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ICT INFRASTRUCTURE RESOURCES AND PERFORMANCE OF KNOWLEDGE MANAGEMENT SYSTEMS IN UNIVERSITIES IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

Knowledge Management Systems (KMS) are integrated systems designed to facilitate the collection, organization, sharing, and analysis of knowledge within an organization. These systems aim to enhance organizational efficiency by ensuring that valuable information and insights are easily accessible to employees, fostering a culture of collaboration and continuous learning. Knowledge Management Systems (KMS) in universities in Kenya, face several challenges that hinder their effective implementation and utilization. The general objective of the study is to assess the influence of ICT infrastructure resources and performance of knowledge management systems in universities in Nairobi City County Kenya. Specifically, the study sought to assess the influence of advanced network infrastructure on performance of knowledge management systems in universities in Nairobi City County Kenya, and to establish the influence of data sharing and collaboration on performance of knowledge management systems in universities in Nairobi City County Kenya. This study was guided Social Capital Theory and Knowledge Management Theory. This study used a descriptive research design. The target population for this study was 256 management employees the 64 universities accredited to undertake university education in Kenya, distributed as follows: 27 public universities 18 chartered universities, 5 university constituent colleges and 14 institutions with letter of interim authority according to the Commission for University Education website. Using Yamane formula, the sample size was 156. Primary data was used in this study. The researcher obtained a letter of confirmation from the University for Collection of data. A research permit was also obtained from the National Commission for Science, Technology and Innovation. Inferential and descriptive statistics was employed for analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS version 25). The study results were presented through the use of tables and figures. The study concludes that advanced network infrastructure has a positive and significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya. The study also concludes that data sharing and collaboration has a positive and significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya. Based on the findings, the study recommends that the management of universities in Kenya should invest in a robust and advanced network infrastructure that supports high-speed internet connectivity and reliable communication channels. Implementing fiber-optic networks and modern wireless technologies can significantly improve data transfer rates, reduce latency, and enhance the overall user experience.

Key Words: ICT Infrastructure Resources, Advanced Network Infrastructure, Data Sharing and Collaboration, Performance of Knowledge Management Systems

Background of the Study

Knowledge Management Systems (KMS) are integrated systems designed to facilitate the collection, organization, sharing, and analysis of knowledge within an organization. These systems aim to enhance organizational efficiency by ensuring that valuable information and insights are easily accessible to employees, fostering a culture of collaboration and continuous learning (Bin-Obaidellah, *et al*, 2023). Knowledge Management Systems (KMS) play a pivotal role in enhancing organizational efficiency and effectiveness by systematically managing the creation, sharing, and utilization of knowledge. One of the primary functions of KMS is to serve as a centralized repository for information, allowing employees to easily access critical resources, documents, and insights (Chowdhury & Alam, 2020). This accessibility not only reduces time spent searching for information but also streamlines workflows, enabling teams to focus on more strategic tasks. By facilitating quick access to relevant knowledge, KMS empower employees to make informed decisions and improve their overall productivity (Ismail & Bakar, 2022).

Another significant aspect of KMS is their ability to foster collaboration and communication within organizations. By incorporating tools such as discussion forums, wikis, and collaborative platforms, KMS encourage employees to share their expertise and insights (Sharma & Singh, 2020). This collaborative environment not only enhances teamwork but also promotes a culture of continuous learning. As employees contribute their knowledge, the system grows richer and more diverse, enabling the organization to tap into a broader range of perspectives and innovative ideas. This collective intelligence is crucial for problem-solving and driving creativity in various projects (Mushi, Amaniel & Munishi, 2023).

KMS play a critical role in preserving institutional knowledge. As organizations evolve and employees transition in and out, valuable knowledge can be lost if not adequately captured and documented. KMS help mitigate this risk by archiving important information, best practices, and lessons learned. This preservation of knowledge ensures that new employees can quickly get up to speed and that organizations can maintain operational continuity (Akomea-Bonsu & Sampong, 2022). By retaining institutional knowledge, KMS not only enhance training and onboarding processes but also safeguard against the potential disruptions that can arise from employee turnover. KMS support strategic decision-making by providing access to relevant data and insights (Piabuo, *et al*, 2022). By integrating analytical tools, KMS can help organizations analyze trends, identify gaps in knowledge, and forecast future needs. This capability enables leaders to make data-driven decisions and develop strategies that align with organizational goals. In a rapidly changing business landscape, having the ability to leverage knowledge effectively is a key differentiator that can enhance competitiveness and drive innovation (Yauri, 2021).

ICT infrastructure resources refer to the foundational technologies and systems that support the effective operation of information and communication technologies within an organization. High-performance computing resources, such as supercomputers and clusters, provide the computational power necessary for processing large datasets and performing complex simulations (Nsekandizi, Karanganwa & Andala, 2020). These resources are essential for tasks that require significant processing capabilities, such as scientific research, financial modeling, and big data analytics. By leveraging high-performance computing, organizations can accelerate their research and development efforts, leading to faster innovation and improved decision-making (Mutua &Muthini, 2019).

Advanced network infrastructure is another critical component, encompassing high-speed internet connections, secure communication protocols, and robust network management tools. This infrastructure facilitates seamless connectivity and data transfer between various devices

and systems, ensuring that information flows efficiently across the organization (Ominde, Ochieng & Omwenga, 2021). Furthermore, data sharing and collaboration tools, such as collaborative platforms and shared databases, promote teamwork and knowledge exchange among employees (Karungani & Ochiri, 2021). This study sought to assess the influence of ICT infrastructure resources and performance of knowledge management systems in universities in Nairobi City County Kenya.

