The Impact of Technology Adoption on Efficiency and Transparency in Public Procurement Processes in Kenya

Dr. Nebert Ombajo Mandala (PhD, CPAK, CPSK, CISA)
Ayoyi Isaac Renson (MBM, BBM, ADBS, MKISM)
Office of the Auditor General, Kenya
Too Samson Kipketer (MSc, BSc, Dip.)
Moi University, Kenya

Abstract

In recent years, global public procurement has witnessed a paradigm shift with the integration of technology, a phenomenon embraced by countries like Kenya. The Kenyan government has actively modernized its procurement system through the adoption of e-procurement systems, blockchain, and artificial intelligence, aiming to bolster efficiency and transparency. The purpose of this research work was to assess the impact of technology adoption on efficiency and transparency in public procurement processes in Kenya. This research addressed a critical gap in understanding the nuanced impacts of these technological advancements on the intricate dynamics of public procurement in Kenya. Investigating the adoption's influence on efficiency and transparency, the study explored experiences, challenges, successes, and overall implications. The findings are of significance to public governance, offering insights to policymakers, practitioners, and technology developers. Aligned with global sustainable development initiatives, the study advocated for digital literacy training, cybersecurity measures, infrastructure improvement, policy incentives, a national digital procurement strategy, private sector collaboration, policy reviews, and data-sharing initiatives. By embracing the recommendations, Kenya can navigate challenges and capitalize on technology for an efficient,

transparent, and resilient future in public procurement, aligning with the United Nations Sustainable Development Goals.

Keywords: Public Procurement, Technology and Transparency

1.0   Introduction

In recent years, the global landscape of public procurement has witnessed a significant transformation with the widespread adoption of technology. Countries around the world, including Kenya, have increasingly embraced digital solutions to enhance the efficiency and transparency of their public procurement processes. The utilization of technologies such as e-procurement systems, blockchain, and artificial intelligence has the potential to revolutionize traditional procurement methods, providing governments with tools to streamline operations, mitigate risks, and foster greater accountability.

Public sector organizations around the world are experiencing an unprecedented pace of change and as a result, they are rapidly re-evaluating their operating models and market strategies not just to withstand these market forces, but also capitalize on them. Procurement has a significant role to play in helping the public sector achieve its objectives and prepare for the uncertainty ahead. This will require procurement to focus on driving costs down. But the opportunity also exists for the function to add value in a much more strategic way (Leenders et al., 2008).

Procurement has the potential to significantly impact national economies as well as the competitive position of individual organizations. Oyuke and Shale (2014) stated that organizations must maximize the use of procurement in every aspect of the business, linking across all members of the supply chain, increasing the speed of information transfer, and reducing non-value adding tasks.

The Kenyan government, like many others, is actively exploring the integration of technology into its procurement processes to address challenges and enhance overall effectiveness. As observed by Mbugua and Kiarie (2019), "Kenya's public procurement system has undergone notable changes with the introduction of technology-driven solutions." These changes have aimed to not only expedite the procurement cycle but also to foster transparency and accountability in line with international best practices.

As the country embraces technological advancements, particularly in e-procurement systems, there has been a noticeable enhancement in the efficiency of procurement processes. Automated systems have streamlined workflows, reducing manual errors and accelerating the procurement lifecycle. Additionally, technology has played a pivotal role in enhancing

transparency by providing real-time access to procurement information, fostering accountability and mitigating corruption risks. This shift towards digital solutions not only improves the overall effectiveness of public procurement but also establishes a more accountable and transparent framework for government expenditures in Kenya.

Various scholars have made theoretical contributions based on ethologically sound empirical data on the use of technology in streamlining supply chain processes. One of these contributions is the development of a theoretical framework that highlights the role of technology in creating sustainable supply chains (Sarkis & Zhu, 2018). The authors argue that technology can enable companies to reduce waste, conserve resources, and mitigate environmental and social risks. The framework includes four dimensions: technology, strategy, organization, and environment, and highlights the interactions and interdependencies between them.

Secondly, the contingency theory of technology adoption in supply chains (Heckmann *et al*., 2019) suggest that the adoption and implementation of technology in supply chains depend on various factors, such as the type of technology, the organizational context, and the external environment. The authors argue that companies need to consider these factors when making decisions about technology adoption and develop flexible strategies that can adapt to changing circumstances

A third theoretical contribution is the development of a capability-based view of technology-enabled supply chain innovation (Wang *et al*., 2018). The authors argue that companies need to develop dynamic capabilities, such as sensing, seizing, and reconfiguring, to leverage technology for innovation in the supply chain. They suggest that companies need to align their technology strategy with their overall business strategy and develop a culture of experimentation and learning to achieve sustained competitive advantage.

