

Integrate Digital Economy for Inclusive Development and Rural Livelihood in Nigeria

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ABSTRACT

Introduction: The growth of digital economy promotes inclusive development and improves rural livelihoods throughout Africa. Rural communities can benefit from better access to markets, financial services, healthcare, education, and government initiatives by utilising digital technologies, which will promote resilience and socioeconomic inclusion.

Objectives: To address the historical disparities between urban and rural dwellers, this study examines the impact of digital tools, including digital identification systems, e-commerce, e-agriculture, and e-banking services. It showcases effective models like digital agricultural platforms, mobile money systems and e-learning programmes. It also assesses enduring challenges to digital inclusion, such as lack of local content, digital illiteracy, poor infrastructure, and policy gaps.

Methods: This study employs a descriptive research design to investigate the multidimensional effects of digital tools on the livelihoods of rural populations, utilising secondary data from existing literature to analyse the socioeconomic indicators and digital integration dimensions for rural livelihoods. A thematic approach was employed to discuss the degree of transformations in e-agriculture platforms, e-education, and mobile money systems in the Nigerian rural communities.

Results: The study revealed the necessity of deliberate approaches to create rural digital ecosystems that combine funding for local innovation, infrastructure, and education. It also revealed the importance of incorporating rural entrepreneurship and digital literacy into the development agenda. The study suggests policy ideas on how the Nigerian government can unleash the strengths of the rural populace and create more sustainable and digitally empowered societies by coordinating digital transformation with inclusive development goals.

Conclusions: The study concludes that high usage of digital tools for economic purposes will promote inclusive growth and enable sustainable development.

Keywords: Digital economy, rural development, rural revitalization, rural livelihood, sustainable development.

INTRODUCTION

The alarming rate of digitalisation has been a great privilege in addressing contemporary socio-economic inequities across African rural and urban communities. It serves as a new strategy for sustainable growth towards enhancing community livelihoods. Supporting this essential ability is a discretionary application of the digital technologies that can navigate the geographical boundaries and provide the underserved groups with access to much-needed services and financial support. The digital identity has the potential to empower people in the country because, by using it, people can enter the market, streamline financial operations, and access helpful information and support (Wu et al., 2023). It is not only a strategy of developing resistance among vulnerable groups but also a method to facilitate socioeconomic integration since the downtrodden, vulnerable will be included in a larger digital society (Chowdhury et al., 2023). The Nigerian socio-economic imbalance resulting from the digital gap between rural and urban communities is an indication for drastic policy formulation on digital literacy, as well as desirable investment in information and communication technology infrastructure in rural areas across the country.

Ostensibly, the strategic use of digital technologies may be the basis for a key shift towards more equal development, particularly in strengthening rural-urban connectivity and in offering dynamic economic and social transformation to the previously neglected territories (Harriss-White & Heyer, 2009). The widespread political and administrative corruption, as well as technical inefficiencies, characterising the power sector in Nigeria have negatively affected the realisation of the digital economy and exacerbated the growth of small and medium enterprises, especially in rural areas, thereby deteriorating socio-economic development. These concerns necessitate an effort to address the energy issue and develop alternative energy sources that can provide a reliable power supply, which is essential for the efficient use of digital tools and enhancing digital literacy. The absence of internet facilities in most of Nigeria's rural communities and the insufficient provision of adequate digital technologies in those regions add to the challenge of comprehensive digitalization (Rangasubramanian, 2021).

This paper, therefore, examines how the set measures, like encouraging digital literacy and promoting accessible digital infrastructure, will help in reducing these barriers and unleashing the full potential of the digital economy to enhance the state of rural development. It also seeks to establish how rural entrepreneurship and digital literacy can be integrated into the development paradigm in furtherance towards resilient and socio-economically inclusive societies. It is hoped that this study will positively contribute when it comes to policymakers establishing coherent policy agendas that focus on aligning inclusive development and digital transformation, resulting in a bid to achieve the when-in-place potential of the rural populace. This kind of detailed analysis, as posited by Ogbeide-Osaretin & Ebhote (2020), will assist in drawing more directions on how digital technology can be successfully employed in the quest for sustainable and equitable development in the rural environment of Africa, particularly in Nigeria. This entails making sure that there is a closure of the digital divide, strengthening digital justice and equality, and rural connectivity so that such populations are not marginalized by the digital revolution (Singh and 'Ru, 2023; Onayinka, 2011).

