



DIGITALIZATION AND SERVICE DELIVERY IN THE MINISTRY OF ICT AND DIGITAL ECONOMY, KENYA

¹ Kamau John Karanja, ² Dr. Omwenga Jane

¹ MsC ICT Management, Jomo Kenyatta University of Agriculture and Technology

² School of Business and Entrepreneurship, Jomo Kenyatta University of Agriculture and Technology

ABSTRACT

Service delivery within state agencies is an important aspect critical to the government service delivery as a whole and in fulfilling its governing mandate. However, service delivery in state agencies remains challenged in diverse ways, including unresponsiveness to citizens' needs, delays in service delivery, and the inability to access diverse services provided by government agencies. Research has shown that Digitalization influences service delivery. Despite significant investments in digital infrastructure, the impact of Digitalization efforts in the Ministry of ICT and Digital Economy, Kenya, remains unclear, raising concerns about their effectiveness. The main objective of this study was to assess the influence of Digitalization on service delivery in Ministry of ICT And Digital Economy, Kenya. The study was guided by the following specific objectives: to establish the influence of digital infrastructure on service delivery in Ministry of ICT and Digital Economy, Kenya and to evaluate the influence of process automation on service delivery in Ministry of ICT and Digital Economy, Kenya. This study was anchored on systems theory and technology acceptance model. The study used descriptive research design. In this study, the unit of analysis was government ministry of ICT and Digital Economy, while the unit of observation is the individual IT Officers, from whom data was collected. Therefore, the target population in this research study consisted of 186 IT Officers in the ministry of ICT and digital Economy, Kenya. In this study, a census approach was employed to collect data from the entire population of 186 IT Officers in the Ministry of ICT in Kenya. Data was collected using a self-administered semi-structured questionnaire. Population of the pilot was 18 individuals which represent 10% of the total population size. Pilot data was used to test validity and reliability of the questionnaire. Data obtained from the field was coded, cleaned, and entered into the computer for analysis using the SPSS version 25. Descriptive statistical included frequency, percentages, mean and standard deviation. Inferential statistical analysis to be used were multiple regression and correlation analysis. The significant of each independent variable was tested at a confidence level of 95%. The relationship between the study variables were tested using multivariate regression models. The findings were presented in tables and figure. Regression analysis revealed that Process Automation having the highest impact ($\beta = 0.398$, $p = 0.000$), followed by Digital Infrastructure ($\beta = 0.312$, $p = 0.000$). The findings confirm that digitalization enhances service efficiency but gaps in infrastructure resilience, financial security, and user training remain challenges. The study concludes that continuous investment in automation, infrastructure upgrades is essential for sustaining digital transformation in public service delivery. It recommends strengthening staff training on digital platforms, expanding assistive technologies for inclusivity, and enhancing cybersecurity frameworks to optimize the benefits of digitalization in government operations.

Key Words: Digitalization, Digital Infrastructure, Process Automation, Service Delivery, Ministry of ICT and Digital

Background of the Study

Service delivery remains a challenge to State agencies across the world (Chan *et al.*, 2018). In this context, Lopes, Soares, Nielsen and Tavares (2019) note that poor service delivery is often characterized by unresponsiveness to the citizens' needs, delay in service delivery and inability to access diverse services provided by government agencies. Other aspects that have been noted to be a challenge in service delivery by the state agencies include lack of transparency and accountability in service delivery, quality of services offered, and speed of service delivery (Heeks, 2018). The challenge of service delivery by government agencies has been associated with diverse aspects including government service culture, poor attitudes by service providers in government entities, and organizational culture amongst other factors (Ajibade, Ibietan, & Ayelabola, 2019). Other factors associated with poor service delivery include lowly paid, unmotivated government employees, poor training on service delivery, inadequate resources and low accountability levels (Ali, 2019).

Service delivery within state agencies is an important aspect which is critical to the government service delivery as a whole and in fulfilling its governing mandate. The service delivery is critical in state agencies since these corporations are created to perform specific functions such as regulatory aspects, improve on execution of government mandate, reduce government bureaucracy in service provision, improve of efficiency in service delivery as well as focus on a specific area of interest to the government (Chepkonga, Nzioki, & Kiprop, 2018). Therefore, poor service delivery of state agencies negates the functions for which the state agencies were created for. Service delivery within the government and the state agencies are important to diverse stakeholders and in diverse ways. According to Njururi (2028) service delivery by state agencies and other government agencies enables meeting of the citizens' needs and general economic competitiveness aspects.

Service delivery has been conceptualized in diverse ways by different scholars. Shrestha and Bodart, (2018) conceptualizes service delivery as the provision of an activity that meet users' needs. In conceptualization of service delivery similar to Legris, Ingham, and Collette, (2019), Onono (2019) indicates that service delivery refers to achievement of organizational goals and objectives leading to customer satisfaction. In both of Alornyeku (2019) and Onono (2020) conceptualization of service delivery, there is achievement of customer needs and hence satisfaction aspects. Maina (2019) further note that service delivery refers to the delivery of specialized skills and knowledge (in contrast to the physical resources) to the citizens. Chone (2019) seems to combine portion of Alornyeku (2018), Onono (2022) and Maina (2019) conceptualizations of service delivery. In this context, Chone (2019) note that service delivery relates to that component of an organization that defines the interaction between providers and clients where the provider offers a service, whether that information or a task, and the client either finds value or loses value as a result.

Digitalization refers to the aspect of incorporating digital technologies into various aspects of society, business, and everyday life, replacing traditional analog methods. It involves transforming data, systems, and processes into digital formats that can be easily stored, analyzed, and shared across digital platforms.

Digitalization has become a fundamental aspect of the modern information age and has had a profound impact on various industries and aspects of daily life. The development of digitalization has become a key factor affecting organizational performance because it provides new opportunities for value creation (Matt *et al.*, 2019). Since the introduction of automated teller machines (ATMs) into the financial industry, extensive digital research on the financial sector has focused on academic discussion (Zavolokina *et al.*, 2019). The new concept of digital technology is bringing creative destruction to the financial industry, whose core is manipulating and transmitting digital information (Clarke, 2019). The global spread of information technology (IT) has intensified the digital innovation of the financial industry. Recent research on the digitalization of the financial industry regards the combination of artificial intelligence, blockchain, cloud computing, big data technology, and the financial industry as "financial

technology (fintech),” which is considered the most disruptive component in the process of financial digitalization (Gomber et al., 2019). Fintech broadly describes the modern connection between mature business activities in the financial services industry (e.g., transaction banking, money lending) and internet-related technologies (e.g., mobile internet, cloud computing) (Puschmann, 2019). This study therefore sought to assess the influence of Digitalization on service delivery in Ministry of ICT and Digital Economy, Kenya.

