Digital Development of Rural Communities in Sub-Saharan Africa

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Abstract: The development of digital technology, particularly the usage of social media, has improved connectivity throughout the world. The COVID-19 virus spread around the world for the past two years, and countries went on lockdown. This pandemic has boosted the adoption of digital technology globally, notably in Sub-Saharan Africa (SSA). The COVID-19 epidemic brought the region's many issues to light as well as a few new ones. Many young people are leaving rural communities to seek better opportunities in the surrounding, more developed urban areas, and this is one of the many issues that rural communities in Africa deal with. Many of these rural villages decline and ultimately perish. Rural communities can change with the adoption of digital technology, which also offers chances for economic expansion. Several obstacles contribute to the slow uptake of digital connections in rural regions. Poor to no Internet connectivity and interrupted electricity supply are major problems in Africa. In South Africa, electricity is declared a national disaster. The research looks at how rural communities may adapt to using digital technology for development to sustain agricultural output, produce alternative sources of energy thereby reducing such challenges and cut down on power outages. The application of such developments will increase internet access. Moreover, the adopting digital technology and artificial intelligence can offer several solutions and create new jobs. The research was conceptualised using Maslow's Hierarchy of Needs Theory and Uses and Gratification Theory. This study used a desktop research approach reviewing of the literature. The potential from digital transformation provides to enhance the employing of renewable energy this in turn supports rural people simultaneously providing relief to South Africa's energy needs is one of the study's primary conclusions.

Keywords: digital communication, digital skills, new technology, transformation, unemployment

Introduction

The COVID-19 Omicron was found on November 25, 2021, in the South African province of Gauteng Madhi, et al. (2022). This signalled the beginning of COVID-19's decline as a virus. The disruption brought on by COVID-19 caused misery for many families, social isolation, company closures, financial hardship, and job loss for many individuals around the globe. Duarte (2021) claims that COVID-19 lockdowns have made their situation worse. Many public services had to be accessible online due to social distancing, while others had to adopt digital media to deliver such services. Millions of Africans are being left behind, and policymakers need to understand how important digital technologies are needed to socioeconomic inclusion. The absence of consistent power, places delays on development and economic promises. The demand for digital technology has increased. This is supported by McKinsey and Company (2020) and concurs that digital usage has increased dramatically at both the organisational and industrial levels.

Africa's digital revolution is now progressing, but some obstacles seem to be skewing and slowing it down. Even though connectivity is either too expensive or has insufficient coverage, the widespread use of smartphones aims to improve consumer connectivity in some way. According to the Internet Barriers Index by McKinsey and Company (2014), which measures connectivity issues internationally, indicated that half of the world's 2 billion inhabitants remain offline. They are from 10 nations that have serious difficulties with each of the four types of informational barriers. In addition, 1.1 billion individuals reside in nations that fit into one of the five groups shown in Figure 1.

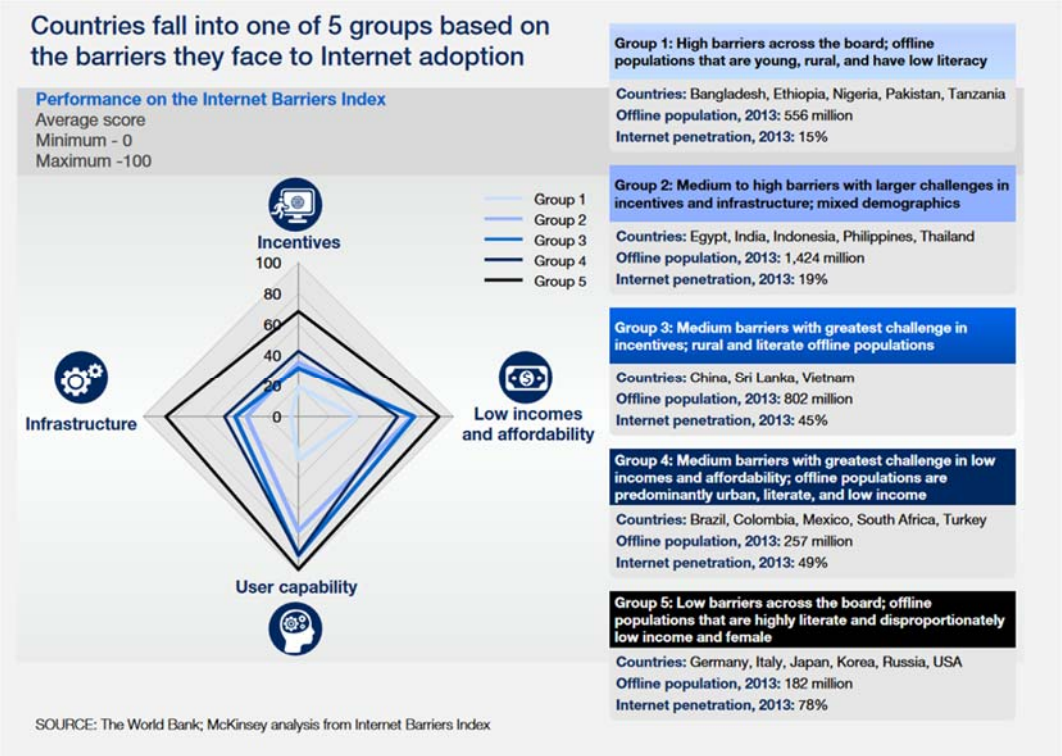

Figure 1: The World Bank Internet Barriers Index
Source: (McKinsey and Company, 2014)