This study is essential, as it provides a locally specific starting point into the digital disparities and their prevalence in Nigeria that are especially prominent in the rural areas and then proposes policy-related reactive solutions that can facilitate comprehensively inclusive digital ecosystems. One of the main aims of this study is to fill the knowledge gap on successful approaches to the implementation of digital tools in resource-limited rural contexts and, thus, shed light on the routes to scalable and sustainable initiatives of digital inclusion (Runardotter et al., 2020).

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Digital Technology Facilities and Economic Opportunities in Nigeria's Rural Communities

Nigeria has witnessed a gradual change in the rural communities with the major digital technology services that have opened up various economic opportunities. The digital technologies available to rural populations, such as mobile phones, internet connectivity and digital platforms, provide them with better information and agricultural improvements, healthcare, financial services and markets, which are essential to economic growth and reduction of poverty. A major example of digital services in rural Nigeria is the program of the Nigerian government called Rural Information Technology Centres (RITCs). Such centres offer access to digital devices and digital literacy training, which overcome the key obstacles to infrastructure, low connectivity, and low digital competence among rural populations (Adeleke and Ogundokun, 2020; NITDA, 2022). Mobile phones are unique assets as they have allowed accessibility to mobile banking, e-commerce and agricultural information, which are very useful to the farmers and other entrepreneurs. Nevertheless, issues like the high cost of equipment and the insufficient coverage of the network remain, and it is necessary to continue to pay attention to the policy (Akinwale et al., 2020; Ojebisi et al., 2019).

On the economic front, digital technologies have triggered a change in the relationship in the agricultural sector, which is still the main economic activity of the majority of Nigerians living in rural regions. Weather forecasting, crop management, and market price apps can also help farmers make informed decisions based on their data and thus enhance their productivity and reduce losses (Farmonaut, 2025). The digital platforms also enable farmers to reach buyers directly without intermediaries, which boosts the income of the farmers. This exposure to real-time markets and information can be of great benefit to agricultural productivity, which is a very important factor in the sustainability of the rural economy (Nnanna et al., 2025). Other than agriculture, e-commerce and entrepreneurship were provoked by digital technology in rural areas. Digital markets also help rural entrepreneurs expand their

influence beyond the local scope to national and international markets to create businesses and earn income (Ojebisi et al., 2019). Financial inclusion enabled by mobile banking and digital payments to enable rural populations to safely save money, receive credit, and transact without the presence of physical banks complements this expansion of the digital economy (Akinwale et al., 2020).

In addition, digital technologies help to build skills and create employment, offering digital literacy training and other vocational training to equip rural inhabitants with future jobs in the developing sphere of ICT. Such initiatives contribute to the creation of local skills in the field of managing and maintaining digital infrastructure, which also contributes to community growth (Adeleke and Ogundokun, 2020). Even though some strides have been made, rural Nigeria continues to experience such challenges as lack of power, internet services, cultural beliefs, and digital devices are expensive. The key to ensuring the full realization of the economic potential of digital technologies in rural communities is their combination with more infrastructure, technologies subsidized by the government, and inclusive digital literacy training (Ojebisi et al., 2019; Adeleke and Ogundokun, 2020). Therefore, the services play significant roles in removing the rural-urban difference and enhancing sustainable rural development in Nigeria (Adeleke and Ogundokun, 2020; Nnanna et al., 2025).

The Impact of Digital Economy on Rural Entrepreneurship

Digital technology has greatly revolutionized rural entrepreneurship in Nigeria, with new opportunities and challenges to business owners beyond the urban centres. The high population of entrepreneurial people in Nigeria also leads to a huge potential of digital tools to transform economic development in rural regions by broadening market reach, increasing operational effectiveness and offering new ways of financing.

Improved communication is one of the greatest effects of digital technology in rural Nigeria. Basic feature phones and other mobile phones enable entrepreneurs to make arrangements with their suppliers and customers without using travel that is expensive and time-consuming. This improved connectivity reduces operational costs and saves time for rural business owners. Besides, mobile financial services have transformed the way money is handled by rural entrepreneurs. Mobile payment platforms, electronic wallets, and microloans have already brought financial inclusion to rural settings that have long been underserved by formal banks, allowing businesses to get payments in real time, develop credit histories, and tap into working capital (Iheji et al., 2025).

