



**AN INVESTIGATION OF DIGITAL CAPABILITIES AND PERFORMANCE OF TELECOMMUNICATION COMPANIES  
IN KENYA**

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**ABSTRACT**

*This study established the influence of digital capabilities on the performance of telecommunication companies in Kenya. Specifically, the study sought to determine the influence of digital infrastructure, digital proficiency, information quality and data integrity on the performance of telecommunication companies in Kenya. The study utilized descriptive research design and targeted 137 technical personnel from ICT departments in the three major telecommunication companies in Kenya. Using a sampling formula, a sample size of 102 respondents was utilized. The study revealed that digital infrastructure ( $\beta=0.227$ ;  $p=0.011$ ) and digital proficiency ( $\beta=0.407$ ;  $p=0.000$ ) significantly influences Performance of Telecommunication Companies. Moreover, it was established that there exists statistically significant influence of information quality ( $\beta=0.189$ ;  $p=0.016$ ) and data integrity ( $\beta=0.173$ ;  $p=0.021$ ) on Performance of Telecommunication Companies. The study concludes that digital infrastructure is a vital component that allows businesses to execute significant innovations to support their goals. Furthermore, the availability of proper software is critical to the efficient operation of a company's digital operations. Furthermore, personnel in organizations must have the requisite skills and capabilities to exploit digital technologies. Data quality allows organizations to make more informed decisions and increase operational efficiency. Firms must invest in data quality if digital technology is to be useful. The study recommends that organizations ought to deploy digital infrastructure that satisfies the firms requirement in terms of hardware, software and network coverage for them to be competitive. Secondly, telecommunication companies need to prioritize digital competencies of their staff if they need to boost and maintain organizational efficiency. Thirdly, firms ought to invest heavily on data quality through implementation of current Digital Infrastructure. This promotes effective data transmission which is accurate and reliable. Finally, it can be recommended that companies must invest in quality of data if digital technology is to be useful.*

**Keywords:** Data Integrity, Digital Capabilities, Digital Infrastructure, Digital Proficiency, Firm Performance, Information Quality, Telecommunication Industry

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## INTRODUCTION

Telecommunication industry is one of the integral economic drivers in the modern world with a huge contribution in leverage of communication and technology. The industry boasts a promising future as the world continues to be a global village as a result of enhanced internet connectivity (Mugo, 2020). In Kenya, the telecommunications industry has had substantial expansion over the years as evidenced by growth in the number of telecommunication operators, coupled with a rapid rise in the number of customers (Communications Authority - CA, 2019). Nonetheless, the telecommunication industry challenges itself on frequent finding of ways to make sure that their services and products meet the needs and expectations of the customers, to deliver enhanced quality of services and goods to guarantee customer's fulfillment (Gachigo, Kahuthia, & Muraguri, 2019).

As industries like the telecommunication industry continue to derive ways to sustain their operations in the turbulence environment, technology come into play as the major driver of the strategic position that these companies seek to occupy (Maisyarah, 2018). According to Faccio and Zingales (2022), in the modern era, information technology cannot be overemphasized any further as the main determinant of how successful companies go in pursuing their strategic goals. On the other hand, Proksch, Rosin, Stubner, and Pinkwart (2021) indicate that the success of technology highly digital capabilities possessed by an organization. The digital capabilities in this case are the competencies, potentials and inputs that are at the disposal of the organization to stimulate the effectiveness of technology towards contributing to performance (Vasconcellos, Silva-Freitas, & Junges, 2021). Telecommunication companies, similar to other organizations require digital capabilities in order to utilize technology to steer their performance. These capabilities ensure that the firms are in a position to effectively integrate digital technology for superior performance.

According to Chaudhuri, Subramanian, and Dora (2022), digital capabilities ensure that the company is best-placed to strengthen its digital strength to support its internal processes to gain a competitive edge. One of these capabilities as described by Hanelt, Firk, Hildebrandt, and Kolbe (2021) is the digital infrastructure. According to Hanelt *et al.* (2021), digital the infrastructure are the core determinants of the potential of the organization to integrate digitalization. The infrastructure includes the internet, ICT hardware and ICT software. Without these, digital technology may not be realized. According to Sudharsan and Ganesh (2022), telecommunication companies require intensive investment in digital infrastructure for them to gain competitiveness and record superior performance.

The other digital capability is the digital proficiency. According to Mittal (2020), the skills and competencies to utilize the digital technology is fundamental in enhancing the success of digital technology in an organization. Information quality is another digital capability as highlighted by Usai *et al.* (2021). The ability of the organization to have quality information integrated into the digital systems significantly determines the effectiveness of the digital technology in enhancing performance (Troise, Corvello, Ghobadian, & O'Regan, 2022). Another digital capability is data integrity. Soto-Acosta (2020) alludes that digital integrity which is the ability to protect the data and store it for traceability and use when needed plays an integral role in ensuring digital technology is integrated in the organizational processes for enhanced performance. Having these capabilities in the telecommunication industry would mean that the companies get into a position to effectively utilize digitalization for enhanced performance.

In the 21<sup>st</sup> century, digitalization has gained traction as the main pillar and enabler for organizational growth and sustainable performance (Calle, Freije, Ugarte & Larrinaga, 2020). Digitalization as defined by Son, Kim, Hur, and Subramanian (2021) is the process of transforming information and the processes in an organization into digital or electronic

form. This is aimed at enhancing efficiency, promoting effectiveness and reliability, and saving on operational costs (Pan, Oh, & Wang, 2021). For every organization to integrate digitalization in its mode of operation, it requires key digital capabilities. These as defined by Cahonar and Hamsal (2021) are the inputs and structures that a company ought to put in place in order to enhance the embrace of technology and information systems in its operation processes. These capabilities/inputs determine the extent to which the technology is able to be instrumental in enhancing organizational performance (El Sawy, Kræmmergaard, Amsinck, & Vinther, 2020).