Statement of the Problem

Service delivery within state agencies is an important aspect critical to the government service delivery as a whole and in fulfilling its governing mandate. These agencies are created to perform specific functions such as regulatory aspects, improving the execution of government mandates, reducing government bureaucracy in service provision, improving efficiency in service delivery, and focusing on specific areas of government interest (Chepkonga et al., 2018). However, service delivery in state agencies remains challenged in diverse ways, including unresponsiveness to citizens' needs, delays in service delivery, and the inability to access diverse services provided by government agencies. Other challenges in service delivery by state agencies include a lack of transparency and accountability, the quality of services offered, and the speed of service delivery.

Research has shown that Digitalization influences service delivery. Despite significant investments in digital infrastructure, the impact of Digitalization efforts in the Ministry of ICT and Digital Economy, Kenya, remains unclear, raising concerns about their effectiveness. As of 2023, internet penetration in Kenya stands at 43% nationally, with urban areas enjoying significantly higher access rates compared to rural areas (Communications Authority of Kenya, 2023). This digital divide poses a challenge to equitable service delivery, as many citizens in remote regions are unable to benefit from online government services. Furthermore, a 2022 World Bank report highlighted inefficiencies in the implementation of digital projects within the Kenyan government. It indicated that 35% of Digitalization projects faced delays and budget overruns, impacting their timely execution and effectiveness. This suggests that the problem may not solely lie in the availability of digital infrastructure but also in the management and execution of these projects. Additionally, digital literacy among both the public and government employees is inadequate. A 2022 survey by the Kenya National Bureau of Statistics found that only 28% of the population had basic computer skills, essential for accessing and utilizing digital services. This lack of digital literacy hampers the uptake and efficient use of government digital platforms, further limiting their impact. The problem also extends to issues of data security and privacy. With increasing cyber threats, the government's capacity to safeguard sensitive information and maintain public trust in digital systems is crucial. A 2023 survey by Cybersecurity Ventures noted a 20% increase in cyberattacks targeting government systems in Kenya, raising serious concerns about the robustness of the country's digital infrastructure.

Various studies have examined the influence of Digitalization on service delivery. For instance, Mwangi (2018) studied the influence of service Digitalization on the performance of commercial banks in Kenya. Ochieng and Njuguna (2018) investigated the influence of information communication technology adoption as a strategic resource on the delivery of public services in Naivasha sub-county, Kenya. Sachdev (2018) researched the impact of Digitalization on organizational performance. Nevertheless, none of these studies focused on Digitalization on service delivery in Ministry of ICT and Digital Economy, Kenya.. To fill these gaps, the current study sought to assess the influence of Digitalization —specifically digital infrastructure, process automation—on service delivery in Kenyan government.

Objective of Study

- i). To establish the influence of digital infrastructure on service delivery in Ministry of ICT and Digital Economy, Kenya.

- ii). To evaluate the influence of process automation on service delivery in Ministry of ICT and Digital Economy, Kenya.

LITERATURE REVIEW

Theoretical Review

Systems theory

Systems theory, introduced by biologist Ludwig von Bertalanffy in the 1940s, is a transdisciplinary study focusing on cohesive groups of interrelated and interdependent components that can be natural or artificial (Von Bertalanffy, 1968). This theory posits that every system is defined by its causal boundaries, influenced by its context, structured by its function and role, and expressed through its relationships with other systems. A system is "more than the sum of its parts," indicating that systems exhibit synergy or emergent behavior, where the whole is different from, and often more complex than, the sum of its individual components (Von Bertalanffy, 1968).

The concept of causal boundaries is central to systems theory, as it defines the scope and influence of a system. These boundaries determine which components are part of the system and which are external to it (Checkland, 1981). For instance, in a government Digitalization project, the causal boundaries might include technological infrastructure, human resources, and regulatory frameworks. This delineation helps in understanding how various elements interact within the system and how changes in one component can impact the entire system.

Systems are significantly influenced by their external environment and context, which play a crucial role in their functioning and adaptation (Senge, 1990). The interaction between a system and its environment is vital for its sustainability and growth. For example, the success of Digitalization efforts in the Kenyan government is contingent upon the socio-economic, political, and technological environment. The ability of a system to engage with and adapt to its environment determines its resilience and effectiveness in achieving its goals. This concept is closely related to digital infrastructure, as robust infrastructure must adapt to changing technological advancements and user demands. Critics argue that systems theory can sometimes oversimplify complex interactions by focusing on general principles rather than detailed, context-specific factors (Midgley, 2000). Additionally, the broad scope of systems theory can make it challenging to derive actionable insights without substantial customization and contextualization. Despite these critiques, systems theory provides a valuable framework for analyzing the interconnected nature of digital infrastructure in government Digitalization efforts.

Resource-Based View Theory

The Resource-Based View (RBV) theory of a firm helps to identify and appraise a firm's strategic resources relative to its competitors. According to Brown and Squire (2019); Mbithi et al. (2019); and Ovidijus (2013), the RBV approach can be traced back to Penrose in 1959, who described a firm as a collection of productive resources, and thus it is more than just administrative (Brown & Squire, 2019). According to Ovidijus (2013), the theory was further developed by Wernerfelt in 1984. It stems from the principle that the source of the firms' competitive advantage lies in their internal resources, as opposed to their positioning in the external environment. Barney (1991), one of the contributors to RBV theory of the firm, suggests that the firm's structure; human capital, including the skills, judgment, and intelligence of the employees; and human resource management systems are key sources of competitive advantage to an organization.

This theory is linked with process automation in this study. The internal resources, such as the skills and capabilities of IT officers and the technological tools available within government ministries, are critical for successful process automation. By leveraging the principles of the RBV, the study will assess how effectively these internal resources are utilized to automate

processes, reduce paperwork, and integrate departmental functions. This approach will highlight the importance of resource management in achieving efficient and effective process automation in government service delivery.

Critiques of the RBV often focus on its static nature and the difficulty in identifying and measuring strategic resources (Priem & Butler, 2001). Additionally, the theory may underemphasize the importance of external environmental factors and dynamic capabilities. Despite these critiques, the RBV offers a powerful lens for understanding how internal resources can drive process automation and improve service delivery in government.

Conceptual Framework

Conceptual framework, according to educational researcher Stratman and Roth (2019) are structured from a set of broad ideas and theories that help a researcher to properly identify the problem they are looking at, frame their questions and find suitable literature. It clarifies the connection among predictor and response variables. In this study the conceptual framework shows the relationship between the dependent (service delivery in Ministry of ICT and Digital Economy, Kenya.) and the independent variables (digital infrastructure, process automation,). Conceptual framework for this study is a presented in Figure 2.1.

