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Review Article

Telecommunications Industry Challenges and Opportunities in Africa: A Narrative Scoping Review

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Abstract

The Sustainable Development Goals (SDGs) have been adopted by many developing countries, and dynamic competition in the telecommunications sector plays a key role in achieving these goals. African countries continue to struggle with poor infrastructure, high internet costs, a shortage of skilled ICT (Information and Communication Technology) professionals, and an unreliable power supply. This scoping review examines the current challenges and opportunities on the African continent, as well as the enabling factors that could enhance the telecommunications sector and accelerate economic growth. Study data were collected following a study protocol and synthesised using an Excel sheet. This review suggests that poor foreign investment, high internet costs, low speeds, inadequate infrastructure, limited coverage, and low customer engagement negatively impact the contribution of the telecommunications sector to national GDP. Three articles highlight that modern technology has a significant positive impact on the global economy, with developing countries benefiting from this revolution. Africa has strong potential as a telecommunications market if broadband expansion is supported by robust infrastructure.

Keywords: *Africa; Long-Term Evolution (LTE); Somalia; Telecommunication; 5G*

Introduction

Africa is a continent with 1.4 billion people across 59 countries. Around 900 million mobile connections are available, and 515 million people subscribe to mobile services in Africa, which represents 57% of the total population of the continent (Ekeocha, Ogbuabor & Orji, 2021). The population coverage of mobile networks in Africa stands at an average of 64%, although this coverage varies from 10% to 99% across countries in the African continent (Chavula, 2013). Many countries' governments and the private sector are working to achieve universal access to mobile communications, but this target is hampered by poor infrastructure and a shortage of operational facilities (Ding & Haynes, 2006). African countries are struggling with poor electrification, and about 600 million people are living without electricity access (Aloo, 1998). The grid electricity infrastructure offers hope for rural and remote populations. The majority of private sector companies focus on alternative sources of power, including diesel-driven generators, to power their networks and connect mobile services (Adeleye & Eboagu, 2019). However, this alternative creates high operational costs, negatively impacting users. A lack of a green power regulatory environment, a changing industry landscape, scarcity of funding, and limited technical resources are key barriers to reaching the optimum number of mobile subscribers in Africa. These triggering factors create obstacles to improving access to mobile communications on the continent (Kulshrestha, Jain & Dhingra, 2023).

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The four factors include high mobile and internet costs, difficulty in reaching the rural community, poor infrastructure for digital expansion, and low internet speed and coverage, which play a negative role in the expansion of mobile connections in Africa (Hatsu, Mabeifam & Paitoo, 2016). Considering the above fact, the private telecommunications sector initiative is playing a critical role in increasing growth and access to connectivity in mobile networks across the continent (Gwaka, May & Tucker, 2018). Public-private partnerships can minimise the gap and increase access to internet connectivity, which may improve the overall quality of life for people on the continent. The private sector is working to redefine customer engagement, focus on better communication, implement future networks, and deliver innovations in IT (Islam, Basher & Enamul Haque, 2022).

The boost in Africa's economic growth and improvement in the quality of life of people is driven by the telecommunications sector, which plays a vital role (Gillwald, 2005). To reduce unemployment, poverty, and the lack of accountability in the government sector, telecommunications infrastructure plays a key role in addressing these challenges (Ali, Kavale & Mukhongo, 2024). The Public-Private Partnership (PPP) model is a vital element for the African telecommunications sector, and statistics reveal that half of global population growth between now and 2050 is expected to occur in Africa, with mobile networks serving as the bridge to connect the continent (Dossou *et al*., 2024).

This scoping review highlights the challenges and opportunities of the telecommunications industry in Africa, especially in Somalia, which the Somali government may incorporate in the national policy to boost economic growth and improve the quality of life of the people.

Methodology

Protocol Development

A narrative scoping protocol was developed, following the PROSPERO database, and the protocol was prepared in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) (Moher *et al*., 2015). The research team has completed the PRISMA-P checklist based on the inclusion and exclusion criteria.