Globally, digital capabilities have been considered to stimulate the pace at which leading global multinationals have continually expanded to sustain their position in the market (Ardolino, Rapaccini, Saccani, Gaiardelli, Crespi, & Ruggeri, 2018). In Canada, Tumbas, Berente, and vom Brocke (2020) describe digital capabilities as the instrumental pillars that organizations implement in order to digitalize their processes and increase their continued expansion. According to Sousa-Zomer, Neely, and Martinez (2020), digital capabilities include the skills possessed by the staff on use of digital technology and the available technology infrastructure that support the digital technology.

Regionally, some companies in the Sub-Saharan Africa have been embracing digital technology as a move to increase the competitive edge and gain access to international markets (Elia, Giuffrida, Mariani, & Bresciani, 2021). Ngatoro (2018) noted that leading Ghanaian companies in industries such as telecommunication industry were on steadfast in incorporating digitalization as a way of promoting efficiency and effectiveness in their processes for enhanced performance. This as the author reports, failed a times to give the expected results due to insufficient digital capabilities such as adequately trained staff and the right technology to manage data. This is also echoed by Manresa, Prester, and Bikfalvi (2020) who noted that most of the indigenous South African companies that tried to

incorporate information systems in their operations failed to achieve the best results as they had inefficient digital capabilities. According to Woude (2021), digital capabilities particularly in technology-oriented industries like telecommunication industry are fundamental in determining the success of the companies since they strengthen the ability of the companies to adopt digital processes to streamline their operations.

In Kenya, digital capabilities have been assessed by a number of authors and established to be significant in streamlining the companies' ability to integrate information systems in their operations (Otioma, 2022). According to Odondi, Arisa, and Wangari (2022), digital capabilities range from the available ICT infrastructure, to the skills possessed by the employees and the data management knowhow in an organization. Through digital capabilities, key multinationals have been able to easily access the Kenyan market and leverage as leading enterprises in a span of few years. Owino and Waema (2020) argue that Kenya's high internet connectivity and enhanced digital infrastructure as some of the key enablers of local businesses' success over the last 10 years. On the other hand, Banga (2022) feels that the leverage in technology and digital economy among the local companies has been curtailed by insufficient digital capabilities.

The telecommunications sector is very significant in the expansion of the Kenyan economy because guarantees ease of communication as well as facilitates business transactions for both the individual person and organizations subscribers. Sridhar and Sridhar (2009) stated that, at a macroeconomic level, better telecommunications structure is known for having a positive association to economic development. Hence, it is imperative for the management of the telecommunication operators to be cognizant of how they can certify that they fulfill (or even surpass) customer's desires. One of the ways of achieving this is by providing quality information technology to the subscribers. Quality of information technology is a key feature for the retention or increment of a business market

stake (Master Intelligence Economique et Stratégies Compétitives, 2018). The mobile telecommunication industry is dared to frequently discover means to establish that their products and services help them in retaining or increasing one's market share. Retaining or increasing one's market share is vital for an enterprise's long-term corporate triumph. To retain or gain much market stake, telecommunication services providers should outdo their competition by presenting quality Information Technology, to ensure subscribers are satisfied (Saghier & Nathan, 2013).

The telecommunication operators can ensure retention or increase in their market share only if they have knowledge of the extent of quality of services offered and the extent to which these services contribute to customer satisfaction. Therefore, the objective of this study will be to assess the digital capabilities and their role in enhancing the performance of telecommunication companies in Kenya. This study will increase on the available literature on Kenya's telecommunication industry, in regard to its embrace of digital capabilities as a way of strengthening customer satisfaction and promoting their continued performance. The study focus on the performance of the sector in term of its profitability, the sales revenue it generates annually, the increase in the number of subscribers (customer base) and the Return on Assets (ROA) for the companies. These measures of performance, comprising of both financial and non-financial, have been strongly upheld by Kiilu (2013), Odhiambo (2015) and Mutema (2017) as essential aspects that can best describe the overall performance of a company in a multidimensional operating environment such as the telecommunication companies in Kenya.

### **Statement of the Problem**

The telecommunication industry has been instrumental in contributing to the country's economy. The industry contributes to over Kshs.116.3 billion to the annual Gross Domestic Product (GDP) employing over 3 million people both directly and indirectly (CA, 2020). The

telecommunication companies however, have been facing tremendous challenges, orchestrated by increased dynamism in the operating market and stiff competition (Amin et al., 2019). According to the Communications Authority – CA (2021), the sector's contribution to GDP declined from 1.5% in 2017, to 1.2% in 2020 and 1.1% in 2021, implying a challenge in the performance of the companies in the sector. According to CA (2023), Safaricom has a market share of over 66% of Kenya's mobile (SIM), followed by Airtel at 26.3% market share, Telkom at 4.9% while Finserve (Equitel) has a 2.3% market share. Moreover, Safaricom controls over 92.2% of the country's SMS market share, and over 46.1% of the fixed internet market share. This implies that the industry has been dominated by one company, while the other industry players have been recording a decline in their overall market share over the years. In the financial year 2021/2022, Telkom Kenya recorded a 9.5% decline in profits, and lost over 15% of subscribers, an indication of a declining performance of the company. In the year ended December 2021, Airtel Kenya recorded a net loss of Kshs.1.7 billion up from Kshs.1.6 billion in the previous year, indicating a 7.7% increase in loss (CA, 2022). This indicates that while Safaricom could be shining as the giant in the industry, the other key industry players are dripping down, an evidence of a declining performance in the Kenya's telecommunication industry.