The worldwide 4IR development was accelerated by the COVID-19 phenomenon, which sparked the digital transition. According to Kanza (2020), the 4IR has caused job losses due to COVID-19. Automation of work is predicted by 75% of businesses in South Africa. Digital innovation can also transform rural communities, contribute to job creation, and increase food production. The context for the emergence, ongoing expansion, and concurrent evolution of digital culture was also supplied by the digital transition. Artificial intelligence (AI) as become more significant as the rollout of fibre and 5G internet access.

Problem Statement

Before the Internet, communication in many African countries was difficult. However, this began to improve as digital communications became available and communication got simpler and improve living standards (Aragba-Akpore, 2022). The rapid use of online education has raised concerns about access gaps between rural and urban areas, commonly known as the "digital divide" (Olawale & Mutongoza, 2021). According to Aruleba & Jere (2022), the term "global digital divide" is frequently used to characterise the digital split between the industrialised and developing nations; at the national level, this is known as the urban-rural divide. One of the difficulties that 21st-century civilisation faces is bridging the digital divide between the affluent and the poor (Megwa, 2007).

However, the digital divide affects much more than simply the availability of internet access; it also has a significant impact on how people use the internet and the benefits it provides. Instead of only focusing on growing consumption, the digitisation goal must effectively increase civil societies' resilience by creating a clear legal framework and a defined educational process for the public (Duarte, 2021). Africa has seen several challenges since the end of colonialism, placing them in a challenging condition. The Industrial Revolution, which saw countries in Europe undergo industrialization, social transformation, and technical improvement, was one reason why European nations colonised Africa (Ocheni & Nwankwo, 2012). The aftereffect of colonialism often reappears to remind Africans that they are unable to care for themselves, even though many nations on the continent are no longer ruled by it. However, due to the underdevelopment this brough on Africa it is one of the factors that contributed towards a digital gap. Digital transformation is a driving force for inventive, inclusive, and long-term growth (African Union, 2020).

According to the African Union Commission (2021), many African countries still need to harness the power of digital transformation. Duarte (2021) contends that the issue extends beyond merely the continent's poor internet access to include other fundamental requirements like access to energy, literacy, financial inclusion, and transparency. Socially, Africa is still confused by the inequalities that now exist.

Numerous European countries were drawn to colonise the African continent and make use of its abundant natural riches. Due to the numerous injustices, it encounters, Africa, if it did experience economic progress, rapidly exhausted itself and remained impoverished. Duarte (2021) asserts that strong worldwide demand for Africa's core exports has been the driving force behind the continent's sustained economic expansion throughout the majority of the twenty-first century. It should nevertheless be emphasised that while some African nations may have unemployment rates below the global average, whilst some of them have rates above 15%. While Nigeria's unemployment rate climbed from 27.1% to 33.3% and South Africa's decreased from 33.9% to 32.9%, Tunisia's unemployment rate marginally decreased and is currently at 15.3%.

Country	Last	Previous	Reference	Unit
Tunisia	15.3	16.1	Jun/22	%
Sao Tome and Principe	15.9	15.7	Dec/21	%
Rwanda	18.1	23	Aug/22	%
Libya	19.6	20.1	Dec/21	%
Sudan	19.81	17.7	Dec/21	%
Namibia	21.7	21.4	Dec/21	%
Senegal	22	25.8	Jun/22	%
Gabon	22.3	22	Dec/21	%
Republic of the Congo	23	22.8	Dec/21	%
Botswana	24.5	23.3	Dec/21	%
Lesotho	24.6	24.6	Dec/21	%
Swaziland	25.8	25.5	Dec/21	%
Djibouti	28.4	28.4	Dec/21	%
Angola	30.2	30.8	Jun/22	%
South Africa	32.9	33.9	Sep/22	%
Nigeria	33.3	27.1	Dec/20	%

Table 1: Unemployment Rate in Africa
Adapted from Source: (TRADING ECONOMICS, 2023)

Duarte (2021) also remarks on the excessively simplistic "Africa Growing" narrative, which is centred on the expansion of rising GDP. The reality is that Africa's economic expansion has not produced many significant jobs. African policymakers have held the view that controlling poverty is the only way to achieve "development"; in other words, the pursuit of development results in poverty reduction (Duarte, 2021). Without enough training and financial support, starting a business becomes a box-ticking exercise. Unless enough finance and talent development is conducted then only such enterprises can prosper, starting such businesses without this is bound to fail.

