptake of green procurement at KCCA.					

SECTION D: E-PROCUREMENT CONTRACT MANAGEMENT & ENVIRONMENTAL COMPLIANCE

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

No.	Statement	1	2	3	4	5
14.	Environmental compliance clauses are integrated into KCCA's e-contracts.					
15.	The e-procurement system allows digital tracking of environmental milestones during contract execution.					
16.	Non-compliance with environmental clauses leads to enforcement actions (e.g., penalties).					
17.	Contract managers receive adequate training on environmental compliance monitoring through e-procurement.					
18.	E-procurement contract management has significantly improved compliance with environmental management plans at KCCA.					

SECTION E: SUPPLIER COMPLIANCE MONITORING

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

No.	Statement	1	2	3	4	5
19.	KCCA uses the e-procurement system to monitor supplier environmental performance.					
20.	Suppliers are required to submit digital environmental performance reports.					
21.	Environmental performance scorecards are used to evaluate suppliers electronically.					
22.	Regular digital supplier audits (including environmental checks) are conducted.					
23.	Digital supplier monitoring has significantly enhanced environmental sustainability outcomes at KCCA.					

SECTION F: ENVIRONMENTAL SUSTAINABILITY OUTCOMES

(Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

No.	Statement	1	2	3	4	5
24.	KCCA routinely generates environmental compliance reports through the e-procurement system.					
25.	The use of e-procurement has increased the procurement of eco-friendly goods and services.					
26.	E-procurement has improved adherence to NEMA regulations and other environmental standards.					
27.	E-procurement has contributed to reduced paper usage in procurement processes.					
28.	E-procurement has led to more efficient use of energy and water in service delivery.					

SECTION G: CHALLENGES & OPPORTUNITIES (Open-ended)

29. **What are the main challenges KCCA faces in implementing e-procurement for environmental sustainability?**

30. **What opportunities do you see for improving environmental outcomes through e-procurement at KCCA?**

31. **What changes would you recommend strengthening the link between e-procurement and environmental sustainability at KCCA**

31. **Any other comments or suggestions:**

END OF QUESTIONNAIRE

Thank you for your valuable time and participation!