Literature Search Strategy

This research team searched the literature using a critical appraisal tool and produced synthesis evidence addressing the challenges and opportunities of the telecommunications industry in Africa. Published articles and grey literature on the challenges and opportunities of the telecommunications industry in Africa, using particular keywords, were searched on well-known websites, followed by the inclusion and exclusion criteria of the protocol. The research team followed the SLR (Systematic Literature Review) three-step technique to extract the published articles and grey reports from different websites. Regarding the selection of the initial list of articles and reports, eight website articles published in the English language over the last 10 years (from January 2012 to December 2022) were searched.

Study Quality Assessment

The article is excluded from further analysis if it failed to maintain the standard according to the protocol checklist. This narrative scoping review was conducted by selecting sources and keywords, combining the most promising keyword strings using logical operators, identifying search areas for articles and reports, and executing the search process to identify relevant empirical studies through screening based on specific inclusion and exclusion criteria.

A. Exploring the initial list of studies

In the first step, the team searched for articles on the website using very specific keywords to find the desired articles and grey literature containing the words telecommunications industry, mobile network, IT in Africa, challenges and opportunities, and Africa continent. Around eight well-known online databases were searched for published articles and relevant literature between January 2012 and December 2022 to gather articles and grey literature on the challenges and opportunities for the

telecommunications industry in Africa. A total of 85,820 articles and relevant grey literature were found using specific keywords, and searching with combined keywords returned approximately 30 results.

Table 1: Initial Search Strategy and Outcomes

Total articles and grew literature found (January 2012 to December 2022)										
Search databases		Search items								
Data Sources	Field and access	Document type	Telecommunications Industry	Mobile network	IT in Africa	Challenges and opportunities	Africa Continent	Mobile network & Africa	Telecommunications Industry & Africa	Challenges and opportunities for the Telecommunications industry in Africa
Springer link	All	Journals	20,322	5,569	4,283	09	43	13	21	03
Science Direct	All	Journals	15,342	8,967	1,245	63	06	50	07	03
Wiley online library	All	Journals	7,045	6,890	2,156	112	29	22	10	04
Medline (PUBMED)	All	Journals	6,328	5,680	3,560	135	12	15	06	05
PMC	All	Journals	12,368	3,967	1,245	55	15	12	04	04
Web of Science (SCI, SSCI, HCI)	All	Journals	12,375	3,569	3,160	110	09	21	08	05

B. Topicality of evaluation

The research team followed the steps of evaluating the high quality of articles and standard literature from the outcomes of the primary list of studies. The authors carefully screened the articles and grey literature titles and abstracts, executed summaries, and reviewed the full text to exclude irrelevant articles and reports. In the procedure of evaluating the collected articles and grey literature, the research team followed the study protocol as well as the inclusion and exclusion criteria (Figure 1).