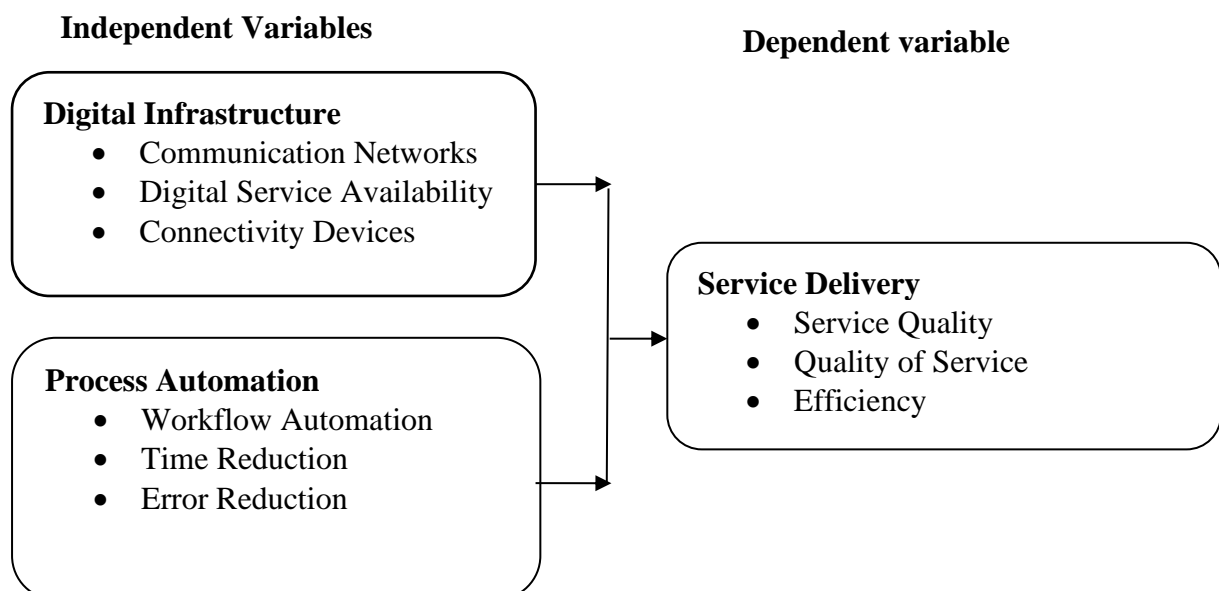


Figure 2. 1: Conceptual Framework

Digital Infrastructure

Digital infrastructure encompasses the fundamental technological frameworks that support the delivery of digital services. This includes communication networks, data centers, and connectivity devices. According to Naughton (2019), robust digital infrastructure is critical for the effective implementation of e-government initiatives. It enables seamless connectivity and integration of various government services, thus enhancing the efficiency and accessibility of these services. Furthermore, the presence of a strong digital infrastructure can significantly influence the overall economic development of a country, as it facilitates better service delivery, promotes transparency, and fosters innovation (Baller, Dutta, & Lanvin, 2019).

One of the primary components of digital infrastructure is communication networks. These networks provide the backbone for data transmission, supporting the operations of various digital services. Efficient communication networks ensure that data is transmitted quickly and securely, which is essential for the smooth functioning of government services (Baller et al., 2019). Data centers, another crucial component, serve as the storage and processing hubs for large volumes of data generated by digital services. They are pivotal in ensuring data availability, reliability, and security (Gholami, 2019). Connectivity devices, such as routers,

switches, and mobile devices, facilitate the end-user's access to digital services, ensuring that services are accessible to citizens anytime and anywhere (Naughton, 2019).

Critics argue that while the development of digital infrastructure is necessary, it is not sufficient on its own. The effectiveness of digital infrastructure also depends on factors such as digital literacy, regulatory frameworks, and the broader socio-economic context (Gholami, 2019). Without addressing these complementary factors, investments in digital infrastructure may not yield the expected improvements in service delivery.

Process Automation

Process automation involves the use of technology to perform routine tasks and processes without human intervention. It includes tools and technologies such as robotic process automation (RPA), artificial intelligence (AI), and machine learning (ML) (Van der Aalst, 2016). Process automation is aimed at enhancing efficiency, reducing errors, and freeing up human resources for more strategic tasks.

According to Van der Aalst (2018), process automation can significantly streamline government operations by automating repetitive tasks such as data entry, document processing, and customer service interactions. This not only reduces the time and cost associated with these tasks but also minimizes the risk of human error, thereby improving the quality of services delivered to citizens. Furthermore, AI and ML can be used to analyze large volumes of data, identify patterns, and make data-driven decisions, thus enhancing the effectiveness of government policies and programs (Davenport & Ronanki, 2018).

However, the implementation of process automation also faces challenges. One of the primary concerns is the potential displacement of jobs due to automation, which can lead to resistance from employees and labor unions (Acemoglu & Restrepo, 2018). Additionally, the success of process automation depends on the availability of high-quality data and the integration of automated systems with existing IT infrastructure (Van der Aalst, 2018). Addressing these challenges requires a strategic approach that includes employee training, change management, and robust data governance frameworks.

Service Delivery

Service delivery in the public sector refers to the mechanism through which government services are provided to the public, ensuring that the needs of citizens are met efficiently, effectively, and equitably. Improving service delivery is a fundamental goal of public administration, particularly in developing countries where there are significant challenges related to infrastructure, resources, and governance (World Bank, 2018). Efficiency in service delivery involves optimizing resources to ensure that services are provided in a timely and cost-effective manner. According to Alford and Yates (2016), achieving efficiency in public services requires the implementation of effective management practices, streamlined processes, and the adoption of technology. Digitalization efforts, such as process automation and the use of digital platforms, play a crucial role in enhancing efficiency by reducing bureaucratic bottlenecks and minimizing the time required to deliver services (Osborne, Radnor, & Nasi, 2017).

The quality of service delivery is another critical aspect, encompassing the reliability, responsiveness, and overall user satisfaction with the services provided. Zeithaml, Bitner, and Gremler (2017) highlight that high-quality service delivery leads to greater public trust and confidence in government institutions. Implementing digital solutions can improve service quality by providing more accurate and reliable services, enabling better monitoring and evaluation, and facilitating more responsive interactions with citizens (Mergel, Edelmann, & Haug, 2019).