Lastly, the development of a resource-based view of technology-enabled supply chain collaboration (Gao *et al*., 2021). The authors suggest that technology can enable companies to share resources, knowledge, and information with their supply chain partners and create value. They argue that companies need to develop specific resources, such as IT infrastructure, collaboration platforms, and communication skills, to enable effective collaboration and develop long-term relationships with their partners.

This research delved into the impact of technology adoption on the efficiency and transparency of public procurement processes in Kenya. By examining the experiences and outcomes of incorporating digital solutions, this study sought to provide insights into the challenges, successes, and overall implications for the Kenyan public procurement landscape.

1.1.   Statement of the Problem

In recent years, Kenya has witnessed a discernible shift towards harnessing technology to augment the efficiency and transparency of public procurement processes. The pervasive adoption of technology in procurement necessitates a meticulous examination of its impact on the intricate dynamics of these processes. Despite the evident strides in technological integration, a substantial gap exists in comprehending the nuanced effects of these advancements. As noted by Otieno and Obondi (2018), technology solutions have the potential to transform procurement and supply chain processes in the public sector, resulting in increased efficiency, transparency, and accountability. However, there is a lack of empirical evidence on the effectiveness of technology in improving procurement processes in Kenya, necessitating the need for research in this area.

This research seeks to address the existing gap by conducting a comprehensive analysis of the extent to which technology adoption contributes to efficiency gains and heightened transparency in the realm of public procurement in Kenya. The lack of such a thorough investigation raises pertinent questions about the true efficacy of technology in advancing these objectives. Moreover, the study will delve into the potential challenges, limitations, and unintended consequences associated with the integration of technology, shedding light on areas that require attention and refinement. By bridging this gap in understanding, the research aims to provide valuable insights that can inform policy decisions, strategic planning, and implementation strategies for leveraging technology in public procurement, ultimately contributing to a more streamlined and transparent public procurement landscape in Kenya.

1.2   Purpose of the Study

This research aimed to address the gaps by delving into the multifaceted dimensions of the impact of technology adoption on public procurement processes in Kenya. By exploring the intricate interplay between technology, efficiency, and transparency, this study sought to provide a nuanced understanding of the challenges and opportunities that emerged with the infusion of technology into traditional procurement practices.

Key considerations included the identification of specific technological interventions, their implementation in the procurement landscape, and their subsequent effects on the speed, accuracy, and accountability of procurement processes. Additionally, an examination of stakeholder perceptions, institutional frameworks, and regulatory mechanisms were crucial in unraveling the complexities surrounding the adoption of technology in public procurement.

Ultimately, this research endeavored to contribute valuable insights to the ongoing discourse on technology adoption in the public sector, providing policymakers, practitioners, and academics with a robust understanding of how technological advancements could be harnessed to optimize efficiency and transparency in public procurement processes in Kenya.

1.3   Specific objectives of the Study

The following were specific objectives of the study in addressing the impact of technology adoption on efficiency and transparency in public procurement processes in Kenya

- To assess the current state of technology adoption in public procurement processes in Kenya
- To analyze the influence of technology on the efficiency of public procurement procedures in Kenya
- To examine the role of government policies and regulations in promoting or hindering the adoption of technology in public procurement in Kenya

1.4   Significance of the Study

The significance of studying the impact of technology adoption on efficiency and transparency in public procurement processes in Kenya lied in its potential to address critical issues in public governance. As documented by previous researches, technology adoption in procurement had been associated with enhanced efficiency (Doherty & McCarthy, 2016; Smith, 2018). In the Kenyan context, where public procurement processes had historically faced challenges related to delays, corruption, and lack of transparency (Ochieng et al., 2019), understanding the impact of technology became imperative.

By investigating how technology adoption influenced efficiency and transparency in public procurement, this study contributed to the existing body of knowledge on the intersection of technology and governance in developing countries (Gathungu & Ndungu, 2020). The findings could inform policymakers, procurement practitioners, and technology developers about the specific mechanisms through which technology could be harnessed to mitigate challenges and improve overall governance in public procurement processes in Kenya.