Conceptual framework for digital culture advancement

According to Adom et al. (2016), a theoretical and conceptual framework is a road map that directs and grounds the investigation in its theoretical premises. By utilising two frameworks, generalizability is ensured, and the study findings are more substantial and acceptable to the constructs. Imenda (2014) backs this up, claiming that having two frameworks offers the study a firm foundation and energy. Maslow's Hierarchy of Needs is described in RNspeak (2021), highlights the various structures in the diagram point out people's transitioning processes. Africans and other impoverished people throughout the world either find themselves locked at the level of basic needs or alternate between the two lower levels of safety and security and basic needs. Africans must develop a world-class digital culture and become financially successful in the digital sphere. Umeh (2021) asserts that rather than just embracing

current digital solutions, Africa must be able to create its own that satisfy its demands. Taormina & Gao (2013) assert that a "need" is characterised as a lack of anything important to an organism's (or a person's) existence or well-being. Many Africans continue to experience numerous inequalities, including potentially fatal issues like ethnic violence and food shortages that limit their objectives to simply surviving day to day (Duarte, 2021).

Maslow's Hierarchy of Needs Theory

Regarding the problem statement, while unemployment is a worldwide issue, it is a particular concern within the continent of Africa since it has lagged other continents in the fast development of digital technologies. Even if there is evidence of digital developments in a few African nations, such as those in the Sub-Saharan area of Africa, Figure 2 depicts the three kinds of five levels of demands that have always been present in humankind's development. These levels fit into three categories that will be covered concerning the development of digital culture among Africans.

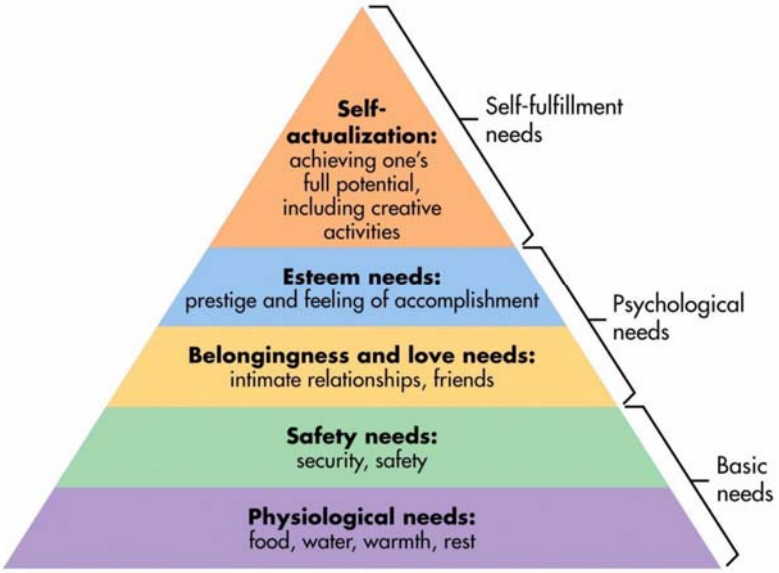

Figure: 2 Maslow's Hierarchy of Needs Theory

Adapted from (Cherry, 2022).

There are two critical levels of fundamental necessities. Since food, drink, warmth, rest, and safety are among the fundamental requirements, that individuals naturally desire, to construct a secure environment for themselves and their belongings. Many Africans have difficulties here and want to make sure that their fundamental requirements are satisfied. These two levels of regions, as indicated in Figure 2, however, tend to become an urgent problem for them to provide for their families if they do not have meaningful jobs. The tendency is to go to the next level, the physiological requirement once these demands are stable and met. This emphasises the necessity for love, intimacy in relationships, and friendship. This urge relates to belonging to a group of people.

Uses and Gratification Theory

As more people connect, either voluntarily or because they have no choice but to exploit the alluring advantages that digital communication has to offer, the use of digital technology is rising. Numerous internet technologies have altered how people interact, do business, and even obtain security services. With the elimination of standing in lengthy lines to conduct transactions, online banking, shopping, and payments have also grown more appealing and effective. By using this invention it has undoubtedly given people more time to spend on other pursuits. Using technology, one may also engage in social contact and obtain information to help them make decisions that could save them time and money, such as when booking a vacation. Users might feel satisfied because of these encounters. Vinney's (2022) critique of the Uses and Gratification Theory Rubin (1993) mentions the following regarding media consumption: Individuals' social and psychological characteristics determine how they use media; therefore, frequent media use has little effect. Furthermore, the rivalry between media and other modes of communication, particularly interpersonal contact, is a reality that people face when deciding what to engage with. This rivalry is more urgent since most media

consumed nowadays is mobile and accessed through technologies such as text messaging, social networks, and apps. Despite this, media messages have little impact on people who regularly consume media (Rubin, 1993).