Accessibility refers to the ease with which citizens can access government services, regardless of their location, socioeconomic status, or physical abilities. Digital platforms significantly enhance accessibility by allowing citizens to access services online, thus overcoming

geographical and physical barriers (Bertot, Estevez, & Janowski, 2016). Ensuring that digital services are inclusive and accessible to all, including those with disabilities, is crucial for equitable service delivery (Henry, 2019). Equity in service delivery ensures that all citizens have fair and impartial access to government services. According to Brown and Potoski (2019), digital solutions can promote equity by providing more transparent and standardized processes, reducing opportunities for corruption, and ensuring that services are distributed based on need rather than favoritism. Additionally, leveraging data analytics can help identify underserved populations and tailor services to meet their specific needs (Mergel et al., 2019).

Citizen satisfaction is a key indicator of the effectiveness of service delivery. It reflects the degree to which citizens feel their needs and expectations are being met by government services. Studies by Van de Walle and Bouckaert (2017) suggest that high levels of citizen satisfaction are associated with increased trust in government and greater civic engagement. Digital transformation initiatives that enhance service delivery can lead to higher levels of citizen satisfaction by providing more convenient, transparent, and reliable services (Dwivedi, Rana, Jeyaraj, Clement, & Williams, 2019).

Empirical Literature Review

Digital Infrastructure on Service Delivery

Gholami, Asadi, and Nourbakhsh (2019) explored the impact of digital infrastructure on public administration efficiency in Iran. The study used a quantitative approach with a cross-sectional research design. The target population comprised government officials from various ministries. A sample size of 200 respondents was selected through random sampling. Data were collected using a structured questionnaire and analyzed using structural equation modeling (SEM). The results indicated that investments in digital infrastructure led to significant improvements in administrative efficiency and service delivery. The study emphasized the need for continuous investment in technological infrastructure to sustain these improvements.

Baller, Dutta, and Lanvin (2019) conducted a comparative study titled digital infrastructure and its impact on economic development: a case study of European Union Countries. This research used a mixed-methods design, combining quantitative data analysis with qualitative case studies. The target population included policymakers and ICT experts from EU countries. A sample size of 120 respondents was selected using purposive sampling. Data collection methods included surveys, interviews, and document analysis. The findings revealed that countries with advanced digital infrastructure experienced higher levels of economic development and improved public service delivery. The study highlighted the importance of policy frameworks that support digital infrastructure development.

Kim and Lee (2020) examined the role of digital infrastructure in enhancing public service delivery in South Korea. This study used a quantitative research design with a longitudinal survey methodology. The target population included government employees and ICT experts. A sample size of 250 respondents was selected through stratified random sampling. Data were collected using online surveys and analyzed using regression analysis. The findings indicated that robust digital infrastructure, including high-speed internet and data centers, played a critical role in improving the efficiency and quality of public services. The study concluded that continuous upgrades to digital infrastructure are essential for sustaining these improvements.

Moussa and Toumi (2021) conducted a global study titled impact of digital infrastructure on government service delivery: evidence from OECD Countries. The study employed a quantitative research design, utilizing a cross-sectional survey methodology to collect data from 36 OECD countries. The target population included government agencies responsible for ICT and public service delivery. A sample size of 180 respondents was selected through stratified random sampling. Data were collected using structured questionnaires and analyzed using multiple regression analysis. The findings indicated that robust digital infrastructure significantly enhances the efficiency, accessibility, and quality of government services. The

study highlighted that investments in high-speed internet and data centers positively correlated with improved public service delivery outcomes.

Mwangi, Ochieng, and Njuguna (2020) investigated the role of digital infrastructure in enhancing public service delivery in Kenya. This study utilized a mixed-methods approach with a descriptive research design. The target population was government employees in the Ministry of ICT in Kenya, and a sample size of 150 participants was selected using purposive sampling. Data collection involved surveys and interviews, with quantitative data analyzed through descriptive statistics and qualitative data through thematic analysis. The findings revealed that digital infrastructure, particularly broadband connectivity and modern data centers, significantly improved the efficiency and transparency of public services. The study concluded that digital infrastructure is crucial for the successful implementation of e-government initiatives in Kenya.

Process Automation on Service Delivery

Smith and Wiggins (2020) conducted a global study titled the effects of process automation on public sector efficiency. The study utilized a quantitative research design with a longitudinal survey methodology. The target population included government departments in the United States and Europe. A sample size of 300 respondents was selected using stratified random sampling. Data were collected through online surveys and analyzed using structural equation modeling (SEM). The findings indicated that process automation significantly reduces operational costs and processing times in public service delivery. The study highlighted that the adoption of robotic process automation (RPA) and artificial intelligence (AI) tools led to substantial improvements in service efficiency and accuracy.

Chowdhury and Chatterjee (2021) investigated the role of process automation in enhancing public service delivery in India. The study used a quantitative research design with a cross-sectional survey methodology. The target population included government officials and IT staff in Indian ministries. A sample size of 200 respondents was selected through stratified random sampling. Data were collected using structured questionnaires and analyzed using regression analysis. The findings indicated that process automation improved the efficiency and transparency of public services, particularly in areas such as tax collection and social welfare distribution.

Nchimbi and Mgonja (2020) explored the impact of process automation on local government service delivery in Tanzania. This study employed a mixed-methods approach with a descriptive research design. The target population included local government employees and service users in urban areas. A sample size of 180 respondents was selected using purposive sampling. Data collection methods included surveys, interviews, and focus group discussions, with data analyzed using thematic and statistical analysis. The findings revealed that process automation enhanced the efficiency and responsiveness of local government services by streamlining administrative processes and reducing paperwork.

Adebayo and Adedeji (2019) examined the impact of process automation on public service delivery in Nigeria. This study employed a mixed-methods approach with an exploratory research design. The target population was employees in various government ministries in Lagos State. A sample size of 120 participants was selected using purposive sampling. Data collection involved surveys and in-depth interviews, with quantitative data analyzed through descriptive statistics and qualitative data through content analysis. The findings revealed that process automation, particularly in administrative and financial processes, significantly enhanced service delivery by reducing delays and errors. The study recommended increased investment in automation technologies to further improve public sector performance in Nigeria.

Makori and Waiganjo (2021) examined the effect of automation on public service delivery in Nairobi County, Kenya. The study used a quantitative research design with a cross-sectional survey methodology. The target population included government employees in Nairobi County. A sample size of 150 respondents was selected using simple random sampling. Data

were collected using structured questionnaires and analyzed using descriptive and inferential statistics. The findings indicated that automation significantly improved the efficiency and accuracy of service delivery, particularly in areas such as licensing and revenue collection. The study recommended further adoption of automation technologies to enhance public service delivery in Kenya.