A study by Oketch and Muathe (2022) also noted that most of the telecommunication companies in Kenya were constantly downsizing their operations and reducing the number of employees as a way of saving costs, amid decline in revenues and profitability. Ngugi and Murugi (2022) on the other hand reported that despite the promising future in the Kenyan telecommunication industry, the sector was crippled with reduced customer satisfaction, poor market coverage and increased operational costs.

As companies strive to sustain their operations in today's competitive environment, adoption of digital technology remain to be an essential enabler to

organizational success (Rupeika-Apoga, Petrovska & Bule, 2022; Van Peteghem, Joshi, Mithas, Bollen & De Haes, 2019).). Empirical evidence shows that digital capabilities such as employee ICT skills, digital infrastructure and data storage and management play an essential role in promoting firm performance. A study by Calle, Freije, Ugarte, and Larrinaga (2020) on the role of Digital capabilities on performance of companies in Spain revealed that embracing digital technology through key competencies such as available infrastructure, information security and storage had a significant influence on firm performance. Wang, Gu, Ahmad, and Xue (2022) on the other hand assessed how digital competencies through ICT literacy contributed to organizational performance. The findings revealed that the technical knowhow of the staff had a significant influence on performance.

In Kenya, Onyango and Ondiek (2021) assessed the effect of digital technology on sustainable development and revealed that companies gain more sustainable competitiveness when they possess the appropriate capabilities to sustain digitalization. Otioma (2022) assessed the role of digital capabilities on firm growth and expansion in Kenya. The findings revealed that organizational growth was significantly driven by adoption of digital capabilities such as data storage, employee digital skills and available digital infrastructure. These studies, however, have focused on varied contexts with some having been carried out in developed countries. Moreover, other studies have focused on varied concepts addressing digital capabilities in different approaches. The local studies also have focused on different sectors which cannot be generalized to the telecommunication sector. While previous studies have found digital capabilities to be instrumental in enhancing firm performance, there lacks a consensus on which digital capabilities should be upheld, owing to the fact that most studies have contextualized digital capabilities differently. It is on this merit that the study seeks to fill the contextual, methodological, empirical and conceptual gaps by assessing the influence of digital capabilities on

performance of telecommunication companies in Kenya.

### **Research Objectives**

The main of the study was to assess the influence of digital capabilities on the performance of telecommunication companies in Kenya. The study was guided by the following specific objectives: To determine the influence of digital infrastructure on the performance of telecommunication companies in Kenya, to examine the effect of digital proficiency on the performance of telecommunication companies in Kenya, to establish the influence of information quality on the performance of telecommunication companies in Kenya and to assess the influence of data integrity on the performance of telecommunication companies in Kenya.

## **LITERATURE REVIEW**

### **Empirical Review**

Digital infrastructure is a digital capability that determines the extent to which a company is able to implement key technologies to support its performance. Several studies have focused on digital infrastructure and its role in enhancing firm performance. Chaudhuri, Subramanian, and Dora (2022) assessed the effect of digital infrastructure on adoption of technology and performance of companies in Canada. The study utilized a descriptive research design and surveyed small and medium enterprises in service industry in Canada. From the findings, Chaudhuri *et al.* (2022) established that digital infrastructure such as ICT hardware and software were essential in supporting companies' ability to adopt key technologies that were instrumental in determining their performance. This is supported by Saputra, Sasanti, Alamsjah, and Sadeli (2022) who alluded that through key digital infrastructure such as internet and computers, companies get a more robust ground to implement technologies the enhance their performance.

Heredia, Castillo-Vergara, Geldes, Gamarra, Flores, and Heredia (2022) analysed the effect of digital

capabilities on firm performance. The study aimed at assessing the role played by available digital infrastructure as one of the digital capabilities in enhancing firm performance. An enterprise survey was utilized where 999 respondents were surveyed from 27 countries including Bulgaria, Romania, Mongolia, Morocco, Czech Republic, Poland, Hungary, Italy, Zambia and Zimbabwe. The findings revealed that digital infrastructure was an integral digital capability that determined the ability of organizations to integrate digital technology in steering organizational operations for continued performance. According to Heredia *et al.* (2022), digital capabilities are best defined in terms of the extent to which the organization incorporates the essential inputs that support the success of digital utilization in the organizational processes, and digital infrastructure is one of these inputs. This is supported by Zhen, Yousaf, Radulescu, and Yasir (2021) who indicated that integration of digital technology in organizational processes for enhanced performance is best determined by the available digital infrastructure, which is the basic support of digital technology.

Ogiri (2020) studied the effect of digital infrastructure on the performance of telecommunication companies in Nigeria. The research assessed how key digital infrastructure such as ICT software, ICT hardware and internet drive the effectiveness of digitalization towards enhancing firm performance. Their study used a cross-sectional research way and had a total sample of 216 respondents. The findings showed that through focusing on digital infrastructure, the effectiveness of Information systems in an organization was enhanced. According to Ogiri (2020), digital infrastructure such as ICT software and hardware are essential in determining the implementation of key digitalization prospects aimed at enhancing organizational efficiency, thus steering competitiveness and performance. The author further indicates that for telecommunication companies, the network coverage is an essential digital infrastructure that significantly contribute to

the performance of the industry by promoting a widespread access to network. This is echoed by Cenamor, Parida, and Wincent (2019) who indicated that digital infrastructure is the beginning of the long journal of integrating ICT in organizational processes through which performance is sustained.