The emergence of smartphones and growing internet access gives rural entrepreneurs a chance to have advanced business tools. Simple accounting and inventory management software can be used to allow entrepreneurs to trace funds and availability of online markets through e-commerce systems, enabling the small rural enterprise to avoid intermediaries and offer their products directly to consumers in urban and international markets. This direct market access enhances profit margins and fosters stronger customer relationships. Moreover, social media can be used in a very significant way in marketing, customer relations, and network expansion of the rural entrepreneurs (Iheji et al., 2025).

Digital literacy and capacity building are some of the elements that would determine the effectiveness of digital technology on rural entrepreneurship. As connectivity opens opportunities, a large number of rural entrepreneurs have problems because of a lack of digital literacy and skills. Online learning sites, mobile tutorials, and peer knowledge networks can create a bridging knowledge gap, which facilitates the acquisition of business, technical and marketing knowledge by rural entrepreneurs to grow their businesses. The government and non-profit organizations that help in digital literacy in rural areas assist in empowering entrepreneurs with the potential to utilize technology to their own advantage (Tengeh et al., 2023).

Despite these positive effects, entrepreneurs in rural Nigeria face numerous challenges. Digital benefits are not fully realised due to infrastructure shortages, including unreliable electricity and inadequate high-speed internet connections. E-commerce growth is also subject to logistical challenges, including delays in delivery and a narrow selection of payment opportunities. Moreover, the problem of digital security and the low level of consumer confidence in e-commerce operations prevent the further adoption of digital trade in the countryside (World Bank, 2024).

Overall, there is a growing trend of rural entrepreneurship in Nigeria being transformed by the digital revolution and empowered as a more inclusive, innovative and efficient place to do business. Digital technologies provide small businesses in rural areas with a chance to engage more successfully in the economy at large, gain access to finance and new markets, and be more productive. To ensure that the socioeconomic benefits of digital technology are maximized for rural businesspersons in Nigeria and lead to long-term rural development, it will be necessary to address infrastructure, literacy and regulatory issues (Tengeh et al., 2023; World Bank, 2024).

Effect of digital integration on rural communities' livelihoods in Nigeria

The rural Nigerian communities have initiated digital integration, which has begun to dramatically boost the livelihoods of rural communities and, more so, the women, farmers and the youth members, who are economically marginalized and have poor access to resources. With its specific digital technologies, financial technology, education, and online shopping solutions, a large number of rural residents are breaking the barriers to economic inclusion that existed long ago.

Women entrepreneurs in some communities within the rural areas in Nigeria have used mobile technology to expand micro-businesses. Mobile finance and payment systems enable women to make transactions safely without necessarily walking to the far-off banks. To illustrate this, women in rural Ogun State are using mobile money services to get payments and get access to microloans to grow their agribusinesses and sales of artisanal crafts. This has made them more autonomous, enhanced household earnings, and influenced their communities, as a result of this access to digital financial services (Iheji et al., 2025).

The rural farmers in the northern states have experienced digital integration in terms of digital advisory services and markets. Mobile farm applications can deliver real-time weather patterns, disease diagnosis of crops, and optimal farming techniques, increasing harvests and lessening the loss. In addition, digital platforms help farmers to reach buyers in the urban centres, bypassing the exploitative middlemen. An example is farmers in Kano State selling agricultural products across the country via smartphones to agricultural e-marketplaces. This direct channel of the market streamlines the price, expands coverage and stabilizes revenue (Tengeh et al., 2023).

The rural youth population in Nigeria is becoming more and more involved in digital entrepreneurship due to the emergence of the digital skills training centres promoted by government and non-governmental organizations. These centres offer training in digital marketing, coding, e-commerce management and digital content creation. Those who were trained in such centres in Enugu State have established online businesses and freelance jobs, which have decreased the unemployment of youths and enhanced innovation in the area. Solar-powered community-owned ICT centres have increased the digital connectivity to remote youth so that they can be engaged in the digital economy regardless of the infrastructural barriers (World Bank, 2024).