Statement of the Problem

Knowledge Management Systems (KMS) in universities in Kenya, face several challenges that hinder their effective implementation and utilization. One significant challenge is the lack of adequate infrastructure, which includes both hardware and software resources (Larry & Mutuku, 2024). Many universities struggle with outdated technology, limited internet connectivity, and insufficient data storage solutions. For instance, a survey conducted by the Kenya Education Network (KENET) in 2021 indicated that only about 45% of universities in Nairobi have reliable high-speed internet access, which is crucial for supporting KMS. This limitation impacts the ability of students and faculty to access and share knowledge efficiently (Mutugi & Joshua, 2024). Another major challenge is the cultural resistance to knowledge sharing among faculty and staff. Many educators are accustomed to traditional teaching methods and may not fully embrace the collaborative nature of KMS (Larry & Mutuku, 2024). According to a study published in the "International Journal of Educational Development" in 2022, nearly 60% of academic staff expressed concerns about sharing their research and teaching materials, fearing plagiarism or a loss of intellectual property. This reluctance can create silos of knowledge, where valuable insights and resources remain isolated within departments, thus undermining the potential benefits of KMS (Larry & Mutuku, 2024).

The lack of training and awareness regarding KMS usage poses a significant barrier. Many faculty members and students may not be adequately trained to use the available systems, which can lead to underutilization or misuse of KMS resources. (Mutua &Muthini, 2019) A report by the Commission for University Education (CUE) in 2023 highlighted that only 38% of university staff had received formal training on knowledge management practices. This gap in skills not only affects the effectiveness of KMS but also diminishes the overall potential for collaboration and innovation within the academic community. Funding constraints further complicate the implementation of effective KMS. Many universities in Nairobi operate under tight budgets, which can limit their ability to invest in modern KMS technologies and training programs (Ominde, Ochieng & Omwenga, 2021). The same CUE report indicated that over 70% of universities cited budget limitations as a major obstacle to enhancing their knowledge management initiatives. This financial challenge restricts their ability to create and maintain robust systems that can facilitate knowledge sharing and management, ultimately impacting the quality of education and research outputs in these institutions (Karungani & Ochiri, 2021).

ICT infrastructure resources play a crucial role in shaping organizational performance by enabling efficient operations, enhancing communication, and facilitating data-driven decision-making (Larry & Mutuku, 2024). A well-established ICT infrastructure, including high-performance computing, advanced networking capabilities, and robust data storage solutions, provides the foundation for organizations to streamline their processes (Mutugi & Joshua, 2024). Various studies have been conducted in different parts of the world on ICT infrastructure resources and organization performance. For instance, Mutua and Muthini (2019) conducted a study on information and communication technology infrastructure and performance of Kenya Railways Corporation. Karungani and Ochiri (2021) assessed on the effect of ICT infrastructure support on organizational performance and Larry and Mutuku (2024) examined on the influence of information and communication technology infrastructure on the adoption of enterprise resource planning. However, none of these studies focused on advanced network

infrastructure, and data sharing and collaboration on performance of knowledge management systems in universities in Nairobi City County Kenya. To fill the highlighted gaps, the current study sought to determine the influence of ICT infrastructure resources (advanced network infrastructure, and data sharing and collaboration) on performance of knowledge management systems in universities in Nairobi City County Kenya.

Objectives of the Study

General Objective

The general objective of the study is to assess the influence of ICT infrastructure resources on performance of knowledge management systems in universities in Nairobi City County Kenya

Specific Objectives

i. To determine the influence of advanced network infrastructure on performance of knowledge management systems in universities in Nairobi City County Kenya
ii. To establish the influence of data sharing and collaboration on performance of knowledge management systems in universities in Nairobi City County Kenya

LITERATURE REVIEW

Theoretical Review

Social Capital Theory

Social Capital Theory developed by Pierre Bourdieu (1986) revolves around the idea that social networks, relationships, and norms of reciprocity and trustworthiness can serve as valuable resources for individuals and groups. It posits that the connections people have—whether within their communities, organizations, or across broader societal contexts—can enhance their ability to achieve goals, access resources, and improve overall well-being (Nada *et al*, 2020). This theory emphasizes the importance of social relationships and the benefits that arise from being part of a network, highlighting how social structures can facilitate cooperation and mutual support. At the core of Social Capital Theory are three main dimensions: bonding, bridging, and linking social capital. Bonding social capital refers to the close connections among individuals within a homogeneous group, such as family and close friends (Orishede, *et al*, 2024). This form of capital fosters strong ties and provides emotional support, but it may also create insularity. Bridging social capital, on the other hand, involves connections that span different social groups, allowing for the exchange of diverse ideas and resources. This type of capital is crucial for fostering broader social networks and promoting inclusivity. Finally, linking social capital refers to relationships between individuals and institutions, such as government or organizations, enabling access to resources and support that may not be available within one's immediate community (Irungu, 2020).