Ndubuisi, Otioma, and Tetteh (2021) addressed the effect of digital infrastructure such as internet and digital software in enhancing firm performance in Kenya. Their study sought to assess how these key digital infrastructures enabled organizational success by promoting the efficiency and effectiveness of organizational processes. The study used a descriptive research approach and sampled a total number of 182 respondents that were drawn from insurance companies in Kenya. The findings showed that internet was an essential enabler of information sharing and communication in a modern organization, thus creating a more supportive ground for digitalization. Further, Ndubuisi *et al.* (2021) established that digital software such as operating systems were crucial in determining what kind of information can be stored and shared, thus supporting the companies' ability to integrate digital technology in their operations. Scantlebury, Combes, McKinstry, and Virgo-Sheriff (2019) support this by indicating that digital software is an essential support to digital technology in any organization, since this is the basic enabler of integration of ICT.

Technology is mainly driven by the knowhow of the targeted users (employees) and their skills towards utilizing the latter (Karakose, Polat, & Papadakis, 2021). According to Jared, Oloko, and Orwa (2017), any digital technology that is introduced in an organization can only be effective if the employees have the knowledge and skills to use the technology. This is also echoed in the Unified Theory of Acceptance and Use of Technology by Venkatesh, Morris, Davis, and Davis (2003) that upholds the need for employees being capable of using technology for it to be optimized effectively in the organizational processes. This puts digital proficiency as a key digital capability that would determine the effectiveness of digitalization on

organizational success. According to Soluk, Miroshnychenko, Kammerlander, and De Massis (2021), digital proficiency is the collection of skills and competencies possessed by the employees on how to use and implement key technologies introduced in the organization.

A study by Magistretti, Pham, and Dell'Era (2021) sought to assess the effect of digital skills on the performance of communication-based companies in Australia. The study aimed at reviewing the performance of companies as a result digital skills possessed by the employees. Their study employed an empirical approach and reviewed over 200 studies carried out in Australia. The findings revealed that digital technology was gaining a high penetration as the key driver of organizational success, but highly depended on the employees skills for its effectiveness. According to Magistretti *et al.* (2021), as much as most organizations focused on key ways to enhance their performance through integration of ICT in their pipeline of processes, this could only achieve any results if the employees were well versed with the use of the technology. This compares with the findings by Snow, Fjeldstad, and Langer (2017) who established that human knowledge and skills on the use of digital technology determines how effective a given ICT system is implemented in an organization.

Mittal (2020) analysed the effect of ICT capabilities on the implementation of digital technology among government enterprises in South Africa. The study sought to assess the role played by the skills and competencies possessed by employees on the performance of government enterprises through enhancing their ability to integrate digitalization in their systems. Using a structured questionnaire, the authors surveyed 197 respondents drawn from senior and middle-level management in government enterprises. The findings revealed the ICT knowledge and skills possessed by the employees were integral capabilities that significantly contributed to the effectiveness of digital technologies in organizations. According to Li, Su, Zhang, and Mao (2018), employees are at the helm of implementing any

technology introduced in the company, and not unless they have the necessary digital skills, the technology may not effectively contribute to the intended purpose.

Maingi and Wachira (2022) analysed the effect of digital skills on the recovery from COVID-19 effects among the Small and Medium Enterprises (SMEs) in Kenya. The study sought to assess the role played by digital technology in enabling SMEs have a speedy recovery from the havoc caused by the COVID-19 Pandemic. The study utilized a correlational research approach and surveyed SMEs in the tourism industry. The findings revealed that digital proficiency among the entrepreneurs was an essential driver to the speedy recovery of SMEs from the effects of the pandemic. According to Maingi and Wachira (2022), the ability of the entrepreneurs to utilize digital technology now that the COVID impact has seen most customers and companies go digital would enable them to effectively recover and survive the effects of the pandemic.

Digital technology is about transforming the information into digital format for easier access and efficiency sharing (Matarazzo, Penco, Profumo & Quaglia, 2021). The effectiveness of this technology mainly relies on how appropriate the information is and its overall quality (Drobyazko *et al.*, 2019). As defined by Rupeika-Apoga, Petrovska & Bule, (2022), information quality is the ability of digital technology to transmit appropriate information, in real time and when needed, with its original state and format and in an understandable manner. The information quality is therefore a fundamental digital capability that determines the completeness of digital technology (Matarazzo *et al.*, 2021).

A study by Situmorang, Simanjuntak, Togatorop, and Pratama (2022) sought to assess the effect of quality of information on the effectiveness of digital technology towards promoting organizational performance in Indonesia. The study utilized a correlation research approach and surveyed 81 companies in Indonesia. The findings revealed that information quality through the effectiveness of transmission, the accuracy and the content of the



information significantly contributed to the effectiveness of digital technology towards enhancing firm performance. According to Situmorang *et al.* (2022), the ability of digital platform to convey appropriate information and in the required state significantly contributes to organizational performance. Teece (2017) indicates that information quality is at the centre of enhancing firm performance by promoting the effectiveness of communication and its overall contribution to information sharing.

Essel, Awuni, and Mohammed (2020) assessed the effect of information quality as a capability of digital technology in enhancing integration of information communication technology in Ghanaian organizations. The research used a mixed method analysis and looked at 384 respondents and used the semi-structured questionnaire. The findings revealed that information quality was notable in enhancing the adoption and acceptance of technology in the modern organizations. According to Essel *et al.* (2020), the quality of information determines the reliability of the communication technology and how efficient the technology can be in enhancing firm performance. According to Li *et al.* (2018), focusing on information quality is an essential move to drive the effectiveness of information technology in enhancing firm performance.