People use media to fulfil their wants and desires, which are influenced by their own needs and values. To access this material, digital technology is required, and once again, individuals will decide what type of technology is required. The UGT can also shed light on how individuals in rural communities grow in their usage of digital technologies and media. Furthermore, in terms of the digital divide, UGT explains why some individuals in rural regions do not utilise or engage with technology, even though it is available to them. We can identify possible hurdles to adopting new technology and devise methods to overcome them by evaluating the requirements and motivations of different groups.

Regarding Maslow's Hierarchy of Needs and Gratification Theory, they are essential for digital development. Rural residents lack access to essential resources. As a result, satisfying their fundamental physiological requirements should be prioritised to enhance their living situations. Remote delivery of products and services is made easier by digital technology. For example, digital markets may connect farmers with clients, while medical advice and consultations may reach people in deep rural communities. Other engagements, such as social interaction, entertainment, and education, can be met by technology. Rural communities may interact with individuals from all over the world, obtain educational resources, and get entertainment material by using the internet and social media platforms. Therefore, through the application of Maslow's Hierarchy of Needs Theory as well as Uses and Gratification Theory, rural communities in Sub-Saharan Africa can help close digital development gaps. Stakeholders seeking to establish rural communities will recognise that for digital solutions to be accepted, demands must be met since they are fundamental needs and individual motivations.

Literature Review

According to Rheault & Reinhart (2022), the fastest increase in internet usage was in South Africa. In South Africa, the percentage of people who use the internet rose from 52% to 66% in 2021. Adult internet users increased by 10 points in Nigeria, the country with the largest economy and population in the subcontinent. Currently, Miniwatts Marketing Group (2022) indicates that Africa has grown 0.5%; this is based on Internet usage and World Population Statistics estimates for July 31, 2022. The growth of internet users was 127 716 995, which is rather low. This means that many African regions are still either very poor or without connectivity. According to Galal (2022), mobile devices will account for more than 73% of web activity on the continent in 2022. Individuals totaling 28% of SSA's population used their mobile phones to connect to the internet. Furthermore, 19% of people in SSA lived in a place with no mobile network. According to Aragba-Akpore (2022), there will be 495 million subscribers to mobile services in SSA by the end of 2020. This represented 46% of the region's population, which was an increase of almost 20 million in 2019. It is important to note that, more than 40% of the population was under the age of 15. These young mobile phone consumers will remain the primary source of growth for the foreseeable future. The following Figure 2 provides the GSM Association's (GSMA) 2019 comparison of network coverage scores for Kenya, Nigeria, South Africa, and SSA as a region.

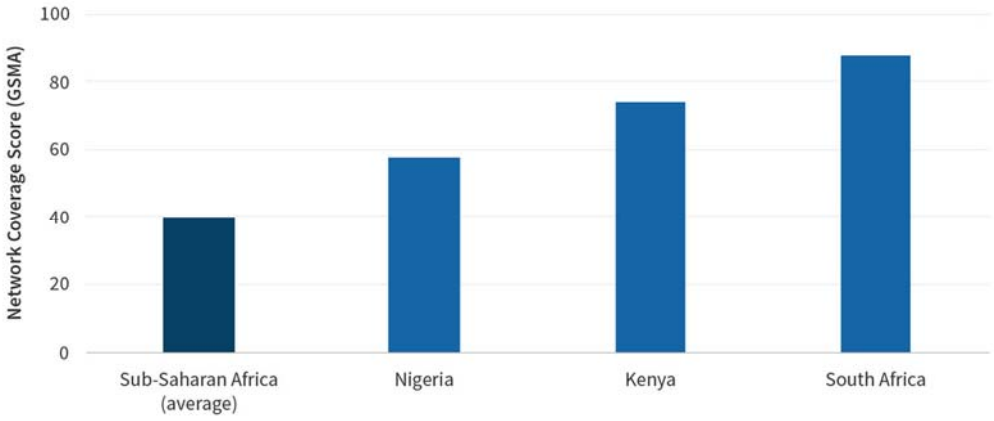

Figure 2: Network coverage in Sub-Saharan African

Adapted from (Devermont & Harris, 2021)

The United Nations Economic Commission for Africa (UNECA) highlights that digital innovation and entrepreneurship are on the rise in Africa, with 400 digital hubs in 93 cities, including over 130 new hubs opening in

the last two years. Collectively, they are generating more than $1.1 billion. While this is promising, a digital Africa could be more productive; however, not all of Africa is digital. According to Duarte (2021), digitalization is not widespread in Africa except for Rwanda, and only 28% of Africans use the internet. This digital divide is preventing the continent from taking full advantage of digital technology's ability to mitigate some of the worst effects of the pandemic. The plan for Africa is to become part of the networked world, and since digital technologies will be critical [crucial] for Africa to attain sustainable development goals, they must address connectivity issues on the continent (UNECA, 2020). SSA has seen significant progress in the use of mobile money and digital payments. According to Devermont & Harris (2021), the digital transformation is clear in SSA; students are being exposed to learning code and technological innovation using drones to deliver medical supplies. Moreover, the increased use of mobile [online]payments, which redefined traditional banking, resulted in the uptake of digital banking. Technology innovations have changed many sectors, such as the fintech sector, where the Mpesa mobile money solution brought the unbanked and eliminated the need for physical branches (Doroba, Mbanugo, & Edosio, 2022). According to Blumberg (2021), the pandemic has further accelerated the adoption of digital payments as people look for contactless ways to transact. These innovations have helped provide banking solutions for many rural communities.