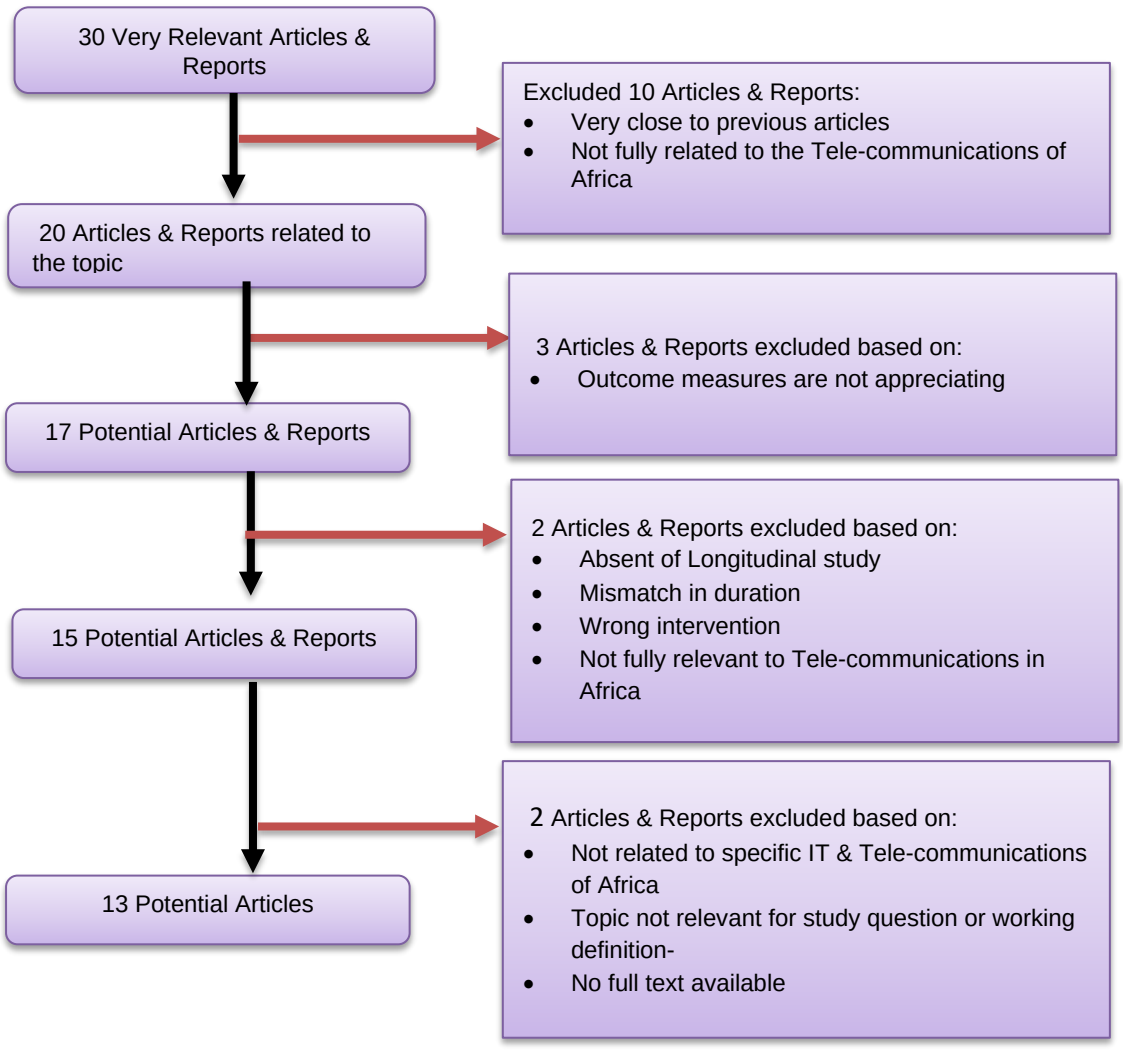

Figure 1: Outcome of Search and Selection of Studies According to Study Protocol

C. Extraction and analysis of data

In the 3rd stage, the authors finalised the articles and reports by following the key details of the relevant articles according to the inclusion and exclusion criteria, the year of publication, and the articles' main themes. Following the protocol criteria, the research team selected 10 articles and 3 grey literature sources to develop the introduction of the study. Around 13 articles and reports were selected for further analysis. Figure 1 below shows the results of the search and selection of studies, including the exclusion steps.

An Excel sheet was developed to extract necessary data from each article and report. Some information, including the title, author, country, name of the journal, date of publication, study outcome, study design, results, and limitations, was included in the Excel sheet. In the case of multiple studies using the same data source, the most recent study was considered the primary data.

Results

The team reviewed 13 selected articles, expanding the literature to deepen their understanding of the challenges and opportunities within Africa's telecommunications sector. The majority of the articles discussed policy-related barriers and enabling factors. The financial crisis, skilled human resources, poor infrastructure, lack of user-friendly policy, and monopoly business policies are highlighted in published documents. Three articles described the telecommunications sector's high mobile and internet costs and difficulty in reaching the rural population, five articles described poor infrastructure for digital expansion and low internet speed and coverage due to the political environment, and five articles highlighted the increased regulatory requirements in the context of African countries (Table 1 & Table 2). Most of the synthesis documents suggested that collaboration with policymakers is a key ingredient for a successful information and communications technology (ICT) development programme in Africa, and PPP is a good option for digital market expansion in the African region. African developing countries need a sound ICT strategy given the low penetration of ICT services in unserved areas, especially in rural parts.