Baia (2020) did a study on the effect of digital technology and digital capabilities on the competitive advantage of private corporations. The study sought to examine the role played by integrating digital technology and ensuring there is digital capabilities in enhancing firm competitiveness. The study utilized an empirical approach and analysed 119 studies on digital technology and digital capabilities. The findings revealed that digital technology had a significant impact on organizational competitiveness. Baia (2020) however indicated that digital technology was only effective when the appropriate digital capabilities were put in place. The study revealed that information quality was one of the digital

capabilities that ensured the companies utilized digital technology for superior performance. This is in line with Calderon and Cantu (2021) who revealed that digital capabilities ensure that the organization has the right approach and infrastructure to store quality information for enhanced performance.

Digital technology encompasses of data management through sharing, storing and securing the data for appropriate use (Pearson, Shawcross & Dickson, 2021). Data integrity is the ability of the digital technology to store, secure and enhance retrieval of data when needed. For the digital technology to be effective, there is need for the organization to invest in data integrity, since this is the main component of the technology (Chen *et al.*, 2019). Freitas, Maçada, and Brinkhues (2017) while assessing the effect of digital capabilities on the effectiveness of digital technology in modern organizations revealed that data storage was an essential capability that determined the extent to which digital technology contributed to firm performance. Further, Freitas *et al.* (2017) established that effective digital technology was driven by how secure the data was, and the ability to retrieve the stored data when needed.

Khin and Ho (2018) did a study on the role of data integrity and security on the performance of telecommunication companies in Pakistan. The study sought to evaluate how the appropriateness of digital systems to store and secure data determined firm performance. The authors utilized an exploratory research approach and surveyed 219 respondents drawn from service industry in Pakistan. The findings revealed that data storage and security were essential determinants of the reliability and usefulness of digital technology towards enhancing firm performance. According to Khin and Ho (2018), to achieve the full benefit of digital technology, firms ought to ensure they invest in security of the data, and ensure that data is stored in the original state and free from unauthorized alteration. Pearson, Shawcross, and Dickson (2021) support this by arguing that the extent to which digital technology becomes efficient in contributing

to firm performance highly relies on the amount of data that can be stored, the security of the data and the retrieval of the data when needed.

Makoza (2022) analysed the effect of data integrity on organizational effectiveness in Malawian firms. The study sought to assess the role played by the effect of the amount of data that can be stored, the security and integrity of such data on organizational performance. Using a correlational research design, the authors surveyed 106 respondents. The findings revealed that data storage was an essential enabler of organizational effectiveness by promoting efficient communication through storage and retrieval of information. According to Makoza (2022), data is an essential aspect of digital technology thus its security, integrity and storage can significantly contribute to its effectiveness in enhancing firm performance. This is echoed by Wang, Gu, Ahmad, and Xue (2022) who argued that in the modern era, adopting technology and utilizing it to streamline organizational success is determined by among other factors, the storage of data and its security. Hanelt, Firk, Hildebrandt, and Kolbe (2021) indicate that companies easily lose the credibility of their information technology when data breaches occur, and this could risk the organization losing its value and have detrimental effects on its competitiveness.

Hirvonen and Majuri (2020) assessed the effect of digital capabilities on the performance of manufacturing enterprises in Ethiopia. The study aimed at evaluating the role played by data integrity as one of the digital capabilities on the performance of manufacturing entities. The authors utilized a cross-sectional research approach and sampled a total of 308 respondents. The findings revealed that digital technologies through data integrity play an integral role on the performance of manufacturing firms. According to Hirvonen and Majuri (2020), through enhanced integrity, security and storage, the companies are able to efficiently utilize digital technologies towards enhancing performance. This concurs with the findings by Xu, Hou, and Zhang (2022) who indicated that data integrity is the

beginning and key determinant of a successful digital technology that ensures the company is able to protect its information and sustain competitiveness.

## **METHODOLOGY**

Descriptive design was adopted in this study for collect data collection from the target respondents. This design allows the researcher to cluster the respondents and explain on each cluster of their groups (Ridder, 2017). Using this design, data were collected and analyzed in regard to the role of digital capabilities (digital infrastructure, digital proficiency, information quality and data integrity) on performance of telecommunication companies in Kenya. Through the descriptive research design, the researcher collected extensive quantitative data in order to underpin the essence of digital capabilities in strengthening the performance of telecommunication companies in Kenya. As expounded by Saunders (2019), descriptive design enables the researcher to answer the questions what, where, when and how, thus being an ideal design to answer the research questions of this study.

This study targeted the three major telecommunication companies in Kenya. These include Safaricom PLC, Telkom Kenya, and Airtel Kenya. The study specifically focused on employees drawn from the Information Communication Technology (ICT) Department, Finance Department, Customer Care Department, Operations department from each of the telecommunication companies. The ICT department was targeted to give information regarding the digital technology other departments will provide information regarding the overall performance of the companies and the status of digital capabilities in a non-expert's perspective. According to Kothari (2014), it is essential for a study to focus on diverse respondents so as to obtain diverse responses that represent the true reality of the organization. A representation of 137 personnel's will be used for this study.

A sample is a portion or part of the population of interest. The purpose of sampling is to gain an

understanding about some features or attributes of the whole population based on the characteristics of the sample (Kara, 2015). This study adopted a stratified random sampling method to get the sample size as it reduces selection bias and since the population is homogenous (they are all ICT technical personnel). A stratified random sampling approach supports to ensure a sample that accurately reflects the population by giving all the respondents a fair chance to be included in the sample (Kara, 2015). The stratified random sampling method was used to pick the respondents thus giving all the technical personnel in the companies an equal chance to be included in the study.