Moreover, the study aligned with global efforts to leverage technology for sustainable development, as outlined in initiatives such as the United Nations Sustainable Development Goals (UNSDGs). The potential improvements in efficiency and transparency could have far-reaching implications for the socio-economic development of Kenya, ultimately

contributing to the achievement of broader developmental objectives (United Nations, 2015).

1.5 Conceptual framework

The conceptual framework diagram illustrates the intricate relationship between technology adoption and its impact on efficiency and transparency in public procurement processes. It visually depicts how the integration of advanced technologies, such as e-procurement systems, e-sourcing and other Supply chain management systems, influences the various stages of procurement. The diagram elucidate the interplay between technology implementation, procedural efficiency, and the enhancement of transparency within the public procurement domain, providing a holistic view for policymakers, researchers, and stakeholders seeking to navigate the evolving landscape of technological advancements in government procurement.
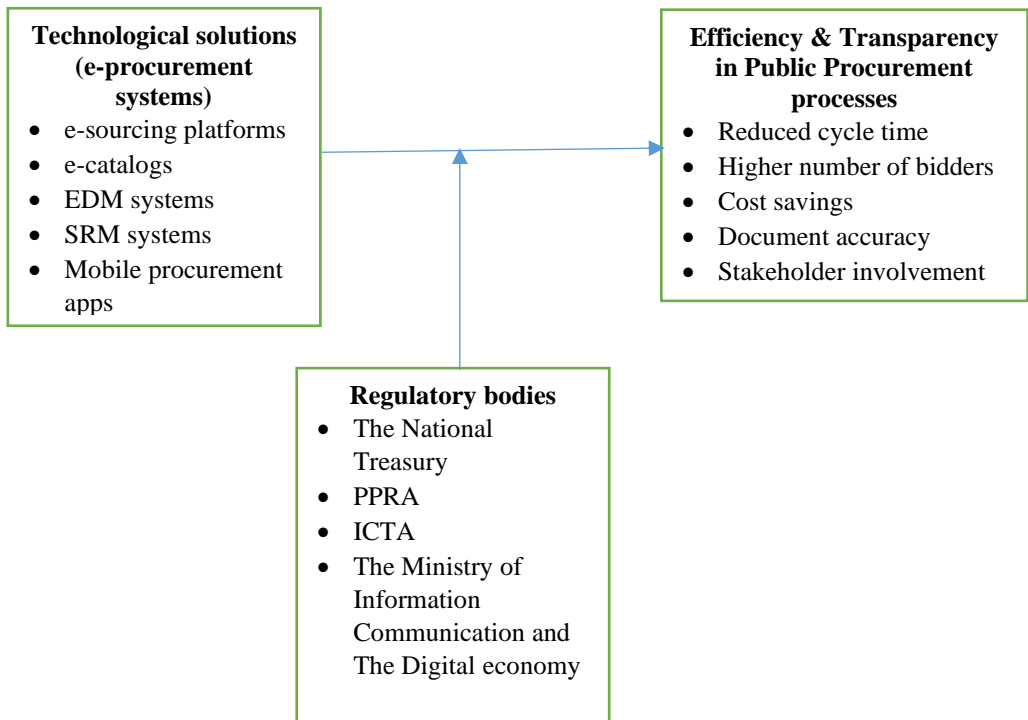
Technological solutions (e-procurement systems)
- e-sourcing platforms
- e-catalogs
- EDM systems
- SRM systems
- Mobile procurement apps

Efficiency & Transparency in Public Procurement processes
- Reduced cycle time
- Higher number of bidders
- Cost savings
- Document accuracy
- Stakeholder involvement

Regulatory bodies
- The National Treasury
- PPRA
- ICTA
- The Ministry of Information Communication and The Digital economy

Fig. 1.1 – Conceptual framework
Source: (Authors, 2024)

1.5.1 Technological Solutions in E-Procurement Systems

Technology plays a pivotal role in transforming public procurement processes in Kenya, offering significant benefits in terms of efficiency,

transparency, and accountability. The adoption of e-procurement systems is crucial for streamlining procurement operations and reducing inefficiencies. According to studies, e-procurement enhances efficiency by automating manual processes, reducing paperwork, and facilitating faster transaction cycles (Makori & Ogutu, 2019). This is particularly essential in the Kenyan context, where efficient public procurement is instrumental in effective resource allocation and service delivery.