Figure 2 illustrates Africa's three most digitally advanced SSA countries in the region—Kenya, Nigeria, and South Africa. These countries have great internet penetration, and it is projected that these top three markets will have more smartphone connections. Table 1 lists various digital advancements that are making a major impact in SSA:

Kenya	With a vibrant and growing digital environment, Kenya is a regional leader in information and communications technology (ICT) innovation. Between 2014 and 2019, mobile internet penetration, according to the GSMA, nearly doubled. 2019 saw a 12 percent increase in mobile phone subscribers over the total population. The telecom colossus Safaricom is the main force behind Kenya's M-Pesa money transfer technology, which has boosted the percentage of Kenyan adults with access to at least basic financial services from 26 to 83 in just over 15 years. Kenya has also led the continent in financial inclusion.
Nigeria	An ICT powerhouse and the region's most populous nation. The government has invested in high-speed internet via five undersea cables with international connections, cutting bandwidth charges and boosting network capacity. The sector contributes more than 14% of the nation's GDP. Nigeria will have 154 million smartphone connections in 2025, more than South Africa and Kenya combined, according to the GSMA, making it the country with the most smartphone connections. Most bitcoin dealers on the continent are Nigerians, despite the country's reputation as a haven for corruption. In terms of global bitcoin commerce in 2020, Nigeria came in third after the US and Russia.
South Africa	South Africa is home to a wide variety of tech start-ups that address issues in the health, transportation, and education sectors. It also boasts a robust digital entrepreneurship environment. The country represents 49% (a plurality) of the region's cellular Internet of Things (IoT) connections and is the only SSA state to have delivered commercial 5G services. Major fibre optic network advancements in South Africa have led to a considerable drop in bandwidth costs. However, a large portion of this development has taken place in urban areas, creating a significant digital divide.

Table 2 Digital advancements that are making a major impact in Sub-Saharan Africa
Adapted from (Devermont & Harris, 2021)

Table 2 shows some major digital developments; however, it's crucial to highlight that these are primarily located in metropolitan areas. Due to inadequate internet access and a lack of infrastructure, rural communities are not included in this.

Three significant projects, following Liu (2019), represents this openness to change in Africa:

- The establishment of the African Continental Free Trade Area (AfCFTA), a single market with a combined GDP of over $3.4 trillion and a population of over one billion,
- The World Economic Forum (WEF) has established a new centre in South Africa for discussion and collaboration on the possibilities and challenges brought on by cutting-edge technology.
- Africa has 13 percent more entrepreneurship in its early stages than the global average, and the WEF's Africa Growth Platform strives to support businesses in growing and competing globally.

Many young Africans left rural areas in quest of a better life. Rural areas must be included in the rollout of digital infrastructure. There is no question that this will give young people a chance to stay while also giving others a chance to return and take part in digital activities. According to Schwab (2021), the people who are best suited to achieve this are young. The Global Shapers Community of the World Economic Forum, which focuses on people between the ages of 20 and 30, has been actively working on confronting issues in more than 450 locations worldwide to discover workable solutions for the past ten years. These vibrant youngsters have the most original concepts for building a better future for society. According to Duarte (2021), 600 technological centres in Africa support start-up businesses, and this has resulted in the largest change so far coming from the bottom up. Three have received worldwide recognition thus far: Lagos, Nigeria; Nairobi, Kenya; and Cape Town, South Africa. These technological centres have been led by the private sector, and more than a thousand start-ups have passed through these incubators. It is energising for young people to put aside their difficulties and accept that technological advancement is the route to self-employment (Duarte, 2021). Therefore, digital hubs must also be built in rural communities that can enable this, given this good feature among young people.

Galal (2022) claims that social media usage in Africa has steadily increased, reaching 384 million users as of that year. In comparison to other areas, northern and southern Africa are said to use social media more often. Additionally, as of February 2022, 56% of people in Northern Africa and 45% in Southern Africa used social media (Galal, 2022). Only 8% of Central Africa's population used it. It's interesting to note that while Facebook was more popular in Egypt and Morocco, WhatsApp was more widely used in Ghana, Kenya, Nigeria, and South Africa. This demonstrates that there is a desire, and as connection grows and improves, more Africans will be able to participate in digital innovation.

A Digital Africa in the pandemic phase

Setting aside the negative aspects this virus brought upon the global population, there have been many notable advancements that were provided to humankind. Such is the opportunity for the African continent to innovate and go digital. Many African countries are rebuilding their economies, and they will have to not just focus on repairing, but they will have to remake themselves by adopting digital technology (Duarte, 2021). The "COVID-19 crisis," according to McKinsey and Company (2020), holds the germs of a comprehensive reimagining of Africa's economic structure, service delivery methods, and social contract. Digitalization, market consolidation, and regional collaboration are all being accelerated by the crisis.

