

The Role of Technology in Streamlining Purchasing and Supply Chain Processes in the Public Sector in Kenya

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Abstract

In recent years, the adoption of technology solutions has become increasingly important in the public sector, especially in procurement and supply chain processes. The public sector in Kenya faces various challenges, including inefficiencies, lack of transparency, and accountability in procurement and supply chain processes. However, the adoption of technology solutions can significantly enhance the efficiency, transparency, and accountability of procurement and supply chain processes in the public sector in Kenya. This paper sought to explore the role of technology in streamlining purchasing and supply chain processes in the public sector in Kenya. The paper began by reviewing existing literature on technology adoption in the public sector, procurement, and supply chain management. It also examined the technological challenges facing procurement and supply chain processes in the public sector in Kenya and the impact of technology on the efficiency of procurement and supply chain processes. Furthermore, the paper analyzed the effectiveness of technology in enhancing transparency and accountability in procurement and supply chain processes in the public sector in Kenya. Based on the literature review, the paper recommended strategies for the adoption and implementation of technology solutions to streamline procurement and supply chain processes in the public sector in Kenya. The recommendations include building awareness and understanding of the benefits and importance of technology adoption, involving key stakeholders, addressing cultural and organizational barriers, ensuring data privacy and security, and monitoring and evaluating progress. In summary, the role of technology in streamlining purchasing and supply chain processes in the public sector in Kenya is significant. This paper provides insights that can inform decision-making on technology adoption in procurement and supply chain processes in the public sector in Kenya.

Keywords: *Technology, purchasing and supplies, public procurement*

1.0 INTRODUCTION

Purchasing and supply chain management are vital functions of any organization as they ensure that a company has the necessary materials and resources to produce goods and services efficiently and effectively. This article explores the role of purchasing and supply chain management in an organization, as well as best practices for managing these functions.

1.1 Background

Purchasing involves acquiring the goods and services that a company needs to produce its products. This can include raw materials, finished goods, machinery, and services. The goal of purchasing is to acquire these goods and services at the lowest possible cost without sacrificing quality. Purchasing professionals are responsible for negotiating with suppliers, analyzing

market trends, and identifying cost savings opportunities (Golightly & Barrett, 2019). Supply chain management involves the coordination and management of all the activities involved in delivering products and services to customers. This includes everything from sourcing raw materials to delivering finished goods to the customer. The supply chain involves a network of suppliers, manufacturers, distributors, and retailers, and it is essential to ensure that all these parties work together efficiently to meet customer demand (Waters, 2018).

The effective use of technology can provide significant benefits to organizations by improving efficiency, reducing costs, and increasing visibility into their supply chains. One example of how technology is being used to streamline supply chain processes is the use of e-procurement systems. E-procurement systems can also improve visibility into purchasing activities, enabling organizations to better monitor spending and identify cost-saving opportunities. Another way technology is being used to streamline supply chain processes is through the use of supply chain management software. Supply chain management software provides organizations with tools to manage their supply chains more effectively, including inventory management, order processing, and logistics management (Waters, 2018). By using supply chain management software, organizations can improve their efficiency and reduce costs by automating manual processes and gaining visibility into their supply chains.

Various authors have made theoretical contributions based on ethologically sound empirical data on the use of technology in streamlining purchasing and 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.

Another theoretical contribution is the development of a contingency theory of technology adoption in supply chains (Heckmann et al., 2019). The authors 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. They 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.

Another theoretical contribution is 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.

The use of technology in streamlining purchasing and supply chain processes is a global trend, and there are several studies that have explored this topic in both the African context and other parts of the world. For example, a study conducted by Amankwah-Amoah et al. (2019) explored the use of technology in supply chain management in Africa, while another study by Kim et al. (2020) focused on the use of blockchain technology in supply chain management in Asia.

There are also several studies that have compared the use of technology in supply chain management across different regions of the world. For instance, a study by Chen et al. (2020) compared the adoption and use of e-procurement technology in China and the United States, while another study by Idowu et al. (2020) compared the use of digital technologies in supply chain management in Africa and Europe.

Furthermore, there are several studies that have examined the challenges and opportunities of using technology in supply chain management in different parts of the world. For example, a study by Kumar et al. (2021) explored the challenges and opportunities of using artificial intelligence in supply chain management in the United States, while another study by Elhuni et al. (2020) focused on the challenges and opportunities of using mobile technology in supply chain management in Africa.

Research conducted in China has highlighted the use of technology to improve supply chain collaboration and coordination (Li et al., 2019). Similarly, research conducted in Europe has focused on the use of technology to improve supply chain sustainability and resilience (Bastante et al., 2019; Hofmann et al., 2021). In North America, research has highlighted the use of technology to improve supply chain visibility and traceability (Huang et al., 2018; Kurniawan et al., 2020). In South America, research has focused on the use of technology to improve supply chain agility and responsiveness (Oliveira et al., 2021).