RESEARCH METHODOLOGY

The study used descriptive research design. the unit of analysis is government ministry, as the study aimed to assess the impact of Digitalization on service delivery across these entities. Meanwhile, the unit of observation was the individual IT Officers, from whom data was collected. This approach allowed for a comprehensive analysis of Digitalization 's impact on service delivery within the Kenyan government. These IT Officers are pivotal in implementing and managing digital infrastructure and services within their respective ministries, making them crucial sources of insight for this study. Therefore, the target population in this research study consisted of 186 IT Officers across the government ministries in Kenya. Table 3.1 shows their distribution.

Table 3. 1: Target Population

Category	Target Population
ICT Secretary	1
Director	1
Deputy Director	3
Senior Assistant Director	4
Assistant Director	29
Principal ICTO	10
Chief ICTO	44
Senior ICTO	94
Total	186

A census approach was employed to collect data from the entire population of 186 IT Officers across the government ministries in Kenya. Data was collected using a self-administered semi-structured questionnaire. According to Mugenda and Mugenda (2019) the pretest sample should be between 1% and 10% depending on the sample size. Population of the pilot was 18 individuals which represent 10% of the total population size which was pre tested. Data obtained from the field were coded, cleaned, and entered into the computer for analysis using the SPSS version 25. For the quantitative reports, the tables consisted of mean and standard deviation values that were used to make interpretation of the analysis. Percentage, mean and standard deviation was used to show the frequency of responses. Descriptive statistics included frequency, percentages, mean and standard deviation. Inferential statistical analysis to be used were multiple regression and correlation analysis. The significant of each independent variable was tested at a confidence level of 95%. The relationship between the study variables were tested using multivariate regression models.

RESEARCH FINDINGS AND DISCUSSION

The study targeted a total population of 186 IT Officers from the Ministry of ICT and Digital Economy, Kenya. However, 18 questionnaires were used for pilot testing, leaving 168 questionnaires issued for the main data collection. Out of these, 145 were successfully completed and returned, while 23 were not returned or were incomplete. This resulted in a response rate of 86.2%. A response rate of 86.2% is considered high and acceptable for survey research. According to Mugenda & Mugenda (2019), a response rate of above 70% is sufficient for statistical analysis and provides reliable insights into the research variables. The high response rate enhances the credibility and generalizability of the findings, ensuring that the results are representative of the target population.

Descriptive Analysis

This section presents descriptive statistics for the study variables. The responses were measured using a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Moderate, 4 = Agree, 5 = Strongly Agree). The mean (M) and standard deviation (SD) values provide insights into the central tendencies and variability of responses. A higher mean (4.0–5.0) indicates strong agreement and widespread implementation, while a lower mean (1.0–2.9) suggests disagreement or limited adoption. A moderate mean (3.0–3.9) reflects neutral or mixed views. The standard deviation shows response variability; a higher value (≥ 1.0) indicates diverse opinions, while a lower value (≤ 0.5) suggests strong consensus among respondents.

Digital Infrastructure

The first objective of the study was to establish the influence of digital infrastructure on service delivery in Ministry of ICT and Digital Economy, Kenya. Table 4.1 presents the descriptive statistics for Digital Infrastructure.

Table 4.1: Descriptive Statistics for Digital Infrastructure

Statement	Mean (M)	Standard Deviation (SD)
The digital infrastructure in our ministry supports efficient service delivery.	4.158	0.821
Investments in digital infrastructure have improved the quality of services provided.	4.118	0.871
Our ministry's communication networks are reliable and support our service delivery needs.	4.098	0.931
Our data centers provide adequate storage and processing capabilities for our digital services.	4.088	0.891
The digital infrastructure allows for seamless integration of various government services.	4.278	0.761
There is adequate technical support for maintaining digital infrastructure in our ministry.	3.958	0.911
Our ministry regularly upgrades its digital infrastructure to meet current needs.	3.898	1.021
The digital infrastructure is resilient and ensures minimal downtime of services.	3.998	0.941
Aggregate Score	4.074	0.894

The findings indicate that seamless integration of various government services is the most highly rated aspect of digital infrastructure (M = 4.278, SD = 0.761), suggesting that digital systems effectively interconnect different services within the Ministry of ICT and Digital Economy. This is followed by support for efficient service delivery (M = 4.158, SD = 0.821) and improvements in service quality due to digital infrastructure investments (M = 4.118, SD = 0.871), highlighting the perceived benefits of digitalization. Reliable communication networks (M = 4.098, SD = 0.931) and adequate data storage and processing capabilities (M = 4.088, SD = 0.891) were also positively rated, showing strong confidence in the ministry's ICT backbone. However, concerns arise regarding technical support availability (M = 3.958, SD = 0.911) and regular infrastructure upgrades (M = 3.898, SD = 1.021), with the lowest mean scores, indicating a need for more consistent infrastructure enhancements and support to maintain digital service efficiency. The resilience of digital infrastructure (M = 3.998, SD = 0.941) also scored lower, suggesting that while the system performs well, there may be occasional service disruptions.

Overall, the results confirm that while digital infrastructure significantly supports service delivery, continuous upgrades and stronger technical support are necessary for sustaining high performance. The findings affirm that digital infrastructure plays a crucial role in enhancing service delivery efficiency, aligning with Mwangi, Ochieng, and Njuguna (2020), who found

that broadband connectivity and modern data centers significantly improve transparency and efficiency in public services in Kenya. The study also supports Kim and Lee (2020), who emphasized that robust digital infrastructure, including high-speed internet and reliable data centers, enhances public service efficiency in South Korea. However, the lower ratings in areas such as technical support and regular infrastructure upgrades highlight ongoing challenges, echoing Kim and Lee's (2020) recommendation that continuous investment in digital infrastructure is necessary to sustain improvements in service delivery. These findings collectively underscore the need for not only maintaining and integrating digital systems but also ensuring consistent upgrades and support mechanisms to optimize public sector performance.

Process Automation

The second objective of the study was to evaluate the influence of process automation on service delivery in Ministry of ICT and Digital Economy, Kenya. Table 4.2 presents the descriptive statistics for Process Automation.