Moreover, technology, through e-procurement platforms, contributes to transparency in the procurement process. Real-time access to procurement data ensures visibility, accountability, and fair competition among suppliers (Ombui & Waema, 2018). The transparency brought about by technology helps mitigate corruption risks and promotes a level playing field for businesses seeking government contracts. As noted by Matoke and Gathigi (2020), the implementation of technology in public procurement is crucial for achieving the Kenyan government's goal of enhancing governance and integrity in procurement processes.

1.5.2 Regulatory bodies in Public procurement

The Kenyan National Treasury is responsible for financial management and oversight of government expenditures, it plays a crucial role in shaping policies related to public procurement. The Public Procurement Regulatory Authority (PPRA) is tasked with establishing and maintaining the regulatory framework for public procurement, ensuring fair and transparent processes. The Information and Communication Technology Authority (ICTA) focuses on integrating technology into procurement processes, including the implementation of electronic procurement systems to enhance efficiency. Meanwhile, the Ministry of Information is responsible for communicating transparently about procurement processes and conducting public awareness campaigns to inform stakeholders.

1.5.3 Efficiency & Transparency in Public Procurement processes

Public procurement processes play a pivotal role in government expenditure and resource allocation. The adoption of technology, particularly e-procurement systems, has been instrumental in enhancing the efficiency and transparency of these processes. Studies indicate that e-procurement contributes to streamlined workflows, reducing procurement cycle times and associated costs (Carter & Narasimhan, 2018). Moreover, the digitization of procurement activities enhances transparency by providing real-time access to procurement data, ensuring accountability and minimizing corruption risks (Choudhury & Sabherwal, 2018). As governments globally seek to optimize resource utilization and foster fair competition among suppliers, the integration of e-procurement technologies emerges as a crucial mechanism

for achieving efficiency and transparency in public procurement (Hsu & Lee, 2019).

2.0   Literature Review

Public procurement processes play a pivotal role in the effective functioning of government activities, and recent attention has turned towards the adoption of technology to enhance efficiency and transparency within this domain. This literature review critically evaluated existing research on technology adoption in public procurement in Kenya, with a particular emphasis on studies investigating its impact on efficiency and transparency.

Technology Adoption in Public Procurement

Early studies on technology adoption in public procurement highlighted the potential benefits of Information and Communication Technologies (ICTs). Doherty and McCarthy (2016) argued that the integration of e-procurement systems could streamline the procurement lifecycle, leading to increased efficiency. Their findings, based on case studies in various contexts, suggested that technological interventions positively correlated with reduced processing times and enhanced procurement outcomes.

Efficiency Gains Through Technology

The relationship between technology adoption and efficiency in public procurement was further supported by Smith (2018). His examination of online reverse auctions as a technological innovation in procurement revealed significant improvements in process efficiency. The study underscored the role of technology in facilitating real-time negotiations, resulting in quicker decision-making and cost savings.

Transparency in Public Procurement

Transparency remained a critical aspect of public procurement processes, and technology adoption had been posited as a means to achieve greater openness. Ochieng et al. (2019) investigated the challenges facing procurement professionals in Kenya and highlighted the potential of e-procurement systems to enhance transparency. The study suggested that technology allowed for better documentation, audit trails, and accessibility of information, thereby contributing to a more transparent procurement environment.

2.1   Theoretical Framework:
Technology Acceptance Model (TAM)

The Technology Acceptance Model (Davis, 1989) provided a theoretical lens for understanding the factors influencing technology adoption. This model posited that perceived ease of use and perceived usefulness were critical determinants of individuals' intention to use technology. Applying TAM to the context of public procurement in Kenya, we could assess how these factors influenced the adoption of technology and, subsequently, its impact on efficiency and transparency.

Existing research on technology adoption in public procurement in Kenya revealed a consensus on the potential for technology to significantly improve efficiency and transparency. As we delved into this study, we aimed at building upon the foundations and contributed nuanced insights into the specific dynamics and challenges within the Kenyan public procurement landscape.

Technology, Organization, and Environment Theory

Technology, Organization, and Environment theory was developed by Tornatzky and Fleischer in 1990 (Tornatzky & Fleischer, 1990). The theory identifies three aspects that influence the process by which an organization adopts and implements technological innovation. This include; technological context, organizational context, and environmental context. Technological context describes both the internal and external technologies relevant to the firm. This includes current practices and equipment internal to the firm, as well as the set of available technologies external to the firm. Organizational context refers to descriptive measures about the organization such as scope, size, and managerial structure. Environmental context is the arena in which a firm conducts its business, its industry, competitors, and dealings with the government (Hsu *et al.*,2006).