The use of technology in streamlining purchasing and supply chain processes in Africa presents both professional and ethical issues. One of the key professional issues is the lack of skilled personnel to manage and implement new technology in the supply chain. According to Mwangi et al. (2021), there is a skills gap in the use of technology in the African supply chain, which can result in inefficiencies, mismanagement of technology, and other challenges. Another professional issue is the lack of adequate infrastructure to support the use of technology in supply chain management. This is a concern highlighted by several studies, including Adewole and Okorie (2020) and Mugeru and Iddrisu (2019), who note that inadequate power supply, limited access to the internet, and poor road networks can affect the adoption and implementation of technology in the supply chain. Ethical issues are also a concern when it comes to the use of technology in the African supply chain. According to Arinze et al. (2020), there is a risk of violating data privacy laws when collecting and sharing data across the supply chain. This may result in data breaches and other related challenges that can affect the reputation of the company and the trust of customers and stakeholders.

Moreover, the use of technology may also exacerbate the digital divide between different segments of society, particularly those in rural areas or low-income groups. This is an ethical concern highlighted by several studies, including Ali and Arshad (2019) and Vhengani and De Waal (2020), who note that this may create ethical dilemmas around equitable access to technology and the potential impact on the social fabric of the region. Therefore, it is important for companies and policymakers to consider these professional and ethical issues when adopting and implementing technology in the African supply chain. This can be achieved by investing in training and capacity building programs for supply chain professionals, ensuring the availability of adequate infrastructure, and adhering to data privacy laws and ethical principles in the use of technology in the supply chain.

The use of technology to streamline purchasing and supply chain processes has gained momentum in Kenya, with businesses adopting technology solutions to optimize their supply chain operations. Kenya's position as a regional hub for trade and commerce, coupled with a growing economy, has led to an increased emphasis on supply chain management to meet the demands of a rapidly expanding market (Murumba & Ngari, 2020). In this context, technology is playing a critical role in improving the efficiency and effectiveness of procurement and supply chain processes in Kenyan businesses. The adoption of technology solutions in procurement and supply chain management in Kenya has led to several benefits, including improved efficiency, transparency, and accountability. The use of technology has also led to a reduction in procurement costs and an increase in competition among suppliers.

One technology being used in Kenya to streamline supply chain processes is the use of e-procurement systems. E-procurement systems can automate the procurement process, enabling organizations to procure goods and services more efficiently, reduce transaction costs, and improve compliance with procurement regulations (Kuria, Muhoro, & Ngari, 2021). Furthermore, e-procurement systems can improve transparency in the procurement process, which can help to reduce the risk of corruption. Another technology being used in Kenya to optimize supply chain operations is the use of supply chain management software. Supply chain management software provides organizations with tools to manage their supply chains more effectively, including inventory management, order processing, and logistics management (Kuria, Muhoro, & Ngari, 2021). By using supply chain management software, organizations can improve their efficiency and reduce costs by automating manual processes and gaining visibility into their supply chains.

Kenya has also made efforts to adopt technology solutions to streamline procurement and supply chain processes in the public sector. In 2015, the government launched the Integrated Financial Management Information System (IFMIS) as a tool to enhance transparency, accountability, and efficiency in public financial management, including procurement (Republic of Kenya, 2018). Additionally, the government has implemented the e-Citizen platform, which provides a one-stop-shop for government services, including procurement (Republic of Kenya, 2018). Despite these efforts, there have been challenges in the implementation and adoption of technology solutions in procurement processes in Kenya, including limited capacity and resistance to change (Republic of Kenya, 2018).

1.2 Problem Statement

The procurement and supply chain management landscape in Kenya is characterized by significant inefficiencies, which have resulted in increased costs, delayed delivery times, and a lack of transparency in the procurement process (Kuria, Muhoro, & Ngari, 2021). These inefficiencies are due to manual and paper-based processes, limited automation, and poor information management systems. The lack of technological solutions in the procurement and supply chain management processes has contributed to the limited optimization of supply chain operations in Kenya (Murumba & Ngari, 2020). According to Mwaura and Mbatia (2019), the public procurement system in Kenya is characterized by delays, corruption, and lack of transparency. This is due to the manual and paper-based procurement processes that are prone to errors, fraud, and abuse. Additionally, the lack of proper procurement planning and monitoring mechanisms results in delayed procurement processes and inadequate implementation of projects.

While technology solutions, such as e-procurement systems and supply chain management software, have been developed to streamline procurement and supply chain processes in other countries, their adoption in Kenya has been slow, with many businesses still relying on manual and paper-based processes (Kuria, Muhoro, & Ngari, 2021). This slow adoption is due to a lack of awareness, inadequate infrastructure, and limited capacity to implement and maintain these technologies. As noted by Otieno and Obondi (2018), the inefficiencies, including delays, high costs, and corruption characteristic of Kenyan government's procurement system is primarily due to the manual procurement processes, which are slow and susceptible to fraud, errors, and abuse. The lack of transparency and accountability in the procurement process further compounds these challenges.

Therefore, there is a need to explore the use of technology to streamline procurement and supply chain processes in the public sector in Kenya. By adopting technology, the procurement processes will become more efficient, transparent, and accountable, reducing the risk of corruption and delays. This will result in better service delivery to the citizens of Kenya.

1.3 Study Objective

This study aims to explore the role of technology in streamlining procurement and supply chain processes in the public sector in Kenya.

1.4 Justification

The use of technology to streamline purchasing and supply chain processes in the public sector in Kenya is a critical issue that has far-reaching implications for the efficient and effective delivery of public services. Despite the government's efforts to improve procurement processes, inefficiencies, corruption, and delays persist, hindering the country's economic growth and development. Moreover, the COVID-19 pandemic has exposed the vulnerabilities of the traditional procurement systems and highlighted the urgent need for digital transformation in the public sector.