A sample usually allows the researchers to make a generalization about the population. A sample is a subset of a population, but that subset is only useful if it is accurately representing the larger population (Nielsen, 2019). The Taro Yamane formula (Yamane, 1967) was adopted to determine the sample size. Through the Yamane's formula of sample size with an error 5% and with a confidence coefficient of 95% Yamane (1967), The calculation from a population of 137, will give a sample size of 102 respondents. The respondents were picked randomly from the target population.

#### **Data Collection Instrument**

The Data for carrying out this research was collected using questionnaires. According to Doryei and Taguchi (2010), a questionnaire is an instrument that best gathers data from a large assembly of individuals who will be in Kenya. The qualitative and quantitative data collected was analyzed qualitatively and quantitatively to establish the role of digital capabilities on the performance of the telecommunication industry in Kenya. The Questionnaires ensure confidentiality is maintained hence respondents remaining anonymous and honest in their responses (Sekaran & Bougie, 2010). The questionnaire will be structured in 3 parts. The first part covered information regarding the general information of the respondents which will include the number of years worked at the respective organization, the respondents' level of education

and the role they hold in the organization. The second part looked at information regarding the digital capabilities whereby the key information on the available digital capabilities will be sought. This section had four sections each covering the key independent variables. The third part covered information regarding the dependent variable which is performance of telecommunication companies in Kenya. Likert's scale questions were used whereby the respondent were asked to give their level of agreement or disagreement on key statements.

Validity is the degree to which result obtained from the analysis of the data represents the phenomenon under study (Balomenou & Garrod, 2016). Content validity and construct validity will be tested in this study. Content validity was achieved by having objective questions included in the questionnaire it will also be ensured by pre-testing the instruments to be used through a pilot study in order to identify and change any ambiguous, awkward, or offensive questions and techniques as emphasized by Cooper and Schindler (2011). Intensive review of the extant literature was done during the formulation of the questionnaire to ensure that the content aligns with the digital capabilities and their influence of organizational performance. Parties within the mentioned department were given the questionnaire to ascertain the content of the questionnaire is in line with the contextual area of the study. Construct validity was tested through use of Principle Component Analysis (PCA) whereby the obtained values ascertained the validity of the items in the questionnaire.

Reliability refers to a measure of the degree to which research instrument yield consistent results (Kara, 2015). In this study, reliability was ensured by pre-testing the questionnaire with a selected sample which will not be included in the final study. The research instrument was subjected to overall reliability analysis of internal consistency. This was measured using Cronbach's alpha. Typically, reliability coefficients of 0.70 or higher are considered adequate and this is the threshold that will be adopted by this study.

### Data analysis and Presentation

Liamputtong (2019) defines data analysis as the process of inspecting, transforming, cleaning, and modeling of data with an intention of highlighting useful information, suggesting conclusions, and reporting decisions made during the study. It involves data collection, data display, conclusion and finally drawing a recommendations report.

The Data was compiled, sorted, classified and coded in Statistical Package for Social Scientists (SPSS) version 27. The data was then processed for the descriptive and inferential analysis. Descriptive analysis was carried out and presented using mean, standard deviation and percentages. On the other hand, inferential analysis was carried out using a regression model. The inferential analysis helps to establish the relationship between variables. The regression model for the study is as shown:

$$Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + e$$

Where:

Y = The Performance of Telecommunication Companies

$x_1$  = Digital Infrastructure

$x_2$  = Digital Proficiency

$x_3$  = Information Quality

$x_4$  = Data Integrity

e = error term which captures the unexplained variations in the model

$\alpha$  = (alpha) is the constant or intercept.

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$ = Beta coefficients for independent variables  $x_1, x_2, x_3$  and  $x_4$  respectively.

Once analysis is finished, the findings will be presented in tables, pie-charts and bar-graphs form, so as to enhance clarity and a better understanding of the research findings.

### FINDINGS

The Pearson correlation coefficient (r) is the most commonly used metric for determining a linear relationship. The degree and trend of the association between two variables are measured by this statistic. The analysis in this study was performed with a 2-tailed 0.05 alpha. The results are shown in Table 1.

**Table 1: Pearson Correlations**

		Performance	X1	X2	X3	X4
Digital Infrastructure	Pearson Correlation	.879**	1			
	Sig. (2-tailed)	.000				
	N	88	88			
Digital Proficiency	Pearson Correlation	.908**	.880**	1		
	Sig. (2-tailed)	.000	.000			
	N	88	88	88		
Information Quality	Pearson Correlation	.853**	.818**	.837**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	88	88	88	88	
Data Integrity	Pearson Correlation	.842**	.801**	.826**	.794**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	88	88	88	88	88

\*\**. Correlation is significant at the 0.01 level (2-tailed).*

X1= Digital Infrastructure; X2= Digital Proficiency; X3= Information Quality; X4= Data Integrity

The results established that there exists a statistically positive and significant relationship at 0.05 alpha between Digital Infrastructure and Performance of Telecommunication Companies ( $r=0.879^{**}$ ;  $p<0.05$ ). This indicates that the availability of proper digital infrastructure influences the extent to which a company can implement significant advances to

support its business aspirations. Similarly, the results established a statistically significant relationship between Digital Proficiency and Performance of Telecommunication Companies ( $r=0.908^{**}$ ;  $p<0.05$ ). This suggests that personnel with the necessary abilities and competences to use digital technology

in the company will have an impact on the firm's success.