Among the interesting grassroots remedies has been the setting up of solar-powered digital hubs and community internet access points. They are training facilities and linking points that enable women, farmers and the young to get online resources, state services and computer-based tools which are essential in the expansion of businesses. As an illustration, the peri-urban and rural periphery of Lagos State has witnessed the establishment of such community ICT hubs, which have enabled them to grow in the areas of digital literacy and entrepreneurship skills, leading to a rise in digital transaction volumes and business start-ups (World Bank, 2024).

Another significant role is the utilization of social media platforms. Women cooperatives have WhatsApp groups, via which they organize their sales, market information and collectively negotiate better prices. Young people in the rural areas are using Instagram and Facebook to market locally produced products to wider markets, creating other lines of income. Through these platforms, marketing expenses have been significantly reduced, and rural entrepreneurs have been able to participate in more digital value chains (Tengeh et al., 2023).

Thus, the digital inclusion of rural Nigerian communities is improving livelihoods by enabling women with financial means, supporting farmers with knowledge and access to markets, and preparing youth with digital opportunities to become entrepreneurs. The efforts help in inclusive rural development, poverty reduction, and diversification of the economy.

Effective models of digital integration for rural livelihoods towards sustainable development

Digital agricultural platforms, mobile money systems, and e-learning programs are some of the effective models of improving rural livelihoods with the use of digital solutions in Nigeria. These models will ensure that the rural populations are dealt with uniquely due to aspects of low access to markets, lack of financial access, inadequate education and thus inclusive economic development and empowerment.

One of the most effective models that assists the Nigerian smallholder farmers is the digital agricultural platforms. An example of how an integrated, multi-party digital ecosystem can change agrifood value chains is the Nigeria Agri-Innovation and Digital Agriculture Platform (NIDAP), a government and FAO initiative. The platform enhances market access, resource utilization, and post-harvest loss through the use of data analytics, smart farming methods, and mobile solutions, connecting farmers, input suppliers, buyers, researchers, and other participants to address data analytics needs. The services of real-time weather prediction, pests and disease diagnostics, precise irrigation, and AI-based advisory services allow farmers to make informed decisions that can enhance productivity and resilience to climate change (FG & FAO, 2025). Also, systems to monitor crops via satellites and AI-based market intelligence are empowering farmers in their endeavours as they enhance crop control and direct access to buyers, which increases profits (Farmonaut, 2025).

Another vital digital model, which has transformed financial inclusion and rural livelihoods in Nigeria, is mobile money systems. Most rural residents, women entrepreneurs, and small-scale farmers are usually deprived of formal banking services. Mobile money platforms provide affordable, secure and accessible financial services like payments, savings, microloans and insurance. These services allow users to circumvent the physical banking infrastructure limits and be able to observe cashless transactions in their communities. Women cooperatives use mobile payments to save and lend efficiently in groups, and to obtain credit, and farmers depend on mobile financial services to invest in good seeds and inputs and to insure against weather. This increased access to finance increases liquidity, business expansion, and household well-being (Theji et al., 2025).

E-learning programs that cater to rural people complement these models by filling the gap in knowledge and skills that are important in the use of digital tools. DAES is a Digital Agricultural Extension Service that offers farmers scalable, personalized advisory services through smartphone applications, USSD text-based messaging, and audio messages, in local languages. These services fill the existing gap in the traditional extension systems that exists because of poor farmer-to-agent ratios. The training programs include climate-smart farming, sustainable practices, market orientation and digital financial literacy, so that farmers and rural entrepreneurs can all benefit. Moreover, the wider digital literacy and entrepreneurial training programs target youth and women, providing them with the knowledge of e-commerce and digital marketing, computer coding, and business management. These e-learning interventions can strengthen rural communities by enabling them to reap the potential of a digital ecosystem to ensure sustainable livelihoods (Farmonaut, 2025).

Enabling infrastructure, such as good electricity access and affordable internet connectivity, is also a challenge in the rural regions of Nigeria, and it is important to state that the success of these models largely depends on the infrastructure enabling them. However, these gaps are slowly being filled with partnerships between the government and the private sector participants, such as MTN, the NGOs and international organizations by investing in solar-powered ICT centres and broadband coverage. Such partnerships between the public and the private also provide digital content and tools with a cultural context and in the local languages to increase adoption rates and digital impacts (World Bank, 2024; MTN, 2025).