Social Capital Theory also addresses the role of trust and norms in facilitating cooperation among individuals and groups. High levels of trust within a community can reduce transaction costs, increase the likelihood of collaboration, and enhance collective action. Norms of reciprocity—expectations that individuals will return favors—are essential for sustaining social networks and encouraging mutual assistance. In this way, social capital can be seen as a catalyst for social cohesion, facilitating not only personal relationships but also collective endeavors that contribute to societal well-being (Milimo, Sagwa & Sakwa, 2020). Moreover, the theory has implications for various domains, including economics, public health, and community development. In economic contexts, strong social capital can lead to increased

entrepreneurial activity and economic growth, as individuals are more likely to collaborate and share information within trusted networks. In public health, communities with high levels of social capital often exhibit better health outcomes, as trust and cooperation can enhance access to healthcare resources and promote healthy behaviors. Additionally, in community development, fostering social capital is critical for empowering marginalized groups and facilitating grassroots initiatives (Namisiko, Sakwa & Mwangi, 2021).

Social Capital Theory is built on several foundational assumptions that shape its application and understanding. One key assumption is that social networks inherently provide value and resources to individuals and communities. This view posits that the strength and quality of social connections can lead to increased trust, collaboration, and access to information, thereby facilitating personal and collective success (Nada *et al*, 2020). Additionally, the theory assumes that social capital can be intentionally cultivated and managed, suggesting that individuals and organizations can actively foster networks and relationships to enhance social cohesion and collective action (Orishede, *et al*, 2024).

However, Social Capital Theory faces several critiques that challenge its assumptions. One critique is the notion that social capital is universally beneficial. While strong social ties can provide support and resources, they can also lead to exclusionary practices and reinforce existing inequalities. For instance, bonding social capital may foster in-group loyalty but can simultaneously create barriers for outsiders, limiting access to opportunities for those not within the network (Irungu, 2020). This aspect highlights the dual nature of social capital, where strong ties can sometimes perpetuate social divisions rather than bridge them. Another critique centers on the measurement and operationalization of social capital. Researchers often struggle to quantify social capital effectively, as it encompasses a range of qualitative dimensions, including trust, norms, and social networks (Milimo, Sagwa & Sakwa, 2020). This ambiguity can lead to challenges in assessing its impact or comparing levels of social capital across different contexts. Furthermore, some argue that the focus on social capital can overlook other critical factors influencing outcomes, such as economic conditions, institutional frameworks, and individual agency. By emphasizing social networks, there is a risk of oversimplifying complex social dynamics (Namisiko, Sakwa & Mwangi, 2021).

Additionally, the theory may underestimate the impact of structural inequalities on social capital formation and utilization. Factors such as socioeconomic status, race, and geographic location can significantly influence an individual's ability to build and benefit from social networks (Nada *et al*, 2020). Critics argue that Social Capital Theory should more explicitly account for these structural barriers, as they can hinder certain groups from accessing the potential benefits of social capital. This oversight can lead to an incomplete understanding of how social networks function in diverse contexts and how they can perpetuate or challenge existing power dynamics (Orishede, *et al*, 2024). This theory is relevant in assessing the influence of advanced network infrastructure on performance of knowledge management systems in universities in Nairobi City County Kenya.

Knowledge Management Theory

Knowledge Management Theory developed by Peter Drucker in the 1980s focuses on the processes and practices that organizations use to identify, create, store, share, and utilize knowledge to enhance performance and innovation. It integrates various disciplines, including information technology, organizational behavior, and strategic management, to create a framework that facilitates the effective use of knowledge as a valuable organizational asset (Tutuhatunewa, 2019). Central to this theory is the recognition that knowledge is not merely an object to be transferred but a dynamic process that involves people, culture, and organizational structures. One of the key components of Knowledge Management Theory is

the distinction between explicit and tacit knowledge. Explicit knowledge refers to information that can be easily articulated, documented, and shared, such as manuals, databases, and procedures. In contrast, tacit knowledge encompasses personal insights, intuitions, and experiences that are more challenging to codify and transfer. Understanding this distinction is critical for organizations aiming to leverage their knowledge assets effectively, as it highlights the need for strategies that foster the sharing of tacit knowledge through social interactions, mentorship, and collaborative environments (Gasana *et al*, 2024).

Another important aspect of Knowledge Management Theory is the role of technology in supporting knowledge processes. Information and communication technologies (ICT) play a vital role in enabling organizations to capture, store, and disseminate knowledge efficiently. Tools such as intranets, knowledge bases, and collaboration platforms help facilitate the flow of information and foster a culture of knowledge sharing (Kipkosgei, Seung-Wan & Choi, 2020). However, while technology is essential, it is equally important for organizations to cultivate a culture that values knowledge sharing and collaboration among employees, as human factors significantly influence the success of knowledge management initiatives. Furthermore, Knowledge Management Theory emphasizes the importance of leadership and organizational culture in shaping knowledge practices (Otieno *et al*, 2022). Leaders play a critical role in setting the vision and values that prioritize knowledge sharing and learning. A supportive culture encourages employees to contribute their knowledge without fear of negative consequences, fostering an environment of trust and collaboration. By aligning knowledge management initiatives with organizational goals and fostering a culture of continuous learning, organizations can enhance their ability to innovate and adapt to changing environments (Tutuhatunewa, 2019).

Knowledge Management Theory is grounded in several key assumptions that shape its application and development. One prominent assumption is that knowledge is a valuable asset that can enhance organizational performance and innovation. This perspective posits that by effectively managing knowledge, organizations can improve decision-making, foster creativity, and drive competitive advantage (Gasana *et al*, 2024). Another assumption is that knowledge can be systematically captured, organized, and shared within an organization, enabling a continuous flow of information and learning. This view suggests that creating structured processes and leveraging technology can facilitate knowledge transfer and utilization (Kipkosgei, Seung-Wan & Choi, 2020).