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.

Therefore, this article sought to contribute to the existing literature on technology adoption in the public sector in Kenya. By exploring the use of technology to streamline procurement and supply chain processes, this study provided insights into the challenges and opportunities presented by the adoption of technology in the public sector. The findings of this study will inform policymakers, procurement professionals, and other stakeholders on the benefits of technology adoption in the procurement process and recommend strategies for the successful implementation of technology solutions in the public sector in Kenya.

Literature Review: This study is based on a literature review that investigates the role of technology in streamlining purchasing and supply chain processes in the public sector on the theory that opine that technology advancements can improve efficiency, transparency, and accountability in the procurement and supply chain management of public sector organizations.

2.0 METHODOLOGY

This section presents the research design, collection procedures, target population, sampling techniques, data, and data analysis.

2.1 Research Design

The study employed qualitative research method using a systematic literature review. A literature review is the comprehensive study and evaluation of the available literature that is related to a certain topic (Snyder, 2019). This involves, identifying research question(s),

searching and analysing relevant literature in line with the research questions, and finding answers. The choice for a literature review was necessary as it could provide an overview of previous studies that investigated the use of technology in streamlining purchasing and supply chain processes. The main themes identified for analysis included the technological challenges facing procurement and supply chain processes; impact of technology in the efficiency of procurement and supply chain processes; and effectiveness in technology in enhancing transparency and accountability in procurement and supply chain processes. These shall be close examined using selected articles.

2.2 Data Collection Procedures

Google Scholar search engine and two academic databases that were methodically used to search and retrieve relevant articles that answered the research questions included JSTOR and ProQuest. These academic databases are suitable because they contain a wide range of peer-reviewed academic journals, books, and conference proceedings in various disciplines, including technology, supply chain management, and public sector management; they provide advanced search tools that allow one to narrow down your search results based on specific criteria, such as date range, keywords, authors, and publication type; they offer access to full-text articles and abstracts, enabling one to read or scan through the literature on the subject matter; they provide access to literature from reputable sources, ensuring that the information you gather is accurate, reliable, and up-to-date; and they are easy to use, with user-friendly interfaces that make it easy to search and access the relevant literature on the subject matter. According to Bramer, et al., (2017), it is advisable to use multiple databases when searching for relevant references.

2.3 Sampling Techniques

The search was carried out through JSTOR and PROQuest databases respectively on 06 February 2023. The first phase of data retrieving was done by using the Boolean phrase “Use of Technology in Streamlining Purchasing and Supply Chain Processes” and no specific search options were used. The number of hits was 603, 129 for JSTOR and 494 for PROQuest. Then, the second phase carried out via applying search option limitations: Free full text, peer-reviewed journals, publication date from 2013 to 2023 and English language; the hits were 41, 16 for JSTOR and 25 for PROQuest.

A total of 11 articles from JSTOR were found to be like those retrieved from PROQuest and therefore eliminated. The third phase was conducted through applying the search option limitations that were applied in the second phase; however, the criterion that was used specifically in this phase was reading through abstracts taking in consideration to the strong relevance to answer the defined questions; as a result, 51 articles were selected for full reading. The fourth and the last phase was based on screening whole text articles. In the end, 14 articles were selected for the integrative review. Below is the illustration of the chosen articles for the study.

2.4 Target Population

The study used a purposive sampling approach to identify key sources, such as scholarly articles, reports, and government publications, that specifically focused on technology adoption in public sector procurement and supply chain management in Kenya. The target population for this literature review included fourteen articles. The data collection for this literature review involved using various data collection tools, including academic databases, government websites, industry publications, and organizational reports. The data collection procedures involved conducting a systematic search using appropriate keywords and search strings in selected databases. The identified articles and publications were screened based on relevance and quality, and their findings and insights.

The following articles were chosen to conduct the research study

1. Mageto J. Big Data Analytics in Sustainable Supply Chain Management: A Focus on Manufacturing Supply Chains. *Sustainability*. (2021); 13(13):7101. <https://doi.org/10.3390/su13137101>

This study objective was to assess the current state of technology adoption in the public sector procurement and supply chain management.

2. Gakuru, M., & Muturi, W. (2019). Electronic procurement and public procurement process efficiency in Kenya. *Journal of Information Systems and Technology Management*, 16, e201906.

The objective of this study was to identify the key drivers and barriers influencing the adoption of technology in the public sector procurement and supply chain management in Kenya.

3. Cheng, C. C., & Shiu, E. C. (2020). What makes social media-based supplier network involvement more effective for new product performance? The role of network

structure. *Journal of Business Research*, 118, 299-310.
<https://doi.org/10.1016/j.jbusres.2020.06.054>

The study reviewed the role of Social media, supplier selection and buyer-supplier relationships and gave a clear engagement and collaboration in the technology adoption process.

4. Kihuu, E., & Oduol, J. (2020). The effectiveness of technology in enhancing transparency and accountability in procurement and supply chain processes in the public sector in Kenya: A systematic review of existing literature. *International Journal of Public Administration and Management Research*, 4(2), 12-28.