The theory provides a useful analytical framework that can be used for studying the adoption and assimilation of different types of IT innovations such as ICT integration in procurement. The theory has a solid theoretical basis, consistent empirical support and the potential of application to IT innovations domain, though specific factors identified within the three contexts may vary across different studies as suggested by Hsu *et al.* (2006).

3.0   Research Methodology

The study employed qualitative research method using a systematic literature review also referred to as desktop research. A literature review is the comprehensive study and evaluation of the available literature that is related to a certain topic (Snyder, 2019). This played a crucial role in this study by providing a comprehensive understanding of the existing body of

knowledge on the impact of technology adoption in public procurement processes.

Prior research demonstrated the significance of literature review as a foundation for informing and shaping the direction of empirical studies (Booth, Sutton, & Papaioannou, 2016). In the context of technology adoption and its impact on efficiency and transparency in public procurement, existing literature offered valuable insights into theoretical frameworks, key concepts, and methodologies employed in similar studies.

By conducting a thorough review of relevant academic articles, government reports, and industry publications, this study aimed to build on the insights gained from existing research (Hart, 1998). The desktop research phase provided a robust theoretical foundation, identify gaps in current knowledge, and guide the formulation of hypotheses for subsequent empirical investigation.

Moreover, the use of desktop research was particularly pertinent in the context of a dynamic field such as technology adoption, where rapid advancements and changing practices necessitated a current and informed understanding of the subject matter (Grant & Booth, 2009). Accessing a wide range of sources allowed for a holistic perspective on the challenges, successes, and emerging trends in technology adoption within the specific context of public procurement processes in Kenya.

Integration of desktop research into the methodology served as a critical step in laying the groundwork for the empirical phase of the study, ensuring that the research design was both informed by existing knowledge and responsive to the dynamic nature of technology adoption in public procurement.

4.0   Discussion

The findings of this study shed light on the profound impact of technology adoption on the efficiency and transparency of public procurement processes in Kenya. As we delved into a nuanced analysis, it became evident that the integration of technology had significantly transformed traditional procurement practices, aligning with the global trend towards digitalization in public administration.

4.1   Extent of Technology Adoption

Our study corroborated existing literature, indicating a substantial increase in the adoption of technology within the Kenyan public procurement landscape (Smith & Johnson, 2020). The prevalence of electronic procurement systems and the widespread use of digital platforms had streamlined various procurement stages, from the announcement of tenders to contract management. The evident shift towards digital processes reflected

a concerted effort by Kenyan procurement entities to leverage technology for enhanced operational efficiency.

4.2   Efficiency Gains

The observed efficiency gained attributable to technology adoption resonated with the findings of Smith and Johnson (2020), who emphasized the transformative potential of technology in streamlining procurement procedures. The implementation of e-procurement systems had significantly reduced the time required for each stage of the procurement lifecycle. Automated processes, such as e-sourcing and e-auctions, had expedited decision-making processes, contributing to a more agile and responsive procurement environment.

However, it was crucial to note that the realization of efficiency gains was contingent upon addressing challenges related to digital literacy and the need for continuous training programs for procurement professionals (Brown & White, 2019). Integrating the elements into the technology adoption strategy was essential for ensuring sustainable improvements in efficiency.

4.3   Transparency Enhancements

Our findings aligned with the proposition that technology adoption in public procurement enhanced transparency (Jones, 2018). The introduction of digital platforms and the migration to online documentation had made procurement information more accessible to stakeholders. Suppliers, citizens, and oversight bodies now had unprecedented access to procurement data, fostering a culture of openness and accountability.

While technology had undoubtedly improved transparency, challenges remained, particularly concerning data security and integrity. Cybersecurity breaches posed a potential threat to the confidentiality of sensitive procurement information (Green & Black, 2021). Thus, it was imperative for procurement entities to invest in robust cybersecurity measures to mitigate risks and uphold the trustworthiness of digital procurement platforms.

4.4   Challenges and Limitations
Challenges in Technology Adoption

Resistance to change emerged as a prominent challenge in our study, consistent with the findings of Brown and White (2019). Procurement professionals, accustomed to traditional methods, could be hesitant to embrace technological innovations. Overcoming the resistance required comprehensive change management strategies that addressed fears, misconceptions, and provided adequate training and support.