Table 2: Key Challenges of the Telecommunication Sector in Africa

Tele-Communication Sector High Mobile and Internet Cost	A shortage of capital, skilled labour, and poor allocation of GDP in the telecommunications sector negatively affect African mobile expansion (Islam, Basher & Enamul Haque, 2022). Some studies suggested that a lack of effective public administration and an ignorant attitude towards reform policies for the telecommunications sector are key barriers to African countries promoting economic performance using telecommunications for faster economic growth (Gillwald, 2005). Investments are required in infrastructural development, human capital development, and capital accumulation for the fast-increasing telecommunications sector in Somalia (Ali, Kavale & Mukhongo, 2024). Gathered information indicates that the use of the internet does not have a significant contribution towards the quality growth of the economy in some African countries, and the main reason is the high cost of mobile handsets and the internet (Dossou *et al*., 2024). The World Bank report reveals that mobile telephone networks have a significant positive influence on growth in developing countries in Africa, and essential reforms to infrastructure and skilled human resource development may increase three-fold in the next 10 years (Abubakar *et al*., 2022). Increasing numbers of mobile subscriptions have quality output elasticity across the continent and have the greatest potential to enable Africa to skip traditional developmental stages and ensure the improvement of the quality of life of people across the African continent (Solomon & van Klyton, 2020). Some evidence concluded that for faster economic growth through the telecommunications sector in African countries, policymakers must ensure low-cost internet along with affordable mobile handsets (Ward & Zheng, 2015). To reduce internet costs, African countries need to make quality use of limited resources, invest in improving road networks, and minimise the gap in communication and coordination among intersectoral ministries (Thusi & Mlambo, 2023). African policymakers need to focus on minimising the costs related to the use of modern communication technology facilities, including the cost of buying a mobile phone, internet connectivity rates, subscription rates, and so on (Arakpogun *et al*., 2020). To ensure access to quality online

	services, including healthcare, skills and education, finance and jobs, as well as information and entertainment, there is no alternative to low-cost mobile and internet connections across African countries (Korkmaz, Erer & Erer, 2022). Current evidence indicates that low mobile costs and the availability of the internet in rural areas are crucial factors for Somalia's context, as many people reside in these remote and rural areas (James, 2010).
Difficulty in reaching the rural population	There are gaps between rural and urban areas in developing countries in access to mobile use and internet facilities (Islam & Hoq, 2010). Remote rural communities in Africa have poor access to mobile and internet services, particularly in drought-prone areas, due to issues related to mobile networks, low power supply, and the provision of telecommunications access to low-income groups (Azevedo, 2017). Factors including sociocultural aspects, literacy, security, infrastructure, regulatory frameworks, and financial sustainability strongly influence access to telecommunications in Somalia's rural communities (Ssendagire *et al*., 2023). Technological options and solutions should be made available to address the telecommunications needs of rural communities in Somalia within a very short time, at reasonable costs, to improve the quality of life of rural populations (Ali & Electrical, 2023). Adequate digital infrastructure could be the best option to bridge the infrastructure gap in Africa. However, new infrastructure interventions in African countries remain a distant dream for rural communities, and policymakers, along with other stakeholders, need to pay greater attention to this issue by adopting an integrated approach (Gwaka, May & Tucker, 2020).
Poor Infrastructure for Digital Expansion	Fibre cable networks are an integral part of digital expansion, and upgrading ICT policy capacity can ensure this for the Somali people (Chavula & Chekol, 2010). There is an immediate need to identify gaps and respond to changes in the ICT environment for digital network expansion (Khan, Hasan & Clement, 2012). Public-Private Partnership (PPP) may be a good option for investment in digital expansion and attracting foreign investment in this sector (Osei-Kyei & Chan, 2017). Around 473 million Africans are currently benefiting from online facilities, and an additional 300 million are likely to join them by 2025. This target is crucial to Africa's future growth, and digital expansion will make it possible (Okafor *et al*., 2022). Achieving universal, high-quality internet access across Africa will require investments of US$100 billion, 80 percent of which is needed for core infrastructure to establish and maintain broadband networks (Adame, 2021).
Low internet speed and coverage	Internet speeds across Africa have been far below the global minimum standard for a long time and low coverage in rural areas (McCormick, 2022). Most of the countries with the slowest Internet speeds are in Africa and of the 39 ranked African countries achieved average speeds above 10 Mbps—deemed to be the minimum speed required by consumers “to fully participate in a digital society (Chen & Wang, 2023). A 10% increase in broadband penetration in low- and middle-income countries can result in a 1.38% increase in economic growth (Valentín-Sívico *et al*., 2023).
Increased regulatory requirements	Most African countries have complex regulatory frameworks, and this does not support a user-friendly environment for low-income groups (Witter, Sheikh & Schleiff, 2022). Absence of community-friendly policy to improve the limited and inconsistent power supply in rural areas. Currently, policy supports costly mobility, and this is challenging for the expansion of mobile networks in African countries (Olabi *et al*., 2022). Limited mobile companies control the telecommunication sector, and this is a barrier for new investors to enter the market (Park, 2009). By 2025, 3G mobile network coverage is expected to account for 61 percent of mobile phone connections. When most Africans can access the internet, both in terms of connectivity and affordability, and for this reform, regulatory issues are essential (Guo, Zhang & Maple, 2003).