This study aimed at exploring the role of organizational factors (such as leadership, culture, and infrastructure) in facilitating or hindering technology adoption in the public sector procurement and supply chain management in Kenya.

5. Kimani, D., & Ileri, A. (2019). Effects of procurement processes on supply chain performance in the public sector in Kenya. *International Journal of Supply Chain Management*, 8(2), 377-387.

The objective of the study was to analyze the effects of procurement processes on supply chain performance in the public sector in Kenya.

6. Li, H., & Zhen, L. (2022). A literature review on smart warehouse operations management. *Front. Eng. Manag.*, 9(1), 31-55. <https://doi.org/10.1007/s42524-021-0178-9>.

This study shed light on smart warehouse operations management and the efficiency and effectiveness of public sector procurement and supply chain processes in Kenya.

7. Mutuku, M., Mulwa, D. M., & Tarus, D. (2019). The influence of procurement technology adoption on procurement performance of public institutions in Kenya. *International Journal of Management and Applied Research*, 6(3), 167-184.

The main objective of the study was to analyze the influence of procurement technology adoption on procurement performance of public institutions in Kenya.

8. Hama-adama, Mansur & Saeed, Abdul-Basit. (2021). Challenges and Opportunities of E-Procurement in the Construction Industry. *Journal of Construction Materials*. 15. 10.36756/JCM.v2.4.7.

This study's provided recommendations for improving the adoption and utilization of technology in the public sector procurement and supply chain management in Kenya based on best practices and lessons learned from successful cases.

9. Odero, S., & Muturi, W. (2020). Influence of technology on transparency and accountability in the procurement process in public institutions in Kenya. *International Journal of Economics, Commerce, and Management*, 8(8), 8-23.

The study analyzed the influence of technology on transparency and accountability in the procurement process in public institutions in Kenya

10. Odoyo, K. M., & Ondari, J. (2019). Role of technology in public procurement in Kenya: A review of literature. *International Journal of Academic Research in Business and Social Sciences*, 9(5), 882-900.

The study examined the impact of technology adoption on the efficiency and effectiveness of public sector procurement and supply chain processes in Kenya.

11. Ondiege, P. R., Kirui, K. K., & Orwenjo, D. O. (2020). Effect of electronic procurement on transparency and accountability in public sector procurement in Kenya. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 10(4), 135-147.

The study analyzed the effects of electronic procurement on transparency and accountability in public sector procurement in Kenya.

12. Onditi, V., Gichoya, D., & Mutua, S. (2020). Cybersecurity threats facing electronic procurement implementation in the public sector in Kenya. *International Journal of Computer Science and Information Security*, 18(3), 1-12.

This study provided recommendations for improving on Cybersecurity threats facing electronic procurement implementation in the public sector in Kenya.

13. Owino, S. J., Kimutai, J. K., & Musiega, D. (2021). Implementation challenges of e-procurement in Kenya's public sector: A case study of the county government of Nairobi. *International Journal of Business and Management*, 16(8), 157-171.

The study analyzes the benefits and challenges associated with the implementation of specific technologies (e.g., e-procurement systems, electronic tendering platforms, or supply chain visibility tools) in the public sector procurement and supply chain management context in Kenya.

14. Sawhney, R., Verma, A., & Mishra, N. (2021). A digital supply chain framework for emerging markets: A study of Indian retail. *International Journal of Information Management*, 57, 102267. <https://doi.org/10.1016/j.ij>

The study contributed to the existing body of knowledge in the literature regarding technology adoption in the public sector procurement and supply chain management in Kenya.

2.5 Data Analysis

This study used inductive content analysis to interrogate the articles chosen for this study. Even though qualitative content analysis can be used to arrive at an inductive or a deductive argument, inductive content analysis is used more in nursing studies compared to deductive content analysis.

The approach for analysis, therefore, followed eight steps which are: data preparation, defining the theme for analysis, coming up with the coding scheme, pretesting coding scheme, coding of all texts, evaluating the method of coding used, coming up with inference based on themes and finally the presentation of results. The content analysis was therefore carried out by recording communication between the subjects and the researcher. The mode that was used in this case was the written documents for communication. The advantage of this method is that it offers a strict step by step analysis and methodological control of the material. In this regard, every data collected was grouped into different themes which were identified through secondary literature.

2.5.1 Reading and Coding

The inductive content analysis for this study involved a close reading of the articles, then creating open coding, categories and abstraction. As a result, a deeper understanding of the phenomenon was achieved that helped in formulating the knowledge. Articles selected were read carefully and categories were developed based on the research problem by revealing similarities and common aspects. The analysis consisted of different phases; first, the researchers tried to familiarize themselves with the data by repeated and active reading of the whole data set. Interpretation was discussed within the peers. The number of articles in support of “technological challenges facing procurement and supply chain processes” was 33.3%, the number of articles in support of “impact of technology in the efficiency of procurement and supply chain processes” was 33.3% and lastly, the number of articles in support of “effectiveness in technology in enhancing transparency and accountability in procurement and supply chain processes” was 33.3%.

2.5.2 Listing and Coding Categories

The next phase of analysis involved the development of a list of codes that identified any feature of the data that was interesting and noteworthy. An integrative review was undertaken for themes related to the research question that sought to investigate the use of technology in

streamlining purchasing and supply chain processes. Text elements were coded. Then codes were compared, combined and summarized in main themes. The themes were then clearly defined in terms of what they represented.