Furthermore, the research recognized a statistically and a significant relationship (at 0.05 level) between Information Quality and Performance of Telecommunication Companies ( $r=0.853^{**}$ ;  $p<0.05$ ). This indicates that in order for an organization to be effective, important performance metrics linked to information quality must be identified and utilized. Finally, it was recognized that Data Integrity has a statistically significant relationship with Performance of Telecommunication Companies ( $r=0.853^{**}$ ;  $p<0.05$ ). This indicates that data should be protected from unauthorized individuals and easily transferable across the corporate structure.

### Regression Analysis

Regression analysis is a set of statistical procedures used to estimate the associations between a dependent variable and independent variables. Researchers can use it to analyze the magnitude of the association between variables and to predict the future relationship between components. The strength of the association between the model's parameters and the dependent variable is reported in the model summary table. A regression model can be used to predict how a dependent variable is going to shift as the independent variable(s) vary. The model summary is shown in Table 2.

**Table 2: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.936a	.877	.871	.31882

a. Predictors: (Constant), Data Integrity, Information Quality, Digital Infrastructure, Digital Proficiency

The model established the Adjusted R Square for the study to be 87.1%. This implies that up to 87% in Performance of Telecommunication Companies is explicable by digital infrastructure, digital proficiency, information quality and data integrity. This also means that about 13% cannot be accounted for in the model.

The regression coefficient denotes how much a change in x must be multiplied by to get the corresponding average change in y, or how much y changes for every unit increase in x. As a result, the size and direction of the link between a predictor and the response variable are described by these coefficients. The relationship is described in Table 3.

### Regression Analysis

**Table 3: Regression Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.155	.152		1.014	.313		
Digital Infrastructure	.220	.084	.227	2.607	.011	.196	5.101
Digital Proficiency	.391	.090	.407	4.321	.000	.167	5.982
Information Quality	.207	.084	.189	2.451	.016	.250	4.004
Data Integrity	.176	.075	.173	2.344	.021	.272	3.674

a. Dependent Variable: Performance of Telecommunication Companies

The analysis of multiple regression indicates that Digital Infrastructure significantly influences Performance of Telecommunication Companies ( $\beta=0.227$ ;  $p=0.011$ ). The finding indicates that a corporation can succeed when components such as

hardware, software, internet, and network coverage are robust and reliable.

Furthermore, it was estimated that Digital Proficiency has a significant impact on Performance of Telecommunication Companies ( $\beta=0.407$ ;

$p=0.000$ ). The implication of this study is that an organization's achievement will be proportionately impacted by its employees' ICT and technical knowledge and expertise. This is reinforced by their organization's accept of the technologies.

Besides, it was established that there exists a significant influence of Information Quality on Performance of Telecommunication Companies ( $\beta=0.189$ ;  $p=0.016$ ). This suggests that the reliability and validity of data might influence organizational effectiveness. Furthermore, information accuracy, transmission, and access accessibility all have a substantial impact on organizational effectiveness.

Finally, Data Integrity was established to significantly influence Performance of Telecommunication Companies ( $\beta=0.173$ ;  $p=0.021$ ). It also indicates that data security and retrieval, as well as scalability, have a substantial impact on organizational performance.

#### **SUMMARY AND RECOMMENDATIONS**

It is recognized that the digital infrastructure is a capacity for technology that influences the degree to which an organization can implement important innovations to support its company's goals. Based to the findings, more than half of the participants agreed that the organization's computer system was adequate for its daily operations. This validates the significance of Digital Infrastructure in promoting organization performance. The accessibility of advanced software and technological innovations for implementation has the potential to improve efficiency in any firm. According to the findings of this study, a sizable percentage believe that the existing hardware is up to current for efficient and effective use of technological advances. This is a great indicator of the success of integrating technologies in achieving corporate objectives.

The accessibility of appropriate software is of the utmost importance for the effective functioning of a company's digital operations. According to the data, a considerable portion of participants believed that the company offered the necessary software to enable digital technology. It is essential for businesses to install cutting-edge software that will

propel them to greater heights of success. As a consequence, a cutting-edge technology strategy can give firms an important edge over their rivals.

A tailored software design is crucial for the success of an IT-based firm. It was clear that more than half of participants agreed that the available software infrastructure is up to date for running the firm's digital procedures. As a result, using cutting-edge technology helps to increase efficiency while also boosting client service and happiness. A robust internet infrastructure can boost operations and competitiveness in an organization. According to the data, a portion of the participants confirmed that their workplaces have high-speed internet access for usage in organizational digital activities. This means that firms can communicate with potential clients via the internet, improving corporate performance and speeding up commercial procedures.

A center for data storage needs to have enough active security to prevent unauthorized access. According to the findings, the vast majority of participants believed that the placement of the servers and databases in the organization was secured and only accessed to the appropriate personnel. This means that protecting a server is vital and must include best practices in terms of configuration, control, monitoring, and security review. In order to develop digital access and put it into operation in a company, management assistance is required. According to the survey, the majority of participants said that the organization, through management, has been committed to providing the technical team with enough access to digital infrastructure. This means that top management assistance is crucial in increasing an organization's technological capacity to use new technological services effectively.

Digital literacy in the workplace is critical to the growth of a business. According to the current study, a large proportion of the participants believe that the organization's personnel have the necessary abilities and competencies to use the digital technology that has been implemented. Furthermore, in order to increase efficacy, the

company's senior management should invest in digital literacy training for its employees. According to the findings, a section of participants' state that management encourages staff training to improve their skills in using digital systems. Nonetheless, it is worth noting that a sizable majority of those polled were unconvinced by the assertion. The application of digital technology in a business boosts productivity while decreasing operating costs. According to the findings, a sizable majority of participants indicated that employees were encouraged to use digital technology in their day-to-day activities at work. This viewpoint was shared by a group of people who stated that the majority of employees perform better when they use digital technology to carry out their jobs.