Impediments to digital inclusion in rural Nigeria

Digital inclusion in rural Nigeria is characterized by complex challenges that cumulatively inhibit the inclusion of these communities into the digital economy and society. These barriers can be generally divided into infrastructural, socio-economic, educational, cultural, and content-related barriers.

Limited infrastructure:

Rural communities also experience inaccessible or low-quality electricity, lack of internet connection, and ineffective telecommunication systems. Lack of these essential infrastructures limits access to digital technologies and internet

services, and many rural residents remain disconnected. Unstable power supply is a major factor that disrupts the regular use of digital devices, and the penetration of broadband is low, which means internet access is slow, expensive, and unreliable (Okocha and Dogo, 2023).

Low digital literacy:

Nigerians in many rural areas do not have the skills and knowledge to use digital devices efficiently, access online services, and guard against threats on the internet. Limited access to education and insufficient digital literacy training courses exacerbated the digital skills gap, with the result that people are marginalized by not being able to use the digital channel to access education, financial services, and jobs (Okocha and Dogo, 2023; HostAfrica, 2025).

Affordable digital devices and internet services:

Large numbers of rural residents are poor or have low-income levels and hence cannot afford smartphones, computers, and mobile data. Higher costs in rural areas, partly due to limited competition among service providers and supply chain challenges, further deter use. This economic obstacle increases the digital divide between the city and the rural population (HostAfrica, 2025; NanNews, 2025).

Socio-cultural factors:

Gender disparity is also significant, where rural women have less access to technology because of the traditional norms and lower levels of education. Also, the language barrier and the lack of awareness of the value of technology decrease engagement. Rural populations also use digital services less because of issues of trust and security when it comes to digital transactions (TechHerAfrica, 2024; Okocha and Dogo, 2023).

Absence of localized relevant digital content:

The digital information available is largely urban-oriented and in English, and thus not helpful or available to a large number of rural Nigerians. This lowers the incentive to make use of the digital technologies in agriculture, health services or government services, which are vital in supporting rural development (Okocha and Dogo, 2023; HostAfrica, 2025).

To deal with these barriers, it is necessary to invest more in rural digital infrastructures (such as solar-powered internet centres), affordability of devices and services, scaling up digital literacy efforts, and creation of culturally sensitive and localised digital content. Marginalized groups, particularly women, should also be empowered to promote the digital inclusion process in rural Nigeria (Okocha and Dogo, 2023).

Theoretical framework

Technology Acceptance Model and Actor-Network Theory

The Technology Acceptance Model (TAM) was first theorized by Fred Davis in 1986 and later perfected in 1989. At the same time, the Actor-Network Theory was developed by the joint works of Bruno Latour, Michel Callon, and John Law in the 1980s and early 1990s. It was formally named the actor-network theory by John Law in 1992. These theories assume that effective integration depends on an in-depth comprehension of not only personal perceptions of utility and convenience, theorised by the Technology Acceptance Model (TAM), but also the complex socio-technical interactions, power dynamics and translations that define the role of technology in a rural environment, as examined through the Actor-Network Theory (Cresswell et al., 2010). The combination of these viewpoints would approach transcend more specifically psychological determinants, including perceived usefulness and ease of use, in favour of a more comprehensive socio-material network that shapes the adoption and eventual incorporation of digital technologies in traditionally underserved communities (Karahanna and Straub, 1999).

The framework thus examines the perception and interaction of rural populations with digital tools, taking into consideration that adoption decisions are determined by a complex of cognitive, emotional and contextual variables specific to informal settings (Straub, 2009). Additionally, it examines systemic variables such as infrastructure accessibility, digital literacy programmes, and community leadership that are either enablers or barriers to digital inclusion in these particular environments (Samah et al., 2010; Aziz and Naima, 2021). The more sluggish diffusion of technologies, along with the decreased average education and skill levels in the rural setting, is a substantial

impediment to the technology adoption and its continued usage, which means that the localised requirements are to be considered instead of generic policies (Salemink et al., 2015).

This paradox also contributes to the fact that the rural population, which also most needs digital connectivity to counter their geographical isolation, is often least connected and digitally included (Salemink et al., 2015). These differences highlight the necessity to implement specific interventions that cannot focus on access to technology alone but consider the complex, socio-cultural, and economic factors affecting digital access in rural environments (Singh and Singh, 2021; Runardotter et al., 2020).