However, Knowledge Management Theory faces several critiques that challenge these assumptions. One critique is the oversimplification of knowledge as a tangible asset. Critics argue that the complexities of knowledge—particularly tacit knowledge—are not easily captured or codified. Tacit knowledge, being personal and context-dependent, often eludes formal management processes, leading to potential gaps in knowledge transfer (Otieno *et al*, 2022). This limitation highlights the need for a more nuanced understanding of knowledge dynamics, where relational and contextual factors play a significant role in how knowledge is created and shared. Another critique centers on the reliance on technology as a primary enabler of knowledge management. While technology can enhance knowledge sharing, it can also create barriers. For instance, over-reliance on digital platforms may lead to information overload, reducing the effectiveness of knowledge dissemination (Tutuhatunewa, 2019). Additionally, the assumption that technology can substitute for interpersonal relationships overlooks the importance of human interactions in knowledge sharing. Knowledge is often created and refined through dialogue, collaboration, and socialization, making the role of culture and personal connections vital in knowledge management efforts (Gasana *et al*, 2024). This theory is relevant in establishing the influence of data sharing and collaboration on performance of knowledge management systems in universities in Nairobi City County Kenya.

Conceptual Framework

A conceptual framework refers to an organized way of thinking about how and why a project takes place and how to understand its activities. According to Kothari (2018), a framework could help to explain a project in a particular way. It could also help understand and use the ideas of others who had conducted similar studies.

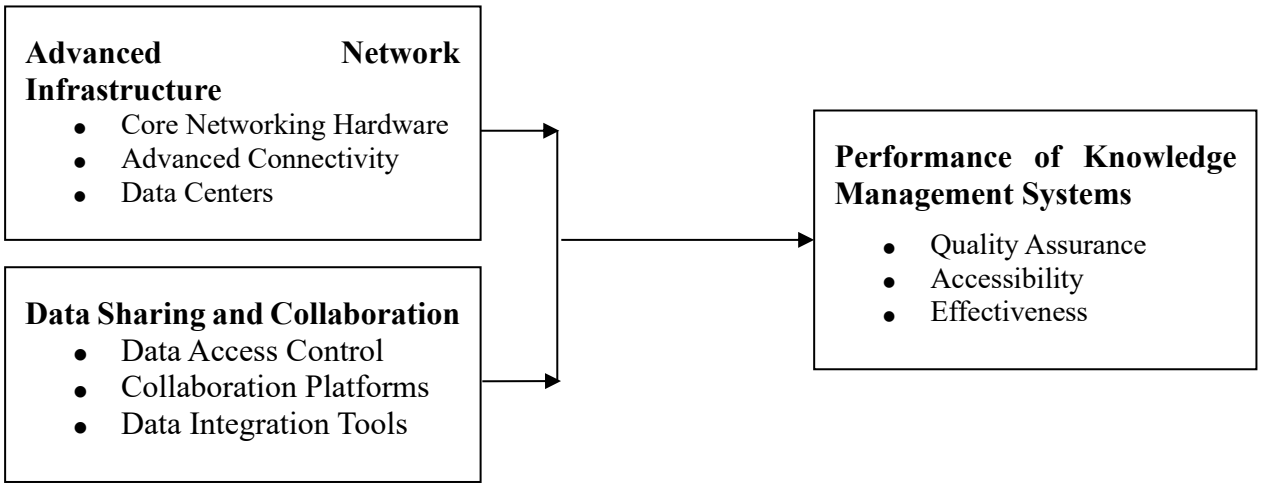

Figure 2. 1: Conceptual Framework

Advanced Network Infrastructure

Advanced Network Infrastructure refers to a robust and sophisticated framework designed to support high-performance data transmission and communication across various computing environments (Irungu, 2020). This infrastructure encompasses a range of technologies, protocols, and components that facilitate the seamless exchange of information among devices, systems, and users. Key elements include high-speed routers, switches, and fiber optic cables, which ensure low latency and high bandwidth, allowing for efficient data flow even under heavy loads (Milimo, Sagwa & Sakwa, 2020).

At the heart of any advanced network infrastructure lies core networking hardware, which includes routers, switches, and firewalls. Routers serve as the traffic directors of the internet, guiding data packets between different networks (Milimo, Sagwa & Sakwa, 2020). They ensure efficient data routing by determining the optimal paths for information to travel. Switches operate within local area networks (LANs), connecting devices such as computers and servers to facilitate internal communication. Advanced switches, particularly those equipped with features like Power over Ethernet (PoE) and advanced security protocols, enhance network functionality and support various devices, including IoT sensors (Irungu, 2020). Firewalls play a crucial role in protecting the network by monitoring incoming and outgoing traffic, filtering data packets, and preventing unauthorized access. The integration of next-generation firewalls (NGFWs) adds additional layers of security, such as intrusion detection and prevention systems (IDPS), application awareness, and real-time threat intelligence. These core networking components must be scalable, reliable, and capable of handling increased traffic volumes to meet the demands of modern applications and services (Namisiko, Sakwa & Mwangi, 2021).