Table 4. 2: Descriptive Statistics for Process Automation

Statement	Mean (M)	(SD)
Process automation has significantly reduced the time required to complete tasks in our ministry.	4.318	0.771
Automation has improved the accuracy of our administrative processes.	4.228	0.831
The implementation of automation tools has increased the overall efficiency of service delivery.	4.188	0.791
Automated processes have reduced the reliance on manual interventions.	4.168	0.851
Automation has streamlined workflows and reduced bottlenecks.	4.198	0.821
Our ministry provides adequate training for staff on using automated systems.	3.768	1.081
Automation has improved the consistency of service delivery.	4.148	0.871
The use of automation has led to better resource management within the ministry.	4.118	0.901
Aggregate Score	4.142	0.865

The findings indicate that process automation has significantly reduced the time required to complete tasks ($M = 4.318$, $SD = 0.771$), making it the highest-rated aspect. This suggests that automation has effectively streamlined government operations, reducing delays and improving overall productivity. Additionally, automation has enhanced the accuracy of administrative processes ($M = 4.228$, $SD = 0.831$), reinforcing the idea that digital systems minimize human errors and improve data precision. The streamlining of workflows and reduction of bottlenecks ($M = 4.198$, $SD = 0.821$) further highlights how automation enhances operational flow, reducing inefficiencies in service delivery. Similarly, the overall efficiency of service delivery has increased due to automation tools ($M = 4.188$, $SD = 0.791$), indicating that automated processes have improved speed and service quality within the ministry.

The findings also show that automation has reduced reliance on manual interventions ($M = 4.168$, $SD = 0.851$), suggesting that employees now perform fewer repetitive tasks, allowing them to focus on higher-value work. Furthermore, automation has improved the consistency of service delivery ($M = 4.148$, $SD = 0.871$), ensuring that government processes are more uniform and reliable. The use of automation in resource management ($M = 4.118$, $SD = 0.901$) suggests that automated tools contribute to better allocation and utilization of government resources. However, the lowest-rated statement was the adequacy of training for staff on using automated systems ($M = 3.768$, $SD = 1.081$), indicating that while automation is beneficial, a lack of sufficient training may hinder its full effectiveness and adoption.

The findings align with Smith and Wiggins (2020), who established that process automation significantly reduces operational costs and processing times in public service delivery, leading

to improved efficiency and accuracy. The strong ratings for task completion speed, administrative accuracy, and workflow efficiency support Chowdhury and Chatterjee (2021), who found that automation in Indian government agencies improved transparency and minimized bureaucratic inefficiencies. However, the low rating for staff training resonates with Adebayo and Adedeji (2019), who noted that while automation enhances government service delivery in Nigeria, inadequate training and resistance to technology adoption remain key challenges. These findings collectively emphasize the need for continuous investment in automation technologies alongside staff training programs to maximize the benefits of digital process automation in government service delivery.

Service Delivery in Ministry of ICT and Digital Economy, Kenya

The main objective of this study was to assess the influence of Digitalization on service delivery in Ministry of ICT and Digital Economy, Kenya. This section presents descriptive statistics for the overall impact of digitalization on service delivery in the Ministry of ICT and Digital Economy, Kenya. Table 4.3 presents the findings.

Table 4. 3: Descriptive Statistics for Overall Digitalization Impact

Statement	Mean (M)	Standard Deviation (SD)
Digitalization has improved the overall efficiency of service delivery in our ministry.	4.328	0.741
The quality of services provided by our ministry has improved due to Digitalization.	4.208	0.791
Digitalization has made our services more accessible to the public.	4.238	0.781
Overall, Digitalization has positively impacted the satisfaction of service users.	4.218	0.811
Digitalization has enhanced the transparency of our service delivery processes.	4.198	0.831
The use of digital tools has led to better data management and utilization.	4.268	0.781
Digitalization has reduced the cost of delivering services.	4.178	0.801
Continuous improvement in digital services is a priority in our ministry.	4.288	0.761
Aggregate Score	4.241	0.787

The findings indicate that digitalization has significantly improved the overall efficiency of service delivery ($M = 4.328$, $SD = 0.741$), making it the highest-rated aspect. This suggests that digital transformation has played a crucial role in optimizing operational workflows and enhancing service delivery processes within the ministry. Additionally, continuous improvement in digital services is a priority ($M = 4.288$, $SD = 0.761$), reinforcing the ministry's commitment to ongoing advancements in technology to sustain service quality. The use of digital tools leading to better data management and utilization ($M = 4.268$, $SD = 0.781$) highlights how digitalization has strengthened information handling, ensuring accuracy and efficiency in decision-making. Furthermore, digitalization has made services more accessible to the public ($M = 4.238$, $SD = 0.781$), demonstrating that technology has enhanced user reach and engagement with government services.

The findings also show that digitalization has positively impacted user satisfaction ($M = 4.218$, $SD = 0.811$), indicating that citizens and stakeholders perceive digital initiatives as beneficial to their experience with government services. Additionally, enhanced transparency in service delivery ($M = 4.198$, $SD = 0.831$) suggests that digital systems have contributed to reducing corruption and improving accountability. The cost reduction in service delivery due to digitalization ($M = 4.178$, $SD = 0.801$) supports the notion that technology-driven solutions have increased financial efficiency by minimizing administrative costs and streamlining

operations. The quality of services provided by the ministry improving due to digitalization ($M = 4.208$, $SD = 0.791$) further emphasizes how technological advancements have strengthened the effectiveness and reliability of public services.

The findings align with Moussa and Toumi (2021), who found that investments in digitalization significantly enhance efficiency, accessibility, and service quality in government institutions across OECD countries. The strong ratings for efficiency improvements, transparency, and cost reduction support Kim and Lee (2020), who established that digitalization plays a critical role in optimizing public sector performance by streamlining workflows, improving data management, and reducing administrative costs. However, the emphasis on continuous digital service improvement resonates with Wambugu and Karanja (2021), who highlighted that ongoing digital advancements are necessary to maintain high service delivery standards in Kenya. Collectively, these findings underscore the importance of sustained investment in digital infrastructure, transparency measures, and user-centric innovations to maximize the benefits of digital transformation in government service delivery.

These findings affirm that digitalization is perceived as a crucial driver of service efficiency, transparency, and accessibility in the ministry. The next section presents correlation analysis to examine the relationships between study variables.

Correlation Analysis

This section presents the correlation analysis between the independent variables (Digital Infrastructure, Process Automation) and the dependent variable (Service Delivery). The purpose of correlation analysis is to determine the strength and direction of relationships among the study variables. The analysis was conducted using Pearson's Correlation Coefficient (r), which measures the degree of linear association between variables. The correlation values range from -1 to +1, where: $r = +1$ indicates a perfect positive correlation, $r = -1$ indicates a perfect negative correlation, and $r = 0$ indicates no correlation. According to Kothari (2014), correlation coefficients between 0.1 - 0.29 indicate a weak relationship, 0.3 - 0.49 indicate a moderate relationship, and 0.5 - 1.0 indicate a strong relationship between variables. Table 4.10 presents the correlation coefficients between the study variables.