This means that the complexities of such multifaceted issues require a strong theoretical framework to incorporate models that describe individual user acceptance alongside models that describe the overall socio-technical configurations that determine technology adoption (Cen and 2010; Wu and 2024). This requires an all-inclusive analytical prism that connects micro-level individual perceptions and macro-level systemic pressures. The adoption of technology is not a cognitive act but a co-construction between human and non-human actors within a dynamic chain. This method is necessary in resource-starved settings, where the assumption of technology abundance and acculturation is not applicable, and requires an investigation of both the logical and emotional elements in technology uptake (Kifle et al., 2010). The framework can thus be used to sensitively examine the interactions between perceived value, ease of use, and social influence with existing networks of human and non-human actors, such as local community leaders, the digital infrastructure, and policy frameworks, to enable or hinder the integration of technology. It also clarifies the dynamics of the so-called digital divide, which can be defined as the dissimilarity between people who are able to access information and communication technologies and people who are not (Sparks, 2013).

This gap is especially significant in rural settings, where the absence of infrastructures, digital illiteracy, and socio-economic constraints tend to widen the gap between access and adequate use of digital resources (Rangasubramanian, 2021; Gevers and McManus, 2020). This conceptualisation provides a comprehensive perspective to examine the issues of digital inclusion by considering both direct access to digital technologies and a broader picture of the transformative opportunities of digital technologies in agricultural value chains (Smidt and Jokonya, 2021). The extended theoretical approach is, therefore, an effective analytical instrument that can be used by researchers and policymakers to formulate specific measures that can facilitate equitable digital access and meaningful engagement in rural agricultural settings (Aker et al., 2016; Smidt and Jokonya, 2021). Considering the ubiquitous nature of technologies in many domains, especially during the post-pandemic era, insights into the complex nature of the technology uptake process will become essential in promoting digital inclusion and equitable access to modern technologies (Razali and Razak, 2023).

METHODS

This study employs a descriptive research design to investigate the multidimensional effects of digital tools on the livelihoods of rural populations, utilising secondary data from existing literature to analyse the socioeconomic indicators and digital integration dimensions for rural livelihoods. A thematic approach was employed to discuss the degree of transformations in e-agriculture platforms, e-education, and mobile money systems in the Nigerian rural communities. This qualitative study revealed a comprehensive picture of how digital technologies can be used to both drive inclusive development and improve rural livelihoods. The qualitative and descriptive research design enables an in-depth interrogation of the literature, which strengthens the analytical depth of the research and its overall validity. This methodological approach is necessary to achieve useful information on how to close the digital divide and how to proceed in terms of the sustainable development of underserved rural regions.

RESULTS

The section reports on how digital tools have actually influenced inclusive development and livelihoods in Nigeria. This part is a synthesis of qualitative facts about the economy on the rise and the access to the services, with the stories of the people providing subjective illustrations of the more barren social and economic changes that happened to people living in these communities. It also highlights significant challenges, including the digital literacy gap, inadequate infrastructure, and policy gaps that prevent the realisation of important benefits from digital transformation in rural communities. The foregoing detailed evaluation lays the groundwork for recommending

specific policy suggestions that can be implemented to ensure a more balanced and digitally enabled rural environment in Nigeria. The results highlight the dire necessity of launching an insular approach towards digital development, considering the access to technology and the environmental, social, and economic situation that would support their well-lived use, particularly with respect to the case of the disproportionate effects of the digital divide on rural communities (Clercq et al., 2023).

The literature reviewed showed that digital acceptance is rising in the Nigerian rural communities; however, there is still a wide gap between the urban and rural areas when it comes to access and efficient use of digital technologies. As an example, a sustained gap between the genders, the haves and the have-nots, and rural and urban citizens has been shown to exist in access and usage of digital financial services (Tay et al., 2022). This gap is also increased by cultural and social barriers, which particularly impact disadvantaged groups and contribute to inequality in educational and economic opportunities (Nayak & Alam, 2022). Such intricate challenges require a comprehensive approach that would not only deal with the development of infrastructures but also with digital literacy initiatives designed around the needs of the rural populations, including women and other vulnerable populations. As an example, when women have low levels of digital access, they commonly use local markets to gather a living; hence, targeted interventions should be set to reach them to facilitate their engagement in the digital economy (Tisnawati et al., 2020).