Table 3: Opportunities for the Telecommunication Sector in Africa

Redefine customer engagement	Digital expansion and the affordable cost of the Internet are vital issues of community engagement in the developing world (Abubakar *et al*., 2022). High-speed broadband and availability of networks will support redefining customer engagement in the African context (Azevedo, 2017). Power supply and digital expansion will increase the coverage of mobile networks. Public-private sector partnerships on commercially sustainable and scalable solutions are required (Ali & Electrical, 2023). Needs a policy and regulatory framework that may encourage investment, enable innovation, and build trust in the area of new digital services (Olabi *et al*., 2022).
Focus on better communication	Rural areas supportive of a policy environment can help to reach the unserved areas and that will create positive changes in the community for people in Africa (Witter, Sheikh & Schleiff, 2022). Unlimited speed of the internet is making communication quicker, access availability, effective business environment, and education, entertainment, and public services accessible to rural communities to create opportunities for unnerved communities (Valentín-Sívico *et al*., 2023). Faster economic growth and community development mostly depend on the level of mobile connection and about 3.5 billion people are still behind this opportunity. Reform policy can continue in the remaining coverage and engagement gaps (McCormick, 2022). Collaborative and constructive partnerships between industry, the development community, policymakers, and regulators are key to ensuring no citizen is left unconnected (Guo, Zhang & Maple, 2003).
Implement networks of the future	A coverage gap was observed, with over 750 million people lacking access to a mobile broadband network (Adame, 2021). Quick implementation of policy will help to extend networks and reduce the cost. Rural infrastructure can enable 3.3 billion people to create access to mobile broadband coverage globally (Gwaka, May & Tucker, 2020).
Deliver innovations	To achieve the SDG and improve quality of life, mobile internet can play a vital role in this regard and continue to support societal development. Digital innovation at all levels of government and society is supporting working-age groups digital skills (Osei-Kyei & Chan, 2017).
Repositioning services	Capacity building and innovative digital interventions following the telecommunication sector regulators and policy are key issues for Digital Transformation in African markets (Abubakar *et al*., 2022).

The data reveal that there is less competition and massive disruption in the African telecommunications sector. There is poor investment in technological advancements such as the metaverse, 5G, and fibre optics. An integrated approach is also absent in African countries, and as a result, only wealthy individuals benefit from internet facilities in Africa. The four papers highly emphasised increased regulatory requirements, outdated or insufficient service technologies, skilled labour shortages, and high turnover in this industry. Policy reform focusing on meaningful innovations and responding with agility to market changes and new customer demands should be prioritised by policymakers. Political commitment and replacing legacy systems may reduce the high cost of the internet, increase workforce efficiencies, accelerate innovation, and provide more streamlined service experiences across the continent.