The issues highlighted by COVID-19 are being mitigated by the growth of ICT activities and the responsiveness of young Africans to digital technology (Duarte, 2021). Governments must become more capable and equally invested in digitisation in cooperation with civil society and the business sector if Africa is to see revolutionary growth. It is crucial to recognise that the socioeconomic and digital divides in Africa are connected and impacted by one another. Therefore, to create policies that would support structural transformation, authorities must give digitization a high priority (Duarte, 2021).

The pandemic's profound upheavals have created chances to reshape society and industry. During the lockdown, a lot of shops and restaurants began making plans, investing more money, and offering delivery services to their consumers. More merchants are using this type of service, and more are embracing it, as we can see. Deloitte (2015) asserts that Africa is still a developing region in the digital sphere with a bright future. Additionally, according to Deloitte (2015), the eCommerce industry in Africa is being used by merchants, and it is anticipated to reach an estimated value of US$50 billion by 2018. Saleh (2022) claims that mobile e-commerce has significantly increased online buying. Different forms of digital payments quickly expanded throughout African nations. Credit card use is still very infrequent, and most internet purchasers prefer to pay using mobile money or cash-on-delivery. Africa cannot go back to the pre-pandemic era as it recovers from the COVID-19 disturbances since digital activity is accelerating and will soon be challenged. The use of digital technology is Africa's means of overcoming a plethora of development difficulties, including poverty, health, productivity, competitiveness, economic diversification, food security, climate change, and governance. Africa must comprehend the necessity for innovation (Duarte, 2021). Additionally, according to Duarte (2021), Africa has transformed over the last five years and must be open to improving rather than only rebuilding. This crucial construction must be done with intention.

Policy for digital implementation

The only way for successful digital development to materialise is for the government to assure balanced policy execution and remove obstacles to success. According to Boakye (2021), Internet governance challenges in Africa hinder market access, growth, and innovation. Furthermore, according to Boakye (2021), there is evidence that laws governing digital rights and data protection exist to safeguard the rights and information of African citizens; however,

regulatory inconsistencies and obstacles to their effective enforcement across African nations continue to exist. This keeps Africa in a state of stagnant digital innovation. Digital developments have been made in the business world. The COVID-19 shutdown has made it possible for more digital developments, and business innovations are now more apparent in how they operate. However, according to Duarte (2021), policymakers must prioritise regulatory frameworks, infrastructure, digital skills, and financial inclusion to achieve digital solutions. As a result of this innovation, policymakers must also make sure that these regulations handle the security of personal data and cybercrime, which may take many different forms. According to Duarte (2021), with the widespread acceptance of digital technologies, politicians must face the complicated legal and ethical implications of technology employed in and by society. In addition, policymakers must take privacy, data, and tax evasion into consideration. Africa must reduce and safeguard its cyber vulnerabilities while defending its citizens' rights and interests.

According to Boakye (2021), the following are new policies that may be found throughout Africa and are being developed and discussed: Digital Rights, Digital Taxes, Data Protection and Privacy, Cybersecurity, Fintech Regulation, Start-Ups and Innovation, and the Digital Single Market (DSM) in Africa. These regulations are crucial for a digital Africa and its populace. These are some of the most recent developments in the important discussions surrounding internet policy in Africa, (Boakye, 2021). These emphasis areas are being established in already-existing sectors where governments all around Africa are searching for collaborations to help build an infrastructure that will speed up the adoption of digital technology. According to Agbata (2021), internet activity is growing exponentially, which creates the potential for the malevolent use of digital technology. Cyberattacks are on the rise in Africa due to increased internet activity, and simple targets are frequently the victims of attacks the requirement to watch out for such online fraud. Digital technology cannot be ignored, but while using it, one must strike a balance between innovation, regulation, and ethical use of technology.

The Relevance of digital skills for Africa's digital culture

1. Media literacy	critically read and creatively produce academic and professional communication in a range of media.
2. Communication and collaboration	Participate in digital networks for learning and research.
3. Career and identity management	Manage your digital reputation and online identity.
4. ICT literacy	Adopt, adapt, and use digital devices, applications, and services.
5. Learning skills	Study and learn effectively in technology-rich environments, both formal and informal.
6. Digital Scholarship	Participate in emerging academic, professional, and research practices that depend on digital systems.
7. Information literacy	Find, interpret, evaluate, manage and share information

Table: 3 The seven elements of digital literacy

Adapted from (JISC, 2014)