Advanced connectivity solutions are essential for facilitating high-speed communication across networks. Technologies such as Fiber Optic Communication and 5G Networks are at the forefront of this evolution. Fiber optics provide high bandwidth and low latency, making them ideal for transmitting large amounts of data over long distances. This technology supports various applications, including cloud computing, streaming services, and enterprise data

transfer. Organizations are increasingly deploying fiber optic networks to enhance their connectivity capabilities and support bandwidth-intensive applications. Data centers are the backbone of advanced network infrastructure, providing the physical facilities necessary to house servers, storage systems, and networking equipment (Mushi, Heila & Martie, 2020). These facilities are designed for high availability, security, and efficiency. Modern data centers utilize technologies such as modular design and energy-efficient cooling systems to optimize resource use and reduce operational costs. The implementation of containerization and hyper-converged infrastructure further enhances the flexibility and scalability of data centers, allowing organizations to respond quickly to changing demands (Sadiq, Rehman & Nasir, 2021).

Data Sharing and Collaboration

Data Sharing and Collaboration refers to the processes and practices that enable individuals or organizations to exchange and work together on data and information effectively (Kipkosgei, Seung-Wan & Choi, 2020). This concept is fundamental in today's interconnected world, where collaboration across disciplines, teams, and geographic boundaries is essential for innovation and problem-solving. By facilitating access to shared data, organizations can enhance communication, foster teamwork, and drive collective insights (Otieno *et al*, 2022).

Data access control is a fundamental aspect of data sharing and collaboration, ensuring that sensitive information is only accessible to authorized users while maintaining the integrity and confidentiality of the data. Access control mechanisms can be categorized into three primary types: discretionary access control (DAC), mandatory access control (MAC), and role-based access control (RBAC) (Kiprotich, Gachunga & Bonuke, 2022). Discretionary access control allows data owners to determine who can access specific resources, granting permissions based on individual needs and relationships. While this approach offers flexibility, it can lead to potential security risks if not managed carefully. Mandatory access control is a more stringent model where access rights are assigned based on predefined policies established by an organization. Users have limited ability to change access settings, which enhances security but may reduce flexibility (Kipkosgei, Seung-Wan & Choi, 2020).

Collaboration platforms play a crucial role in facilitating data sharing and communication among team members, regardless of their geographic locations. These platforms provide tools that allow users to work together effectively, share information seamlessly, and streamline workflows. Examples of popular collaboration platforms include Microsoft Teams, Slack, Google Workspace, and Trello (Otieno *et al*, 2022). These platforms offer various features such as file sharing, real-time document editing, chat functionality, and video conferencing, enabling teams to collaborate on projects efficiently. Integration with existing data management systems further enhances these platforms, allowing users to access relevant data and resources directly within the collaboration environment. The ability to centralize communication and data sharing fosters a culture of collaboration, increases transparency, and enhances overall team productivity (Kiprotich, Gachunga & Bonuke, 2022).

Data integration tools are essential for facilitating seamless data sharing and collaboration across disparate systems and platforms. These tools enable organizations to consolidate data from various sources, ensuring that all stakeholders have access to accurate and up-to-date information (Kiprotich, Gachunga & Bonuke, 2022). Data integration can be achieved through various methods, including ETL (Extract, Transform, Load) processes, data virtualization, and API-based integrations. ETL processes involve extracting data from multiple sources, transforming it into a suitable format, and loading it into a centralized data repository, such as a data warehouse. This method allows organizations to create a unified view of their data, making it easier for teams to access and analyze information (Otieno *et al*, 2022).

Empirical Review

Advanced Network Infrastructure and Organization Performance

Nada *et al* (2020) researched on the impact of information technology infrastructure on innovation performance: An Empirical Study on private Universities in Iraq. The study population consisted of six private Universities in Iraq. From these, 75 academics of the faculty were chosen. The regression analysis results indicated a positive and statistically significant association between IT Infrastructure and innovation performance. Results indicated that the use of IT was relevant in improving innovation performance. Much previous research that has been conducted reported the same finding. The study concluded that the findings of the current study also prove that IT helped improve the effectiveness of innovation performance of various universities. The academics of surveyed universities also realized the importance of IT infrastructure dimensions.

Orishede, *et al* (2024) examined on advanced network infrastructure and organizational performance of selected telecommunication firms in Nigeria. Survey design was used, and the sampling object comprised employees of MTN, GLO and Airtel. The study found that there is a significant positive relationship between advanced network infrastructure and organizational performance. The study concluded that advanced network infrastructure has significant positive effect on organizational performance of selected telecommunication firms in Nigeria.

Irungu (2020) conducted a research on influence of information and communication technology performance of aviation industry-a case of Kenya Airway ltd. The study adopted a descriptive survey design. The population comprised all Kenya Airways staff in Nairobi office. A sample of 244 employees will be randomly selected for the study. Purposive sampling was used to select Nairobi office as the study site. The study relied on data collected through a questionnaire structured to meet the objectives of the study. The questions were both open-ended and closed ended. The study findings showed that information and communication technology which includes communication networks, mobile phone technology, handheld devices such as iPads and Internet and computer applications influence the performance of the aviation to a large extent by assisting to improve on faster passenger handling and increased revenue generated from improved access to information. From the study findings the study concludes that information and communication technology which includes communication networks, mobile phone technology, handheld devices such as iPads and Internet applications influence the performance of the aviation industry in Kenya to a large extent.

Milimo, Sagwa and Sakwa (2020) conducted an empirical study of the influence of information technology infrastructure on supply chain performance of Public Universities in Kenya. The study adopted descriptive census survey. A self-administered questionnaire was distributed to 31 public universities in Kenya targeting 62 heads of procurement and Information Communication Technology departments. The results of the study indicate that information technology infrastructure positively influences supply chain performance in public universities in Kenya. Hence the conclusion that information technology infrastructure influences the supply chain performance of public universities.