Table 4. 4: Correlation Matrix

Variables		Service Delivery	Digital Infrastructure	Process Automation
Service Delivery	Pearson Correlation	1		
	Sig. (1-tailed)			
	N	145		
Digital Infrastructure	Pearson Correlation	0.782*	1	
	Sig. (1-tailed)	0.001		
	N	145	145	
Process Automation	Pearson Correlation	0.812*	0.725	1
	Sig. (1-tailed)	0.000	0.063	
	N	145	145	145

The study finds that Digital Infrastructure has a strong positive correlation with Service Delivery ($r = 0.782$, $p = 0.001$), suggesting that well-developed digital infrastructure, including high-speed internet, modern data centers, and reliable communication networks, plays a crucial role in ensuring efficient and reliable public service delivery. Since the p-value is statistically significant ($p < 0.05$), this confirms that the availability of strong infrastructure directly influences public service efficiency. This finding is supported by Mwangi, Ochieng, and Njuguna (2020), who found that broadband connectivity and investment in modern data infrastructure significantly enhanced efficiency and transparency in Kenya's e-government services. Similarly, Kim and Lee (2020) emphasized that high-speed internet and reliable data

storage facilities are critical in optimizing public sector performance, ensuring minimal disruptions in digital service delivery. These findings collectively underscore the importance of continuous investment in digital infrastructure to maintain high service efficiency and ensure smooth digital transformation in government institutions.

The findings reveal that Process Automation has the strongest positive correlation with Service Delivery ($r = 0.812$, $p = 0.000$), indicating that automating workflows, reducing manual interventions, and enhancing administrative accuracy significantly improve public service efficiency. Since the p-value is less than 0.05, the relationship is statistically significant. This suggests that the more automated the processes, the faster and more accurate service delivery becomes, reducing bureaucratic delays and human errors. These results align with Smith and Wiggins (2020), who established that process automation leads to significant improvements in public sector efficiency, reducing operational costs and administrative backlogs. Similarly, Chowdhury and Chatterjee (2021) found that automating administrative tasks in India's government institutions reduced processing times and improved service consistency. The study emphasizes the need for governments to continuously invest in automation technologies and train employees to optimize their effectiveness.

Regression Analysis

The regression coefficients in Table 4.5 provide detailed insights into the influence of each variable on service delivery. The magnitude, direction, and statistical significance of these coefficients help determine which factors have the most substantial impact on public service efficiency.

Table 4. 5: Regression Coefficients

Variable	Unstandardized B	Std. Error	Standardized Beta	t-Statistic	p-Value
Constant	0.215	0.058		3.707	0.001
Digital Infrastructure	0.312	0.065	0.362	4.800	0.000
Process Automation	0.398	0.061	0.521	6.525	0.000

Based on the findings, the fitted regression equation is:

$$\text{Service Delivery} = 0.215 + 0.312 (\text{Digital Infrastructure}) + 0.398 (\text{Process Automation})$$

Digital Infrastructure ($\beta = 0.312$, $p = 0.000$) was the second most significant predictor of service delivery, suggesting that strong IT infrastructure ensures seamless service provision and digital transformation success. This supports the findings of Mwangi, Ochieng, and Njuguna (2020), who established that broadband connectivity and IT investments significantly enhance e-government service efficiency in Kenya.

Process Automation ($\beta = 0.398$, $p = 0.000$) had the highest influence on service delivery, indicating that a one-unit increase in automation leads to a 0.398 increase in service efficiency. This suggests that automating workflows reduces delays, improves service accuracy, and optimizes resource allocation. These findings align with Chowdhury and Chatterjee (2021), who confirmed that automating administrative processes in government improves workflow efficiency and minimizes bureaucratic bottlenecks.

Conclusion

Digital Infrastructure was found to be essential for ensuring seamless service delivery. Investments in broadband connectivity, communication networks, and data storage have facilitated efficient integration of digital services, reducing delays and improving coordination between departments. However, the need for continuous system upgrades and reliable technical support was identified as a key concern. Some respondents reported occasional system failures and maintenance gaps, indicating that without sustained investment, digital infrastructure may not fully support long-term service efficiency.

Process Automation emerged as the most significant contributor to enhanced service delivery. Automating administrative and operational processes eliminates inefficiencies, reduces human

errors, and ensures standardized service provision. The study confirmed that process automation minimizes bureaucratic delays, enabling faster response times and more consistent service quality. However, a lack of adequate staff training on automated systems was identified as a barrier to full adoption, indicating that technical training programs are necessary to equip government employees with the skills required to maximize automation benefits.

Recommendations

Digital Infrastructure

To sustain and improve the effectiveness of digital public services, the government must prioritize continuous investment in digital infrastructure. This includes expanding broadband connectivity, upgrading data centers, and enhancing IT security measures. The study findings indicate that occasional system failures and maintenance gaps hinder service delivery, making it crucial for the Ministry to implement proactive system maintenance and regular infrastructure upgrades. Additionally, technical support teams should be strengthened to ensure quick resolution of system issues and minimize service downtime.

Furthermore, the adoption of cloud computing and advanced data management systems should be explored to enhance scalability, data storage efficiency, and system reliability. Public-private partnerships (PPPs) could play a role in boosting infrastructure development, allowing for shared expertise and cost-effective technology investments. Ensuring that digital infrastructure remains robust and resilient will help sustain efficient and uninterrupted digital service delivery in government institutions.

Process Automation

The study revealed that Process Automation is the most significant driver of improved service delivery, yet a lack of adequate staff training remains a key challenge. To address this, the government should invest in structured training programs to equip public servants with the technical skills required to manage and optimize automated processes. Training should focus on how to utilize automation tools efficiently, troubleshoot common errors, and enhance workflow integration.

Moreover, the expansion of automation across all government departments should be prioritized to eliminate bureaucratic bottlenecks and ensure uniformity in service provision. Automating routine administrative tasks, such as document processing, licensing approvals, and citizen inquiries, can significantly reduce delays and improve service accuracy. Additionally, the integration of Artificial Intelligence (AI) and Machine Learning (ML) into automation systems should be explored to enhance decision-making processes and predictive analytics in public service management. Investing in automation-driven governance will streamline government operations, improve accountability, and enhance service efficiency.