Developing a digital culture requires having strong digital abilities. The demographics of Africa vary, and other studies, including those in education, have found that individuals may be divided into many categories depending on how they utilise digital technology. Prensky (2001a) stated that children born now are referred to as "digital natives," while "digital learners" is a more recent phrase that is used, and "digital strangers" refers to children who have not yet had enough exposure to digital technology. Czerniewicz & Brown (2013). These are students that can easily adapt and become completely digitally proficient when they are paired with their digital cohort. The previous generation is made up of individuals who have embraced technology and integrated it into their daily lives; these individuals are known as "digital immigrants" (Prensky, 2001b). "Digital aliens" refers to the much older generation that has become remote and uninterested in digital technologies. People who have been impacted by cutting-edge technology, such as digital communication, think, learn, and perceive things differently than people in prior generations. Prensky, who collaborated with several students and lecturers, expanded his "digital native" metaphor to include "digital knowledge," which is consistent with the need for educational change (Prensky, 2001a). While older adults may not utilise all forms of digital technology, it is important to highlight that they are increasingly using social media to stay in touch with their loved ones. Even if the number is small, it is nevertheless promising. Most individuals must benefit from and get training in digital skills. To be more relevant to the digital learner, the teaching methodology must

guarantee that ICTs are incorporated into instruction. For online consumption, curriculum design and presentation must be digitally altered (Naidoo, 2019). This will provide a learning atmosphere that is conducive to technology.

Africa's Digital Technology Changing Cultural Landscape in post-pandemic PHASE

The amazing rate of change in Africa has been altered by digital advancements, according to Pew Research (2015). A little more than ten years ago, as mobile usage soared, prices for mobile phones and broadband connectivity fell, making it more affordable for thousands more Africans to access the internet. The growth of digital communication has created various opportunities for the digital sharing and consumption of huge amounts of information (Naidoo, 2021). In nations where usage is widespread, such as South Africa, Egypt, and Nigeria, the use of mobile banking, the interaction of social media, news access, medical apps, and internet access through mobile devices have brought about seamless information. Naidoo & Israel (2021a) claim that social media and new technology system usage are increasing in South Africa and that discussions about technological innovation and the need for new digital skills for all sectors are high on the agenda. Additionally, ICT platforms have started encouraging direct sales, online shopping, advertising, marketing, hiring, and information exchange via online platforms. Many retail businesses transformed their operations during COVID-19 by adopting digital technology innovation and offering their customers delivery services, something they had never done before. In the post-pandemic era, this innovation in their business is gradually gathering traction. Naidoo and Israel (2021b) assert that the work market is being disrupted and that job contraction has been going on for a while. Jobs are lost because of these disruptions, but new ones are also generated. Humanity has evolved with each era, and in the digital age, it is crucial to connect and seize new opportunities brought about by technological advancement. Additionally, the growing digital revolution must make current inequities worse. Reiter (2020) estimates that the gender disparity in SSA's access to digital technology is already 34%. A rising amount of data points to the fact that the crisis will disproportionately affect women's lives, including the possibility that many girls will permanently leave school during or following lockdowns. If we do not address these disparities, gender-based digital growth in Africa will continue.

The Influence of Artificial Intelligence in Sub-Saharan Africa

"None of the SSA countries are anticipated to gain from AI and other coming technologies" (Butcher, 2021). All 29 nations are being impacted by AI, regardless of location. The consequences of the first three industrial revolutions are still being felt in many African nations. Access to power, mechanisation, and automation are a few of these implications. This involves issues with the mechanisation of manufacturing, the accessibility of power, and industrial automation. Thus, Africa is unprepared for the entire range of 4IR's capabilities (Butcher, 2021). The COVID-19 pandemic increased public awareness of the 4IR, which has affected several industries. This led to a lot of companies, including academic institutions, to embrace the phenomenon without having any idea what would happen. Since many of them were insufficient or unsuitable for their intended application, the rush to purchase new digital gadgets and ICT advancements resulted in a lot of unnecessary money. The digital disruptions continue, and AI has emerged as a new digital disruptor as Africa tries to catch up.

Although artificial intelligence (AI) has been in use for a while, it is growing more interactive and will continue to be increasingly involved in a variety of industries. AI is no longer a machine that requires maintenance to keep it operating at its best. So, as AI becomes more prevalent, fewer jobs will exist. Kelly (n.d.) estimates that there are a lot of immigrants and refugees—65 million of them are homeless worldwide. How will they regain stability and find housing? According to some reports, AI would result in the displacement of millions of workers from their occupations throughout the world (Kelly, n.d.). Social media and AI are also merging, and BOTS and people are interacting with each other more often. One can no longer distinguish between the two as they become seamless. This will result in more employment being lost as AI disrupts several industries. However, AI also brings many other possibilities that can create job opportunities. Rural Africa may benefit from digital technology by boosting economic growth and access to services.

In rural South Africa, mobile technology is becoming increasingly vital. Access to information, communication, and services has improved. Efforts to enhance rural internet access and mobile technology. Rural South Africans' livelihoods have been enhanced because of digital progress. AI is now accessible via mobile phones, making it more user-friendly, and mobile phones are used for financial transactions.