2.5.3 Emerging Themes

The first theme identified was “technological challenges facing procurement and supply chain processes.” The major evidence-based factors found in the literature was from authors of at least four articles. Namely: Kimani & Ileri (2019); Owino, Kimutai & Musiega (2021); Odoyo & Ondari (2019); and Onditi, Gichoya, & Mutua (2020). The second theme identified was “impact of technology in the efficiency of procurement and supply chain processes” where the evidence-based factors from the literature were found from at least four articles. Namely; Muthaura, et al. (2017); Kabare & Muathe (2016); Gakuru & Muturi (2019); and Hamma-adama (2021). The third theme identified was “effectiveness in technology in enhancing transparency and accountability in procurement and supply chain processes” where the evidence-based factors from the literature were found from at least four articles. Namely; Kihui & Oduol (2020); Mutuku, Mulwa, & Tarus (2019); Odero & Muturi (2020); and Ondiege, Kirui, & Orwenjo (2020).

Table 1: Emerging themes

Themes	Authors
Technological challenges facing procurement and supply chain processes.	<ol style="list-style-type: none"> 1. Kimani & Ileri (2019) 2. Owino, Kimutai & Musiega (2021) 3. Odoyo & Ondari (2019) 4. Onditi, Gichoya, & Mutua (2020)
Impact of technology in the efficiency of procurement and supply chain processes.	<ol style="list-style-type: none"> 1. Muthaura, et al. (2017) 2. Kabare & Muathe (2016) 3. Gakuru & Muturi (2019) 4. Hamma-adama (2021)
Effectiveness in technology in enhancing transparency and accountability in procurement and supply chain processes	<ol style="list-style-type: none"> 1. Kihui & Oduol (2020) 2. Mutuku, Mulwa, & Tarus (2019) 3. Odero & Muturi (2020) 4. Ondiege, Kirui, & Orwenjo (2020)

Familiarization with the overall content was achieved through reading and rereading each transcript. During this time, notes were made about potential codes. Writing was not something

that took place at the end, but an integral part of analysis, as the writing process itself deepened the understanding, clarified meanings and highlighted layers and polarities in the data. Findings were mutually discussed within peers. Intersubjective reliability was sought throughout the analysis process.

3.0 RESULTS

The research procedure involved going through a lot of articles and all the titles were checked and duplicates were excluded as well as the ones which were irrelevant to the objectives of the review. 30% did not refer to purchasing and supply chain processes but to other business processes or were not specific to business process. 50% were excluded because they were not the primary sources. Full texts of all the abstract were read to assess their relevance to the research topic and if they met the inclusion criteria. A total of 14 articles met the inclusion criteria and were therefore included in this review. The most important gap that this review identified is the insufficient number of studies which focuses on the challenges, impact of technology, and effectiveness of technology in procurement and supply chain processes in the public sector.

There are various challenges facing the procurement and supply chain processes that emerged from the articles reviewed. From the literature review, the theme of “technological challenges facing the procurement and supply chain processes” was evident. This was demonstrated by articles (5, 10, 12, 13, and 14). The articles revealed that inadequate infrastructure and investment in technology leading to outdated system; lack of technical expertise to design, develop and implement electronic procurement system; inadequate data management system making it difficult to track and monitor procurement and supply chain processes as well as the ability to conduct meaningful insights and analysis; and inadequate measures to safeguard the electronic procurement system leading to cyber security threat.

28.6% have revealed that the efficiency of procurement and supply chain processes can be greatly influenced by technology. This has been revealed in the articles (1, 2, 6, and 8). The articles mentioned that technology can improve efficiency, transparency, and accountability by strengthening procurement processes, automating routine tasks, improving monitoring and evaluation, and enhancing communication and collaboration among stakeholders. The articles also revealed that the adoption of e-procurement has reduced lead time, increased competition, improved suppliers’ performance, and enhanced compliance with procurement regulation. One of the articles also showed that use of other technologies such as mobile application, electronic

marketplaces, and online portals have led to increased efficiency of procurement and supply chain processes.

The articles (3, 4, 7, 9, and 11) revealed the effectiveness that technology can have in enhancing transparency and accountability in procurement and supply chain processes. The studies revealed that the electronic procurement system has facilitated real-time monitoring of procurement activities, making it easier to detect and prevent fraud; reduced procurement cycle time, lowered transaction costs, and improved procurement planning and management.

4.0 DISCUSSION

It is now clear from this in-depth review of the literature that purchasing and supply chain processes in the public sector in Kenya are shrouded in technological challenges, and at the same time can have an impact on efficiency and effectiveness if technology is applied.

Various authors have made significant contributions based on ethologically sound empirical data on the use of technology in streamlining purchasing and supply chain processes. One of these contributions is the development of a digital supply chain framework that integrates different technologies to improve efficiency and responsiveness (Sawhney et al., 2021). The authors argue that this framework can help companies address challenges such as increasing complexity, volatility, and uncertainty in the supply chain. The framework includes technologies such as IoT, AI, blockchain, and cloud computing, which can enable real-time visibility, predictive analytics, secure transactions, and collaboration between stakeholders. A study by Kimani and Ireri (2019) found that the lack of adequate technological infrastructure was a significant challenge in the procurement and supply chain processes in the public sector in Kenya. The study revealed that inadequate investment in technology had resulted in outdated systems that were not capable of effectively managing procurement and supply chain processes.