Namisiko, Sakwa and Mwangi (2021) investigated on the effects of network infrastructure sharing challenges on open information communication technology infrastructure sharing among mobile service providers in Kenya. Data was collected from employees from Safaricom, Airtel and Orange in order to study the population. A target population of 800 employees from the three Mobile Service Providers in Kenya was considered. Both Stratified and purposive sampling techniques were used to identify the respondents. A sample size of 86 respondents was used in this study using both structured questionnaires and scheduled interviews. Both descriptive and inferential statistics were used to analyze data collected from respondents in this study. The findings of this study revealed that a majority of respondents from the three Mobile Service Providers did not agree that antennas, Node B's and transmission equipment could be shared in an open ICT infrastructure sharing framework. A fairly average majority of

respondents agreed that feeder cables could be shared in an open ICT infrastructure sharing framework. The study concluded that The study was a justification of the fact Mobile Service Providers' interest in Open ICT infrastructure sharing is alive due since open ICT Infrastructure sharing can substantially reduce capital and operational expenditure thereby increasing the speed of network rollouts, improving coverage and helping to meet the capacity demands of increased data trafficogramme complexity and risk and experience and resources were found to have a profound effect on open ICT infrastructure sharing by Mobile Service Providers in Kenya.

Data Sharing and Collaboration and Organization Performance

Tutuhatunewa (2019) assessed the influence of Information Sharing, Partnership, and Collaboration in Supply Chain Performance, Study on Apples Agroindustry. The results of the study did not find the direct effect of information sharing on SC performance, or the direct effect of partnerships on SC performance. Likewise, the direct effect of information sharing on SC collaboration was not found. The results of the study only indicate that there is an indirect effect of information sharing on SC collaboration, information sharing on SC performance, and partnerships on SC performance. This result found that information sharing does not have a direct relationship with organizational performance. The study concluded that the relationship was mediated by the practice of collaboration between supply chain actors.

Gasana *et al* (2024) researched on twinning partnership network: a learning and experience sharing network among health professionals in Rwanda to Improve Health Services. The study identified 10 hospitals and 30 districts in Rwanda to participate in the TPN. These districts and hospitals participated in a kickoff workshop in which they identified capacity gaps, clarified goals, and selected twinning partners. After the workshop, districts and hospitals participated in exchange visits, coaching visits, and virtual and in-person learning events. The study found that districts and hospitals that selected specific areas and worked on them throughout the duration of the TPN with their peers improved their performance significantly when compared with those that selected and worked on other areas. The study concluded that this acknowledgment of both the quantitative and qualitative outcomes underscores the TPN's role in fostering meaningful partnerships and enhancing health system performance through shared learning and support.

Kipkosgei, Seung-Wan and Choi (2020) investigated on a team-level study of the relationship between knowledge sharing and trust in Kenya: moderating role of collaborative technology. Data were collected from 300 professional employees at three organizations in Kenya, aggregated into 75 teams, and analyzed in a hierarchical multiple linear regression. The team-level analysis found that knowledge sharing was significantly and positively related to the extent of team trust, and the relationship was moderated by the perception of collaborative technology. Our findings suggest that collaborative technology moderates the relationship between knowledge sharing and trust in teams. This suggests that we need to consider other contextual variables, such as technology use in future research, especially when investigating knowledge sharing behavior. After controlling for functional diversity, the results of the study concluded that when employees perceive the technology, they use to facilitate effective functioning of team processes by promoting socialization and transparency, the relationship between knowledge sharing and trust within teams is strengthened.

Kiprotich, Gachunga and Bonuke (2022) examined the Influence of Information Sharing on Performance of Manufacturing Firms in Kenya. The explanatory research design was used in the study. The sample size was 264 procurement managers from Kenyan manufacturing enterprises, with 766 procurement managers as the target population. Respondents were chosen using stratified, simple random, and purposive sampling methods. The primary data collected using questionnaires. The study found that information sharing has significant effect on performance of manufacturing companies in Kenya. It has been determined that the implementation of information sharing, the quality of the shared information, the kind of shared

information, and the technology used to communicate this information all affect how much information businesses exchange throughout supply chains. The study concludes that information sharing has significant effect on performance of manufacturing companies in Kenya.

Otieno *et al* (2022) assessed the effect of supplier information sharing practice on supply chain performance of Kenyan selected county governments of Nyanza region effect of supplier information sharing practice. This study employed a descriptive but correlation research design. The target population was 112 procurement staff and 9 lead prequalified suppliers of the Selected County Governments in Nyanza Region Kenya. The study sampled population by stratified, simple random and purposive techniques. Data analysis involved statistical approaches on basis of descriptive and inferential values. The study found that supplier information sharing had a positive effect on supply chain performance in selected county governments of Nyanza region, Kenya. Simple linear regression results revealed that the Supplier information sharing has a positive effect on performance of supply chain in selected devolved units in Kenyan Nyanza region. The study concluded that Supplier information sharing has significant effect on performance of supply chain in selected devolved units of Nyanza region, Kenya.