Suggestions for Further Studies

Future research should explore organizational culture, leadership, digital policies, and employee adaptability in service efficiency. Additionally, studies should assess the sustainability of digital public services, the role of emerging technologies such as AI and Blockchain, cybersecurity risks, and citizen satisfaction in digital service accessibility. Addressing these gaps will provide a holistic understanding of digital transformation in government service delivery and guide future policy and innovation efforts.

REFERENCES

- Acemoglu, D., & Restrepo, P. (2018). *Artificial intelligence, automation, and work. In The economics of artificial intelligence: An agenda (pp. 197-236)*. University of Chicago Press.
- Adebayo, A., & Adedeji, S. (2019). The impact of process automation on public service delivery in Nigeria. *African Journal of Public Administration*, 9(3), 45-60.

- Alford, J., & Yates, S. (2016). Co-Production of Public Services in Australia: The Roles of Government Organisations and Co-Producers. *Australian Journal of Public Administration*, 75(2), 159-175.
- Baller, S., Dutta, S., & Lanvin, B. (2019). *The global information technology report 2019: Innovating in the digital economy*. World Economic Forum.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.
- Bertot, J. C., Estevez, E., & Janowski, T. (2016). Universal and contextualized public services: Digital public service innovation framework. *Government Information Quarterly*, 33(2), 211-222.
- Brown, S., & Squire, B. (2019). The Resource-Based View: A Review and Assessment of its Critiques. *International Journal of Management Reviews*, 21(2), 166-190.
- Chan, F. T. S., Kumar, N., Tiwari, M. K., Lau, H. C. V., & Choy, K. L. (2018). Global supplier selection: a fuzzy-AHP approach. *International Journal of Production Research*, 46(14), 3825–3857.
- Checkland, P. (1981). *Systems Thinking, Systems Practice*.
- Chowdhury, S., & Chatterjee, S. (2021). The role of process automation in enhancing public service delivery in India. *Journal of Public Administration Research and Theory*, 31(2), 350-370.
- Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard Business Review*, 96(1), 108-116.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the Unified Theory of Acceptance and Use of Technology (UTAUT): Towards a Revised Theoretical Model. *Information Systems Frontiers*, 21(3), 719-734.
- Gholami, R., Asadi, S., & Nourbakhsh, M. (2019). Impact of digital infrastructure on public administration efficiency in Iran. *Journal of Economic Policy Reform*, 22(1), 55-68.
- Heeks, R. (2019). Health information systems: Failure, success and improvisation. *International Journal of Medical Informatics*, 75(2), 125-137.
- Henry, S. L. (2019). *Web accessibility: Web standards and regulatory compliance*. Springer.
- Kim, H., & Lee, J. (2020). Digital accessibility and public service delivery: A cross-country analysis. *Government Information Quarterly*, 37(4), 101481.
- Kothari, C. R. (2016). *Research Methodology: Methods & Techniques* (2nd ed.). Delhi: New Age International Ltd.
- Legris, P., Ingham, J., & Colletette, P. (2019). Why Do People Use Information Technology. A Critical Review of the Technology Acceptance Model. *Information & Management*, 40(3), 191–204.
- Makori, S., & Waiganjo, E. (2021). The effect of automation on public service delivery in Nairobi County, Kenya. *African Journal of Public Administration*, 13(1), 100-120.
- Mbithi, M., Namusonge, G., & Sakwa, M. (2019). The Role of Firm Resources in Sustaining Competitive Advantage among Manufacturing Firms in Kenya. *Journal of Business Administration Research*, 8(1), 25-35.
- Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385.
- Midgley, G. (2000). *Systemic Intervention: Philosophy, Methodology, and Practice*.
- Moussa, S., & Toumi, H. (2021). Impact of digital infrastructure on government service delivery: Evidence from OECD countries. *Journal of Public Administration Research and Theory*, 31(2), 290-306.
- Mugenda, O., & Mugenda, A., (2009). *Qualitative and Quantitative Approaches to Research Methods*: Nairobi: African Centre of Technology Studies

- Mwangi, J., Ochieng, P., & Njuguna, A. (2020). The role of digital infrastructure in enhancing public service delivery in Kenya. *Journal of Information Technology for Development*, 26(3), 420-437.
- Naughton, J. (2019). *From Gutenberg to Zuckerberg: What you really need to know about the internet*. Quercus.
- Nchimbi, G., & Mgonja, E. (2020). The impact of process automation on local government service delivery in Tanzania. *Journal of African Public Administration*, 15(2), 200-220.
- Njururi, A.M. (2021). Change management strategies and health care performance in Nairobi County, Kenya: lewin's change model approach. *International journal of advance research and innovative ideas in education*, 7(5), 149-159.
- Ochieng, G. J. A. & Njuguna, P. M. (2018). The influence of information communication technology adoption as a strategic resource on delivery of public services in Naivasha sub county, Kenya. *International Journal of Business Management and Processes*, 4(2), 218-228
- Osborne, S. P., Radnor, Z., & Nasi, G. (2017). A new theory for public service management? Toward a (public) service-dominant approach. *American Review of Public Administration*, 43(2), 135-158.
- Ovidijus, J. (2013). *Resource-Based View (RBV)*. Strategic Management Insight.
- Priem, R. L., & Butler, J. E. (2001). Is the resource-based "view" a useful perspective for strategic management research? *Academy of Management Review*, 26(1), 22-40.
- Senge, P. M. (1990). *The Fifth Discipline: The Art & Practice of The Learning Organization*.
- Shrestha, L.B. and Bodart, C. (2018). *Data transmission, data processing, and data quality*. In: Lippeveld, T., Sauerborn, R., and Bodart, C., eds. Design and Implementation of Health Information Systems. Geneva: World Health Organisation, 128-145.
- Smith, A., & Wiggins, C. (2020). The effects of process automation on public sector efficiency. *International Journal of Public Administration*, 43(5), 408-423.
- Suri, T., & Jack, W. (2019). The long-run poverty and gender impacts of mobile money. *Journal of Development Economics*, 135, 125-145.
- Van de Walle, S., & Bouckaert, G. (2017). Public service performance and trust in government: The problem of causality. *International Journal of Public Administration*, 40(5), 395-408.
- Von Bertalanffy, L. (1968). *General System Theory: Foundations, Development, Applications*.
- Wambugu, S., & Karanja, E. (2021). The role of digital accessibility in enhancing public service delivery in Kenya. *African Journal of Information Systems*, 13(2), 124-140.
- World Bank. (2018). *World Development Report 2018: Learning to Realize Education's Promise*. World Bank Group.
- Zeithaml, V. A., Bitner, M. J., & Gremler, D. D. (2017). *Services Marketing: Integrating Customer Focus Across the Firm*. McGraw-Hill Education.