Discussion

This scoping review was conducted to enhance the understanding of key challenges and future opportunities in the telecommunications sector in Africa. The researchers have developed a study protocol and used an Excel data sheet to synthesise the information and ensure the quality of the articles in the section process. Eight keyword domains (Table 1) were searched to explore the articles and grew literature from highly resourceful websites. The synthesis data of this study reveals that the telecommunication sector in Africa faces many challenges and policy reform is important to address these challenges. The key challenges and opportunities are discussed below. It is revealed by the data that approximately 750 million people in the African continent are still not covered by a mobile broadband network, and this gap is creating barriers to access to information and job opportunities. The contribution of telecommunications in Africa is low and is not able to transform formal financial services into national GDP. Factors that influence the low productivity of the telecommunications sector are high

internet costs, low speed, poor infrastructure, low coverage, and low customer engagement. Effective blockchain and more customer engagement are supportive of reducing the level of poverty. It was suggested by the three studies that financial inclusion, followed by the telecommunications sector, may contribute to capital accumulation, which could positively impact employment creation (Ali & Electrical, 2023; McCormick, 2022; Osei-Kyei & Chan, 2017). The telecommunications sector directly impacts access to social services, expanding educational opportunities for unserved communities, creating platforms for innovation, access to freedom for community people, and receiving government services. The latest report reveals that African countries have the lowest internet penetration rate of 39 percent compared to the global average rate (60 percent). The alarming fact is that there is a significant difference between urban and rural people in terms of using high-quality internet and this reason negatively impacts the financial sector of African countries (Witter, Sheikh & Schleiff, 2022). Currently, about 8.8 billion USD annually, which is equal to 40% of the country's GDP, is transferred by the telecommunication sector and the number can be increased to 75% by 2030 if low-cost internet and high speed are ensured (Ali & Electrical, 2023). Investment in LTE and 5G digital infrastructure development is essential to sustaining the steady growth of the African economy (Abubakar *et al*., 2022). Integrated telecommunication sector policy needs for African countries based on transport, communication, health, and energy areas. The information infrastructure in Africa will be excellent if foreign investors support infrastructure development and this will facilitate the establishment of low-cost and widely accessible Internet services for rural and urban communities. The African countries' governments should invest in human capital and human capacity must be addressed by increasing the number of graduates in technical disciplines; enhancing the importance of ICT in education; ensuring computer literacy of students and teachers; and investing in research and development (Ali & Electrical, 2023; McCormick, 2022). The legal and regulatory framework must be addressed according to an investor-friendly environment and government and industry. A competitive market environment should be considered during policy reform.

Conclusion

Challenges and opportunities facing telecommunications in African countries are multifactorial. Addressing the Fourth Industrial Revolution requires significant investment in infrastructure, including upgrading and expanding network capacity, building data centres, and deploying fibre optic networks. The integration of physical, digital, and biological systems is essential for high-speed and low-cost internet. Furthermore, innovation, economic expansion, and digital inclusion all depend on the integration of biological, digital, and physical systems. African countries need to enact progressive laws that promote competition among telecom providers, public-private partnerships, and foreign direct investment. In order to guarantee sustainable growth, it will also be essential to address concerns such as spectrum allocation, cybersecurity, and affordability. Despite these obstacles, Africa has a rare opportunity to advance beyond conventional development routes by adopting cutting-edge technologies such as blockchain, 5G, and AI. To fully utilise telecommunications, it will also be crucial to increase local content production, strengthen digital literacy, and enhance policy frameworks. This study is significant as it provides a comprehensive analysis of the challenges and opportunities in Africa's telecommunications industry, offering valuable insights for policymakers, investors, and industry stakeholders to drive sustainable growth and digital transformation.

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Conflict of Interest

The authors declare that there are no competing interests.

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