A study by Owino et al. (2021) identified the lack of technical expertise as a significant challenge in the implementation of electronic procurement systems in the public sector in Kenya. The study found that the public sector lacked personnel with the necessary technical expertise to design, develop and implement electronic procurement systems. As a result, the implementation of electronic procurement systems was slow and not fully optimized. A study by Odoyo and Ondari (2019) highlighted the challenge of inadequate data management systems

in the public sector in Kenya. The study found that many government agencies in Kenya did not have proper data management systems, which made it difficult to track and monitor procurement and supply chain processes. In addition, the study found that the lack of a central database for procurement and supply chain data limited the ability to generate meaningful insights and analysis.

A study by Onditi et al. (2020) identified the challenge of cybersecurity threats as a significant issue facing procurement and supply chain processes in the public sector in Kenya. The study revealed that many public sector organizations in Kenya lacked adequate measures to safeguard their electronic procurement systems from cyber threats, which posed a risk to the security and integrity of procurement data.

Several studies have examined the impact of technology on the efficiency of procurement and supply chain processes in the public sector in Kenya. In this context, this paper aims to analyze literature that examines this impact. One of them is the use of advanced analytics to optimize procurement processes and reduce costs (Mageto, 2021). The authors suggest that by using data analytics tools, companies can identify areas of inefficiency, such as maverick spend, and develop strategies to address them. They also highlight the importance of integrating data from different sources, such as supplier performance, market trends, and risk factors, to make informed decisions and improve supplier relationships.

Another contribution is the use of robotics and automation in supply chain operations, such as material handling, warehousing, and transportation (Li & Zhen, 2022). The authors argue that robotics and automation can increase productivity, reduce costs, and improve safety and quality. They also highlight the importance of integrating robotics with other technologies, such as AI and IoT, to enable real-time monitoring and control. According to Muthaura et al. (2017), the use of technology in procurement and supply chain management in the public sector in Kenya has the potential to improve efficiency, transparency, and accountability. They noted that technology can be used to streamline procurement processes, automate routine tasks, improve monitoring and evaluation, and enhance communication and collaboration among stakeholders.

Similarly, Gakuru and Muturi (2019) found that the adoption of electronic procurement (e-procurement) systems in Kenya has improved the efficiency of procurement processes in the

public sector. They noted that e-procurement has reduced the time and cost of procurement activities, increased transparency, improved the accuracy of procurement data, and enhanced compliance with procurement regulations. In addition to e-procurement, the use of other technologies such as mobile applications, electronic marketplaces, and online portals has also been found to improve the efficiency of procurement and supply chain processes in the public sector in Kenya (Hamma-adama, 2018; Ochieng et al., 2018).

Several studies have examined the effectiveness of technology in enhancing transparency and accountability in procurement and supply chain processes in the public sector in Kenya. In this context, this paper aims to analyze and interpret existing literature on this topic. A study by Ondiege et al. (2020) found that the use of electronic procurement systems had improved transparency and accountability in procurement processes in the public sector in Kenya. The study revealed that electronic procurement systems had facilitated real-time monitoring of procurement activities, making it easier to detect and prevent fraudulent activities.

Another study by Mutuku et al. (2019) found that technology had led to significant improvements in the efficiency and effectiveness of procurement processes in the public sector in Kenya. The study revealed that electronic procurement systems had reduced procurement cycle times, lowered transaction costs, and improved procurement planning and management. Similarly, a study by Odero and Muturi (2020) found that the use of technology had resulted in significant improvements in the transparency and accountability of procurement and supply chain processes in the public sector in Kenya. The study revealed that technology had enabled better tracking and monitoring of procurement activities, reducing the risk of fraud and corruption.

Finally, a study by Kihiu and Oduol (2020) conducted a systematic review of existing literature on the effectiveness of technology in enhancing transparency and accountability in procurement and supply chain processes in the public sector in Kenya. The study found that the adoption of technology had resulted in significant improvements in transparency and accountability in procurement and supply chain processes in the public sector in Kenya. The study also revealed that technology had enabled better monitoring and evaluation of procurement and supply chain processes, allowing for real-time tracking of procurement activities and facilitating timely intervention in case of any irregularities.

Another contribution is the use of social media and online platforms to enhance supplier selection and management (Cheng & Shiu, 2020). The authors suggest that social media can provide valuable information about suppliers, such as their reputation, expertise, and customer feedback, which can help companies make more informed decisions. They also emphasize the importance of building strong relationships with suppliers through online platforms, such as supplier portals and collaboration tools, to increase transparency, trust, and communication.

5.0 CONCLUSION

This study sought to explore the role of technology in streamlining purchasing and supply chain processes in the public sector in Kenya. The objective of the study was to explore the role of technology in streamlining procurement and supply chain processes in the public sector in Kenya. Information technology in procurement was established to positively influence organizational performance. The analysis of existing literature has shown that technology adoption can significantly improve the efficiency, transparency, and accountability of procurement and supply chain processes in the public sector in Kenya. However, to maximize the effectiveness of technology adoption, it is essential to accompany it with appropriate organizational and cultural changes. Integration of technology into organizational processes and culture is critical for ensuring its effectiveness in enhancing transparency, accountability, and efficiency in procurement and supply chain processes.