RESEARCH METHODOLOGY

This study used a descriptive research design. Mugenda and Mugenda (2018) explained the descriptive design is a process of collecting data in order to test a hypothesis or to answer the questions of the current status of the subject under study. The target population for this study was the 64 universities accredited to undertake university education in Kenya, distributed as follows: 27 public universities 18 chartered universities, 5 university constituent colleges and 14 institutions with letter of interim authority according to the Commission for University Education website (CUE, 2021. The survey unit of analysis composed of universities accredited to undertake university education in Kenya whose academic leaders were the units of inquiry. These universities were selected for the study since they are largely controlled by the same regulator (CUE) and are required to observe similar guidelines in their operations. The researcher used Stratified sampling which is a type of probability sampling method in which sample members from a larger population are selected according to a random starting point but with a fixed, periodic interval (the sampling interval). The sample size was determined using the formula suggested by Yamane (1967). Therefore, a sample size of 156 respondents participated in the study.

Table 3.*1*: Sample Size

Unit Of Observation	Sample
University Management	39
Worker Union Representation (2 Representative, Uasu – 1 and Kusu-- 1)	78
University Councils	39
Total	**156**

A questionnaire which is a form of quantitative data collection tool was used to collect primary data. The study's primary data was obtained using a structured questionnaire. The pretesting sample was made up of 16 respondents, representing 10% of the sample size. The results from the pilot test were to be used in the main study. In addition, the respondents used in the pilot test were excluded from the final study. Quantitative data was generated from the closed-ended questions, respectively. Inferential and descriptive statistics was employed for analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS version 25). Descriptive statistics such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages was used. Inferential data analysis was conducted by use of Pearson correlation coefficient, and multiple regression analysis.

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

The sample size for the study comprised of 156 respondents. The researcher sampled 156 respondents who were each administered with the questionnaires. From the 156 questionnaires 136 were completely filled and returned hence a response rate of 87.2%. The response rate was considered as suitable for making inferences from the data collected.

Descriptive Statistics

Advanced Network Infrastructure and Organization Performance

The first specific objective of the study was to assess the influence of advanced network infrastructure on performance of knowledge management systems in universities in Nairobi City County Kenya. The respondents were requested to indicate their level of agreement on advanced network infrastructure and performance of knowledge management systems in universities in Nairobi City County Kenya. The results were as shown in Table 1.

From the results, the respondents agreed that advanced network infrastructure significantly improves the speed and reliability of their data transmission (M=3.983, SD= 0.765). In addition, the respondents agreed that the scalability of advanced network infrastructure allows their organization to accommodate growing data traffic effectively (M=3.806, SD=0.845). Further, the respondents agreed that advanced network infrastructure enhances the security of their data communications (M=3.785, SD=0.688). The respondents also agreed that the implementation of advanced network infrastructure improves collaboration across teams in their organization (M=3.718, SD=0.788). In addition, the respondents agreed that advanced network infrastructure supports the integration of emerging technologies, such as cloud computing and the Internet of Things (M=3.698, SD=0.686). The respondents agreed that the performance of their operations improves due to the deployment of advanced network infrastructure (M=3.662, SD=0.617).

Table 1: Advanced Network Infrastructure and Organization Performance

	Mean	**Std. Deviation**
Advanced Network Infrastructure significantly improves the speed and reliability of our data transmission.	3.983	0.765
The scalability of Advanced Network Infrastructure allows our organization to accommodate growing data traffic effectively.	3.806	0.845
Advanced Network Infrastructure enhances the security of our data communications.	3.785	0.688
The implementation of Advanced Network Infrastructure improves collaboration across teams in our organization.	3.718	0.788
Advanced Network Infrastructure supports integration of emerging technologies, such as cloud computing and the Internet of Things.	3.698	0.686
The performance of our operations improves due to the deployment of Advanced Network Infrastructure.	3.662	0.617
Aggregate	**3.731**	**0.743**

Data Sharing and Collaboration and Organization Performance

The second specific objective of the study was to establish the influence of data sharing and collaboration on performance of knowledge management systems in universities in Nairobi City County Kenya. The respondents were requested to indicate their level of agreement on various statements relating to data sharing and collaboration and performance of knowledge management systems in universities in Nairobi City County Kenya. The results were as presented in Table 2.

From the results, the respondents agreed that their organization promotes a culture of data sharing among teams and departments (M=3.955, SD= 0.895). In addition, the respondents agreed that the tools they use for data sharing enhance collaboration across different projects (M=3.946, SD=0.886). Further, the respondents agreed that data sharing practices in their organization leads to improve decision-making (M=3.907, SD= 0.725). The respondents also agreed that collaboration on shared data sets increases the quality of their outcomes (M=3.902, SD= 0.881). The respondents agreed that they establish clear protocols for data sharing that ensure security and compliance (M=3.898, SD=0.683). In addition, the respondents agreed that data sharing and collaboration tools significantly improve teamwork in their organization (M=3.884, SD=0.796).

Table 2: Data Sharing and Collaboration and Organization Performance

	Mean	**Std. Deviation**
Our organization promotes a culture of data sharing among teams and departments.	3.955	0.895
The tools we use for data sharing enhance collaboration across different projects.	3.946	0.886
Data sharing practices in our organization leads to improve decision-making.	3.907	0.725
Collaboration on shared data sets increases the quality of our outcomes.	3.902	0.881
We establish clear protocols for data sharing that ensure security and compliance.	3.898	0.683
Data sharing and collaboration tools significantly improve teamwork in our organization.	3.884	0.796
Aggregate	**3.878**	**0.757**

Organization Performance

The respondents were requested to indicate their level of agreement on various statements relating to performance of knowledge management systems in universities in Nairobi City County Kenya. The results were as presented in Table 3.