Digital integration in a corporation will be beneficial if the technical team have the appropriate technological skills and expertise. The majority of participants in this study agreed that the technical team has the technical ability to support and administer the organization's digital systems. Furthermore, one segment stated that employees have few concerns about the effectiveness and convenience of use of the implemented digital technology. subsequently a large number of respondents agreed that the existing level of digital proficiency among employees in the business is effective in improving the firm's performance. This shows that good digital utilization combined with digital competences of personnel has the potential to establish new markets and new ways of doing business, resulting in improved results.

Accurate data enables businesses to make better informed decisions, improve operational efficiency, and boost customer happiness. It was underlined that the information provided through their company's digital systems was adequate to address the subject matter. It is claimed that in order for a firm to be effective, essential performance indicators related to information quality must be determined. The reliability of information technology is affected by the standard of information in every company. A large proportion of participants believe that their

company's digital systems are capable of processing content-rich information. This indicates that organizations must invest more in their digital abilities in order to improve their productivity.

The reliability of data communicated with multiple stakeholders plays a key role in improving the effectiveness of the firm. According to the findings, respondents agreed that the information supplied in their digital systems is correct, while the 5a section said that there are frequent reviews and scrutiny to ensure the information shared is accurate. Recognizing the processes that promote technological advancement adoption is critical for their efficacy in this environment. Furthermore, firms update their talents to satisfy shifting market demands by adopting digital progress as their primary organizational approach.

The rate with which data is transferred and responses are received affects how a business operates. A large proportion of participants said that information was transmitted at the appropriate speed in their workplace. This implies that information technology must be reliable and delivered at a reasonable pace. It is well acknowledged that digital technologies eliminate communication obstacles and boost data transmission among enterprises. According to the findings, just a portion of the participants agreed that the digital technology knowledge supplied in their firm was complete with all of the necessary facts. As a result, organizations that invest more extensively in increasing information quality outperform their competitors. A few participants in this study confirmed that there are few instances of incomplete information given by the company's computerized systems.

Firms need to invest in data quality if digital technology is to be useful. According to the findings of the study, the vast majority of respondents agreed that the data shared in their networks is safe from attackers. Despite this claim, a large number of respondents disagreed. This indicates that when firms' systems are secure, their performance improves. Any successful business should strive for

data integrity. This belief was shared by a large number of respondents who reported that their organization had no incidents of data breaches. This implies that digital technologies improve efficiency by altering processes and thereby speeding up corporate activities.

Robust data storage and retrieval are essential components of success for any company. It was confirmed that saved data could be simply retrieved using their company's digital infrastructure. Furthermore, a sizable proportion of respondents said that getting data from the company's digital systems takes less time. This implies that inefficient data management may leave organizations with irregularities in data collecting as well as data security.

In evaluating company performance, the ease with which data is delivered to important stakeholders is critical. Some participants in this survey assumed that data could be simply shared with as many users as needed. Furthermore, a portion of those polled thought the data was scalable enough to be used successfully in the intended context. This demonstrates how the readability and scalability of a company's information can improve its profitability.

Digital infrastructure is a vital component that allows businesses to execute significant innovations to support their goals. Furthermore, the availability of proper software is critical to the efficient operation of a company's digital operations. As a result, a cutting-edge technology strategy can provide companies with a significant competitive advantage. A customized software design is critical for an IT-based company's success. It essential to establish a strong internet infrastructure in order to improve an organization's operations and competitiveness. Furthermore, a data storage facility must have sufficient active protection to prevent unwanted access. This makes the placement of servers and databases in the company a primary motivator for protection and security.

Personnel in organizations must have the requisite skills and capabilities to exploit digital technologies. Furthermore, the company's senior management should invest in digital literacy training for its personnel in order to boost efficacy. One segment, however, said that employees have little reservations regarding the effectiveness and ease of use of the adopted digital technologies. As a result, good digital utilization paired with digital competencies of staff has the potential to boost organizational efficiency.

Data quality allows organizations to make more informed decisions and increase operational efficiency. Furthermore, the quality of data transfer in each company affects the reliability of information technology. The rate at which data is exchanged and responses are received has an impact on how a company functions. As a result, information technology must be dependable and provided on time. Furthermore, firms that invest heavily in improving information quality outperform their competition.

Firms must invest in data quality if digital technology is to be useful. This suggests that when organizations' systems are safe, their performance improves. Any successful firm should strive for data integrity. Furthermore, reliable data storage and retrieval are critical components of any business's success. Therefore, inadequate data management may leave firms with inconsistencies in data collection as well as data security. When analyzing firm performance, the simplicity with which data is supplied to key stakeholders is vital. This demonstrates how the readability and scalability of a company's information can boost its profitability.

The study recommends that organizations ought to deploy digital infrastructure that satisfies the firms requirement in terms of hardware, software and network coverage for them to be competitive. Specifically, management needs to avail up to date software infrastructure for running the firm's digital procedures. Secondly, telecommunication companies need to prioritize digital competencies of their staff if they need to boost and maintain



organizational efficiency. Specifically, top level management ought to provide avenues for their staff to get constant training on technological advancement so that they can promote their effectiveness. Thirdly, firms ought to invest heavily on data quality through implementation of current Digital Infrastructure. This promotes effective data

transmission which is accurate and reliable. Finally, it can be recommended that companies must invest in quality of data if digital technology is to be useful. Any successful company ought to strive for data reliability. This can be accomplished by proper data privacy, access, and adaptability.

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