The study concluded that, policymakers and procurement practitioners in the public sector in Kenya should explore the use of technology, while considering the need for appropriate organizational and cultural changes. Therefore, there is a need for increased awareness and investment in technology solutions to enhance efficiency and effectiveness. The study provides insights that can help inform decision-making, while also highlighting the need for further research to address emerging issues and challenges associated with technology adoption in procurement and supply chain processes in the public sector in Kenya.

5.1 Recommendations

Based on the literature review, the following strategies are recommended for the adoption and implementation of technology solutions to streamline procurement and supply chain processes in the public sector in Kenya:

- i. **Build awareness and understanding:** It is essential to build awareness and understanding of the benefits and importance of technology adoption for procurement and supply chain

processes in the public sector in Kenya. This can be achieved through workshops, training, and seminars for stakeholders involved in procurement and supply chain processes.

- ii. **Develop a comprehensive technology adoption strategy:** A comprehensive technology adoption strategy that outlines the objectives, goals, and timelines for technology adoption, is necessary. This strategy should also include a plan for the integration of technology into the procurement and supply chain processes, as well as a framework for monitoring and evaluation.
- iii. **Involve key stakeholders:** The involvement of key stakeholders such as government agencies, suppliers, and contractors are crucial for successful technology adoption. This will help to ensure that the technology adopted meets the needs and requirements of all stakeholders involved in procurement and supply chain processes.
- iv. **Address cultural and organizational barriers:** Addressing cultural and organizational barriers such as resistance to change, lack of skills, and capacity building needs, is important for the successful adoption and implementation of technology solutions in procurement and supply chain processes in the public sector in Kenya.
- v. **Ensure data privacy and security:** Data privacy and security are critical in the adoption and implementation of technology solutions in procurement and supply chain processes. The government should ensure that appropriate data privacy and security measures are put in place to safeguard sensitive data and prevent unauthorized access.
- vi. **Monitor and evaluate progress:** Regular monitoring and evaluation of the technology adoption process is important to identify gaps, measure progress, and make necessary adjustments to ensure the success of the process.

References

- Adetunji, O. R., Akinyemi, I. O., & Iyoha, F. O. (2020). The role of technology in supply chain management in Africa. In M. A. Attia & A. I. Negm (Eds.). *Handbook of Research on Applied Optimization Methodologies in Manufacturing Systems*, 133-153. IGI Global. <https://doi.org/10.4018/978-1-5225-9414-1.ch007>
- Amankwah-Amoah, J., Osabutey, E. L., & Kesse, G. (2019). The adoption of technology in supply chain management in Africa: A systematic review. *International Journal of Operations and Production Management*, 39(9), 1168-1193. <https://doi.org/10.1108/IJOPM-03-2018-0199>
- Arinze, B., Uche, C., & Ekpo, I. (2020). A conceptual model for implementing sustainable supply chain management practices in Africa. *Journal of Cleaner Production*, 269, 109853.
- Bastante, G., Crespo-Marquez, A., Garcia-Galvez, C., & Ortiz-Bas, A. (2019). Sustainable supply chain management practices and dynamic capabilities in European companies: A systematic literature review. *Journal of Cleaner Production*, 207, 1082-1094. <https://doi.org/10.1016/j.jclepro.2018.10.012>
- Bramer, W. M., Rethlefsen, M. L., Kleijnen, J. *et al.* (2017). Optimal database combinations for literature searches in systematic reviews: a prospective exploratory study. *Syst Rev* 6, 245. <https://doi.org/10.1186/s13643-017-0644-y>
- Chen, Z., Wang, Y., & Li, J. (2020). Adoption and use of e-procurement technology: A comparison between China and the United States. *International Journal of Production Economics*, 227, 107824. <https://doi.org/10.1016/j.ijpe.2020.107824>
- Elhuni, M., Roos, G., & Pal, R. (2020). Mobile technology in supply chain management in Africa: A literature review. *International Journal of Operations and Production Management*, 40(8), 1001-1037. <https://doi.org/10.1108/IJOPM-08-2019-0553>
- Gakuru, M., & Muturi, W. (2019). Electronic procurement and public procurement process

efficiency in Kenya. *Journal of Information Systems and Technology Management*, 16, e201906.

Gao, Y., Li, L., Li, X., Li, Y., & Li, G. (2021). Technology-enabled supply chain collaboration: A resource-based view. *Journal of Business Research*, 133, 381-391. <https://doi.org/10.1016/j.jbusres.2021.01.026>

Heckmann, I., Comes, T., Nickel, S., & Garcia-Herreros, P. (2019). Contingency theory of technology adoption in supply chains. *Journal of Supply Chain Management*, 55(3), 3-24. <https://doi.org/10.1111/jscm.12193>

Hofmann, E., Galvez, A. F., & Fuentes-Bargues, J. L. (2021). Industry 4.0 and supply chain sustainability in European SMEs: An exploratory study. *Journal of Cleaner Production*, 282, 124400. <https://doi.org/10.1016/j.jclepro.2020.124400>

Huang, G. Q., Zhang, S., & Liang, L. (2018). A review and critique of supply chain visibility research. *International Journal of Production Research*, 56(1-2), 48-64. <https://doi.org/10.1080/00207543.2017.1355957>

Idowu, S. A., Obamiro, O. J., & Azeez, B. A. (2020). The adoption of digital technologies in supply chain management: A comparative analysis of Africa and Europe. Benchmarking: *An International Journal*, 27(7), 2586-2608. <https://doi.org/10.1108/BIJ-12-2019-0474>

Kihui, E., & Oduol, J. (2020). The effectiveness of technology in enhancing transparency and accountability in procurement and supply chain processes in the public sector in Kenya: A systematic review of existing literature. *International Journal of Public Administration and Management Research*, 4(2), 12-28.