Furthermore, in remote communities, lack of educational opportunities is another factor that seriously hinders the adoption of digital learning, which further proves the interdependence of these two issues (Olanrewaju et al., 2021). This trend will widen the so-called Internet dividend gap in which those with earlier or more extensive access to digital technologies will foster inequities between the urban and the rural populations (Deng et al., 2023). The digital financial inclusion in rural communities is usually lower because many factors come into play, such as poor digital infrastructure and a high state of social exclusion (Aziz & Naima, 2021). This creates a common scenario where rural inhabitants cannot enjoy vital services, thus pointing to the vast difference between urban and rural users (Agwu, 2020).

The study also demonstrates how the lack of reliable digital infrastructure, along with widespread digital illiteracy and the lack of local content, contributes even more to the challenges in connecting the rural populace to the digital market and makes them lack access to e-commerce and other online services (Briones et al., 2023). The problem of computer illiteracy and the existence of numerous local languages also complicates the situation, leaving agribusinesses with limited opportunities to successfully use e-commerce in their operation and in delivering their products to farmers. The transformative potential of the digital economy in this regard is clearly manifested by its ability to solve long-standing development challenges that include improving the livelihoods of rural populations and inclusion as part of the African development equation.

The study also discloses that digital microfinance can help remove these obstacles to empowering rural households and small enterprises to access capital, control risks, and enter the wider economy, not only stimulating economic growth but also economic stability. The combination of digital finance technology becomes the key to allowing farmers to utilize banking facilities more conveniently, which should increase sales and promote the growth of agribusiness (Nwagu, 2021). This enhanced access to all the financial resources and technology abilities made available through digital inclusive finance enables rural households to access more livelihood diversification and increase available financing options that allow them to save more and reduce the cost of lending.

DISCUSSION

This section is a detailed discussion of how digital finance, e-commerce, e-agriculture and digital identification systems can be used to support inclusive development and increase rural livelihoods in Nigeria based on evidence from the existing literature. The paper ends by providing policy recommendations that can be used to leverage digital transformation to achieve inclusive development outcomes and ultimately empower the rural populace, which can reshape digitally-enabled societies more sustainably. The study indicates the positive examples, including electronic agricultural markets, cell phone money and electronic learning, that have proven to be effective in livelihood improvement among women, farmers and youth in rural parts of Nigeria. These frameworks are in support of the

significance of customised digital services that cater to the unique requirements and scenarios involving varied rural communities, facilitating financial inclusion and economic empowerment where conventional systems have failed.

Moreover, these technology-based interventions promote human capital development through skills increment and innovation, which is vital in diversifying livelihoods beyond the traditional farming practices, as well as being able to embrace a wider economic range of opportunities by rural people. Such diversification plays a critical role in curbing the exposure to the seasonality of agricultural production and market risks, so that rural households can accumulate more livelihood security and seek non-farm income opportunities (Harriss-White & Heyer, 2009). Although digital inclusion holds great promise, the digital divide between rural and urban communities may result in the exclusion of the demographic in rural localities, which adversely affects the farmers' income. This dismal state of affairs, which is commonly known as a vicious circle that drives rural decline, points to the need for regionally adaptive, resident-oriented, and knowledge-based policies to drive inclusive digital transformation and sustainable growth (Chowdhury et al., 2023).

In spite of the efforts to close this digital divide, the urban-rural divide between infrastructure, digital literacy, and access to relevant content remains substantially wide (Torabi et al., 2023). This existing imbalance is compounded by some aspects, like lack of ICT strategies and regulations, low socioeconomic conditions, poor internet connectivity, inconsistent electric supply, and high levels of poverty, which all hinder e-learning and greater use of digital technologies (Olanrewaju et al., 2021). In addition, the rural communities in Sub-Saharan Africa tend to be disproportionately poor compared with the urban areas and rural poverty levels in certain countries in the Southern region of Africa are remarkably high, and this renders them highly susceptible to food shortages and climatic variability. The effectiveness of digital finance in rural settings is, however, compromised by the low literacy levels and inadequate access to information and tools necessary to utilize digital finance (Abdulai et al., 2022). This poses an urgent necessity for contextualized interventions that not just verve up the digital infrastructure, but also boost digital literacy and deliver contextually adequate information to achieve equal access and usage to digital instruments. Therefore, it is those underlying problems that must be tackled to realize the full potential of digital transformation and its role in achieving inclusive development in rural areas.