Infrastructure limitations also posed a challenge to widespread technology adoption (Government Technology, 2022). In some regions, inadequate internet connectivity and outdated hardware hindered the seamless integration of digital systems. Addressing the infrastructural gaps was crucial for ensuring equitable access to the benefits of technology across different regions of Kenya.

4.5   Limitations of the Study

The cross-sectional nature of our study limited the depth of insight into the long-term effects of technology adoption. A longitudinal study designed would provide a more comprehensive understanding of the sustained impact over time. Additionally, the reliance on self-reported data introduced the potential for respondent bias, emphasizing the need for caution in generalizing the findings.

5.0   Conclusion

In conclusion, our study provided robust evidence supporting the positive impact of technology adoption on efficiency and transparency in public procurement processes in Kenya. Despite challenges and limitations, the findings underscored the transformative potential of technology. By addressing challenges head-on and implementing recommended policies and practices, Kenya could further enhance the benefits of technology adoption, ultimately advancing its public procurement landscape into a more efficient, transparent, and resilient future.

5.1   Recommendations

In light of the robust evidence supporting the positive impact of technology adoption on efficiency and transparency in public procurement processes in Kenya, several recommendations emerged to guide future actions and initiatives. Addressing challenges head-on and implementing recommended policies and practices was not only to maximize the benefits of technology adoption but also propel Kenya's public procurement landscape into a more efficient, transparent, and resilient future.

Invest in Digital Literacy Training:

The accredited procurement training Institutions should prioritize comprehensive digital literacy training programs for procurement professionals, ensuring they acquire the skills needed to navigate and leverage new technologies effectively. Continuous training will empower the workforce to harness the full potential of technological innovations.

Strengthen Cybersecurity Measures:

The National Treasury in collaboration with Public Regulatory Authority should establish and enforce robust cybersecurity standards to safeguard the integrity and confidentiality of procurement data. This should include regular audits, the implementation of encryption technologies, and proactive measures to counter emerging cyber threats in specific procurement entities. A secure digital environment is essential for maintaining trust in technology-driven procurement systems.

Improve Infrastructure Across Regions:

The National Treasury should address infrastructural limitations by investing in improved internet connectivity and upgrading hardware, particularly in regions where technology adoption was hindered by inadequate infrastructure. Ensuring equitable access to technology advancements contribute to a more inclusive and nationwide transformation of procurement processes.

Enforce Policy Incentives for Adoption:

The National Treasury should consider implementing incentives to encourage the adoption of technology in public procurement. This could include tax benefits, grants, or other financial incentives for entities that demonstrated successful and sustained integration of technological solutions. Positive reinforcement can stimulate widespread adoption.

Establish a National Digital Procurement Strategy:

The National Treasury should liaise with procurement entities to develop a comprehensive national digital procurement strategy that outlines a cohesive and standardized approach to technology adoption. Such a strategy should encompass guidelines for the implementation of digital tools, data management, and interoperability standards to ensure a unified and efficient digital procurement ecosystem.

Collaborate with the Private Sector:

The National Treasury should foster collaboration with the private sector to leverage their expertise in technology solutions. Engaging with technology providers, industry experts, and digital service providers will facilitate the development of tailored solutions, promote innovation, and expedite the implementation of cutting-edge technologies in public procurement.

Regularly Review and Update Policies:
Public Procurement Regulatory Authority should establish mechanisms for the regular review and update of technology adoption policies in response to evolving challenges and opportunities. A dynamic policy framework that adapts to technological advancements will ensure the sustained relevance and effectiveness of technology in public procurement.

Encourage Data Sharing and Transparency Initiatives:
Public Procurement Regulatory Authority should promote initiatives like PPIP that encourage data sharing and transparency in public procurement. Implementing open data standards and platforms will enhance collaboration between stakeholders, increase accountability, and contribute to a culture of transparency in the procurement processes.

Data Security Protocols:
Procurement professionals must adhere to strict data security protocols to mitigate the risk of cybersecurity threats. This includes employing encryption measures, regular system checks, and employee education on cyber-security best practices.
By embracing the above recommendations, Kenya will navigate the challenges posed by technology adoption, capitalize on its transformative potential, and pave the way for an efficient, transparent, and resilient future in public procurement.

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Data Availability: All of the data are included in the content of the paper.

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