Mobile Banking for Rural Communities

Many people in Africa in general did not have access to banking facilities; however, mobile technology has brought about the possibility of banking innovation, and payment solutions have increased the accessibility of financial services to rural communities, promoting financial inclusion. The mPesa mobile banking innovation made it possible

for the unbanked to have banking accounts and transact in both urban and mostly rural communities (Doroba, Mbanugo & Edosio, 2022). According to Akinyemi and Mushunje (2020), for financial inclusion, mobile money technology must be used in remote areas of Africa where traditional banking services are completely absent. Therefore, mobile money transactions transformed rural African communities. Mobile users can send and receive money without needing traditional banking access. This has improved economic growth and assisted in reducing poverty in rural communities. Akinyemi & Mushunje (2020) aver that the adoption of digital technologies in rural communities is low and advise mobile money carriers to target youthful, educated, and financially stable rural residents in their marketing campaigns to promote their acceptance among the unbanked.

Mobile technology is becoming increasingly important in rural South Africa. The availability of information, communication, and services has improved. Initiatives to improve rural internet connections and mobile technologies will promote the digital revolution and can improve the livelihoods of rural South Africans.

Digital Innovations in rural communities

Technology has enabled the implementation of digital solutions in rural communities. Digital technology has enabled digital transformation in the agricultural and food industries. Digital technology advancements can significantly assist rural Africa by providing digital solutions in the farming sector (Goedde, Ménard, & Revellat, 2020). According to Aker & Fafchamps (2015), information technology and communication access increased, which may have also enhanced agricultural market efficiency for consumer markets. Smallholder farmers' productivity and profitability have grown because of the digitization of agricultural techniques and the use of precision agriculture approaches, which have enhanced output and decreased waste. Moreover, according to Aker & Fafchamps (2015), internet access and mobile devices have made rural development possible. Developing digital skills through eLearning and telemedicine facilitates access to education and healthcare services has increased. In recent years, technological improvements have enabled the implementation of a variety of digital solutions in rural communities originating from digital technology and, hence, the agricultural and food industries' digital transformation. Digital technology has empowered rural people, bridging the urban-rural divide (Trendov, Varas, & Zeng, 2019). According to IT News Africa (2018), simplicity and business innovation are more important than ever in the digital economy.

Conclusions

Aragba-Akpore (2022) asserts that the internet levelled the playing field by facilitating business-to-business, business-to-commerce, and person-to-person communication. Despite this amazing technology, not every African has access to the internet, and many live in isolation. The development of digital technology access in rural areas of the continent presents both considerable potential and constraints. The development of digital infrastructure, especially in the areas of internet connectivity and mobile technology, has the potential to benefit a variety of businesses, from the agricultural to the medical sectors.

Due to a lack of investment in digital infrastructure, poor internet connectivity, and a lack of digital literacy and skills among rural communities, access to digital technologies is restricted in rural areas, according to McKinsey and Company (2014). To fully realise the potential of digital technologies in rural Africa, increased investment in digital infrastructure and more focused programmes to improve digital literacy and skills among rural people are needed (JISC, 2014). Electricity shortages and unemployment are high, and many youths leave rural communities. Therefore, it is important to repurpose farmland into spaces for renewable energy plants.

Technology-enabled distance learning options can give people in rural locations access to quality education. Additionally, more work needs to be done to guarantee that rural communities, especially those that are poor, have access to and can afford digital technologies. Rural populations can access information on topics like agriculture, weather, and health through technology (Liu, 2019). Rural Africa stands to greatly benefit from digital growth, but doing so will require coordinated efforts from the public and private sectors as well as development organisations. With the right investments and initiatives, digital technology could boost economic growth, enhance healthcare results, and raise social and political engagement in rural communities across the continent. Digital technology can also be used for practical activities like job searching and online banking, shopping, delivery or courier services.

Recommendations

For digital development programmes to be successful, it is crucial to evaluate the needs of rural Africa. Analysis needs to help identify development opportunities and limitations in the digital infrastructure. Utilising participatory methods will ensure respect and local relevance. Researchers should look toward practical, cost-effective, and easy-to-maintain innovative rural technology. To establish effective initiatives, it is vital to evaluate current projects and models to draw

lessons from their achievements, challenges, and flaws. A top focus for sustainability must be the creation of long-term procedures, training programmes, maintenance and support systems, and business models. Moreover, establishing the following could provide rural communities with stability:

- The establishment of solar plants.
- Biogas plants.
- Wind farms.
- Produced power could be fed back into the national grid.
- Job creation.
- Improving housing, infrustructures

Public-private partnerships are crucial for the success of digital development in rural Africa. The implementation of the recommendations could stabilise the exodus of youth, and it also provides the opportunity for the use of innovative technologies to increase agricultural output. Moreover, rural communities could have access to stable electricity, which could allow the opportunity to increase literacy levels and online learning and internet access for local schools.

In future research, researchers should investigate how new technologies like artificial intelligence and the Internet of Things might be used in rural Africa.

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