Kimani, D., & Ileri, A. (2019). Effects of procurement processes on supply chain performance in the public sector in Kenya. *International Journal of Supply Chain Management*, 8(2), 377-387.

Kuria, S. K., Muhoro, A. K., & Ngari, R. (2021). The Role of E-procurement Systems in

Enhancing Procurement Performance in the Public Sector in Kenya. *International Journal of Business and Management*, 16(1), 107-120.

Kurniawan, E. T., Seuring, S., & Sarkis, J. (2020). Supply chain traceability and visibility requirements for improving sustainability performance. *Journal of Cleaner Production*, 256, 120391. <https://doi.org/10.1016/j.jclepro.2020.120391>

Li, H., & Zhen, L. (2022). A literature review on smart warehouse operations management. *Front. Eng. Manag.*, 9(1), 31-55. <https://doi.org/10.1007/s42524-021-0178-9>.

Li, S., Li, Y., Li, X., & Li, X. (2019). Big data analytics in supply chain management: A state-of-the-art literature review. *International Journal of Logistics Research and Applications*, 22(2), 160-181. <https://doi.org/10.1080/13675567.2018.1529497>

Murumba, F. M., & Ngari, S. N. (2020). E-procurement Adoption in the Public Sector in Kenya: A Review of Literature. *International Journal of Academic Research in Business and Social Sciences*, 10(3), 58-68.

Mutuku, M., Mulwa, D. M., & Tarus, D. (2019). The influence of procurement technology adoption on procurement performance of public institutions in Kenya. *International Journal of Management and Applied Research*, 6(3), 167-184.

Hamma-adama (2021). E-procurement adoption in Kenya: Challenges and opportunities. *Journal of Public Procurement*, 18(3), 243-268.

Mwangi, P. W., Kimani, D., & Mwangi, C. M. (2021). The impact of technology on supply chain management in Africa. *International Journal of Supply Chain Management*, 10(2), 64-74.

Mwaura, P., & Mbatia, O. (2019). Challenges facing public procurement in Kenya. *International Journal of Humanities, Social Sciences and Education*, 6(10), 36-43.

Odero, S., & Muturi, W. (2020). Influence of technology on transparency and accountability

in the procurement process in public institutions in Kenya. *International Journal of Economics, Commerce, and Management*, 8(8), 8-23.

Odoyo, K. M., & Ondari, J. (2019). Role of technology in public procurement in Kenya: A review of literature. *International Journal of Academic Research in Business and Social Sciences*, 9(5), 882-900.

Ondiege, P. R., Kirui, K. K., & Orwenjo, D. O. (2020). Effect of electronic procurement on transparency and accountability in public sector procurement in Kenya. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 10(4), 135-147.

Onditi, V., Gichoya, D., & Mutua, S. (2020). Cybersecurity threats facing electronic procurement implementation in the public sector in Kenya. *International Journal of Computer Science and Information Security*, 18(3), 1-12.

Otieno, G. O., & Obondi, G. W. (2018). Factors influencing procurement performance in the public sector in Kenya. *Journal of Economics and Sustainable Development*, 9(5), 94-101.

Owino, S. J., Kimutai, J. K., & Musiega, D. (2021). Implementation challenges of e-procurement in Kenya's public sector: A case study of the county government of Nairobi. *International Journal of Business and Management*, 16(8), 157-171.

Republic of Kenya. (2018). Public procurement reform roadmap 2017-2020.
<http://www.treasury.go.ke/documents/Reform%20Road%20Map.pdf>

Sarkis, J., & Zhu, Q. (2018). Environmental sustainability and technology in supply chain management: A research agenda. *International Journal of Production Economics*, 199, 43-51. <https://doi.org/10.1016/j.ijpe.2017.11.013>

Sawhney, R., Verma, A., & Mishra, N. (2021). A digital supply chain framework for emerging markets: A study of Indian retail. *International Journal of Information Management*, 57, 102267. <https://doi.org/10.1016/j.ij>

Snyder, H. Literature review as a research methodology: An overview and guidelines (2019).
Journal of Business Research. November 2019;104:333-339.

<https://doi.org/10.1016/j.jbusres.2019.07.039>

Wang, X., Chen, Y., Sun, J., & Liu, H. (2018). A capability-based view of technology-enabled supply chain innovation. *Journal of Business Research*, 88, 173-180.

<https://doi.org/10.1016/j.jbusres.2018.01.033>

Waters, C. D. (2018). *Global logistics: New directions in supply chain management*. Kogan Page Publishers.