From the results, the respondents agreed that the knowledge management system in their organization facilitates easy access to relevant information (M=3.871, SD= 0.897). In addition, the respondents agreed that their knowledge management system effectively supports collaboration among team members (M=3.804, SD=0.837). Further, the respondents agreed that the search functionality of their knowledge management system allows users to find information quickly (M=3.745, SD= 0.663). The respondents also agreed that their knowledge management system helps in capturing and sharing best practices within the organization (M=3.618, SD= 0.771). The respondents agree that user training and support for the knowledge management system are sufficient to ensure effective usage (M=3.614, SD=0.792). In addition, the respondents agreed that the performance of their knowledge management system enhances productivity in their organization (M=3.610, SD=0.887).

Table 3: Organization Performance

	Mean	Std. Deviation
The Knowledge Management System in our organization facilitates easy access to relevant information.	3.871	0.897
Our Knowledge Management System effectively supports collaboration among team members.	3.804	0.837
The search functionality of our Knowledge Management System allows users to find information quickly.	3.745	0.663
Our Knowledge Management System helps in capturing and sharing best practices within the organization.	3.618	0.771
User training and support for the Knowledge Management System are sufficient to ensure effective usage.	3.614	0.792
The performance of our Knowledge Management System enhances productivity in our organization.	3.610	0.887
Aggregate	**3.682**	**0.796**

Inferential Statistics

Inferential statistics in the current study focused on correlation and regression analysis. Correlation analysis was used to determine the strength of the relationship while regression analysis was used to determine the relationship between dependent variable (performance of knowledge management systems in universities in Nairobi City County Kenya) and independent variables (advanced network infrastructure, and data sharing and collaboration).

Correlation Analysis

The present study used Pearson correlation analysis to determine the strength of association between independent variables and the dependent variable (performance of knowledge management systems in universities in Nairobi City County Kenya).

Table 4: Correlation Coefficients

		Organization Performance	Advanced Network Infrastructure	Data Sharing And Collaboration
Organization Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	136		
Advanced Network Infrastructure	Pearson Correlation	.846**	1	
	Sig. (2-tailed)	.001		
	N	136	136	
Data Sharing And Collaboration	Pearson Correlation	.869**	.179	1
	Sig. (2-tailed)	.000	.071	
	N	136	136	136

The results revealed that there is a very strong relationship between advanced network infrastructure and performance of knowledge management systems in universities in Nairobi City County Kenya (r = 0.846, p value =0.001). The relationship was significant since the p value 0.001 was less than 0.05 (significant level). The findings conform to the findings of Nada *et al* (2020) that there is a very strong relationship between advanced network infrastructure and organization performance.

The results also revealed that there was a very strong relationship between data sharing and collaboration and performance of knowledge management systems in universities in Nairobi City County Kenya (r = 0.869, p value =0.000). The relationship was significant since the p value 0.000 was less than 0.05 (significant level). The findings are in line with the results of Tutuhatunewa (2019) who revealed that there is a very strong relationship between data sharing and collaboration and organization performance.

Regression Analysis

Multivariate regression analysis was used to assess the relationship between independent variables (advanced network infrastructure, and data sharing and collaboration) and the dependent variable (performance of knowledge management systems in universities in Nairobi City County Kenya).

Table 5: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	**(Constant)**	0.330	0.084		3.929	0.002
	advanced network infrastructure	0.376	0.095	0.375	3.958	0.002
	data sharing and collaboration	0.387	0.097	0.386	3.990	0.000

a Dependent Variable: performance of knowledge management systems in universities in Nairobi City County Kenya

The regression model was as follows:

$$\mathbf{Y = 0.330 + 0.376X_1 + 0.387X_2}$$

The results also revealed that advanced network infrastructure has significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya, β1=0.376, p value= 0.002). The relationship was considered significant since the p value 0.002 was less than the significant level of 0.05. The findings conform to the findings of Nada *et al* (2020) that there is a very strong relationship between advanced network infrastructure and organization performance.

In addition, the results revealed that data sharing and collaboration has significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya β1=0.387, p value= 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings are in line with the results of Tutuhatunewa (2019) who revealed that there is a very strong relationship between data sharing and collaboration and organization performance.

Conclusions

The study concludes that advanced network infrastructure has a positive and significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya. Findings revealed that core networking hardware, advanced connectivity and data centers influences performance of knowledge management systems in universities in Nairobi City County Kenya.

The study also concludes that data sharing and collaboration has a positive and significant effect on performance of knowledge management systems in universities in Nairobi City County Kenya. Findings revealed that data access control, collaboration platforms and data

integration tools influences performance of knowledge management systems in universities in Nairobi City County Kenya.

Recommendations

this study recommends that the management of universities in Kenya should invest in a robust and advanced network infrastructure that supports high-speed internet connectivity and reliable communication channels. Implementing fiber-optic networks and modern wireless technologies can significantly improve data transfer rates, reduce latency, and enhance the overall user experience.

This study also recommends that the management of universities in Kenya should establish a unified digital collaboration platform that facilitates seamless data sharing among students, faculty, and researchers. Implementing tools such as collaborative workspaces, shared repositories, and integrated communication channels can significantly improve teamwork and the exchange of ideas.

Suggestions for Further Studies

This study was limited to the influence of ICT infrastructure resources on performance of knowledge management systems in universities in Nairobi City County Kenya hence the study findings cannot be generalized to performance of other academic institutions in Kenya. The study therefore suggests further studies on the influence of ICT infrastructure resources on performance of other academic institutions in Kenya.

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