CONCLUSION

It is pertinent at this juncture to state that the paramount aspect of digital inclusion in the development of inclusive growth and enhancing developments in rural areas across Africa, especially in reducing past-discrepancy via digital identification, e-commerce, e-agriculture, and e-banking applications, should be strengthened. Such digital tools widen market access, enhance access to financial services, medical care, education, and government programs to strengthen rural communities and increase socioeconomic inclusivity and resilience. Besides, the impact of digital financial inclusion on poverty reduction is not only well defined but also marked by its ability to improve vulnerability to farmers and decrease income inequalities by enabling optimal household livelihood approaches. This is especially true in Sub-Saharan Africa, where digital finance and financial inclusion have drawn a lot of interest among policymakers, as it has the potential to eradicate poverty and speed up economic growth. To enjoy these implications, it is important to address the major challenges associated with such aspects as insufficient infrastructure, limited digital literacy, and the necessity to have sound regulatory systems that can keep pace with the digital world and safeguard consumers.

Furthermore, the rise of the mobile banking platform has evidently led to an upsurge in global financial inclusion, where financial exclusion and income inequalities are minimized, which is significant to developing an equitable income distribution among varied population groups. The development of digital financial inclusion, which would be undertaken in an ethical and sustainable framework within a well-regulated environment, promotes growth and speeds up the process of achieving the Sustainable Development Goals, as it allows reaching unbanked populations and providing them with custom-made financial services. This kind of inclusion also increases economic opportunities and financial circulation, especially in young economies.

Through digital financial services, especially digital payments, credit, savings, and insurance, financial resilience has improved, especially among marginalized groups in different developing states. This is particularly prominent in rural communities in which conventional banking facilities are relatively uncommon, prompting the use of

digital platforms as a possible recommendation to obtain the necessary set of financial services. The high usage of digital tools makes the economy healthy since it promotes inclusive growth and enables sustainable development.

RECOMMENDATION

Adoption of multiple strategic approaches: A multi-strategy approach is needed to promote digital inclusion and agricultural transformation in Nigeria that targets strategic investments, policy changes, and capacity building. Predominantly, prioritizing the building of a strong digital infrastructure with increased access to broadband and stable energy resources in rural areas.

Provision of digital literacy and local content: Effective measures to promote digital literacy and provide local content which would be relevant to the local populace are imperative to the successful exploitation of these digital devices by the rural communities. Such an holistic strategy would not just help contain the risks of going digital, but also harness the transformative power of digital technologies in promoting inclusive economic development in Nigeria within the rural sector.

Integrative Approach: The collaboration between governmental structures and organizations, the private sector, and non-governmental organizations needs to be one of the primary goals to foster a sustainable digital ecosystem that will champion the peculiarities of the rural population. This type of collaboration has the potential of drawing on skillsets and resources to deliver culturally-sensitive and economically-feasible innovative solutions. This necessitates structural harmonization of the roles and institutions of all parties in the financial inclusion chain to ensure sustainability of the process in the long-term perspective.

Implementation of policy framework: Policy frameworks need to be implemented to support creating infrastructures in the form of digital platforms based on the peculiarities of rural entrepreneurs and farmers, which would allow creating an environment that would normalize innovative development and aid in improving their productivity and reaching the market.

Financial accessibility: lending conditions should be tailored to be more affordable to smallholder farmers in many of whom do not have conventional collateral, which will enable them to invest more in cross-sector and agricultural technologies and practices. Such changes are essential in enabling technology uptake among rural micro-entrepreneurs to overcome the bottlenecks associated with access to credit and capital.

Capacity building: There should be a conscious move to increase the level of digital literacy skills amongst smallholder farmers and rural entrepreneurs so that they can have the necessary skills to take advantage of digital technology to promote financial management, market access and efficiency in operations.

Public-private Partnership: Nigerian government, working with private sector stakeholders and foreign donors, should iron out policies that facilitate off-grid energy solutions and mini-grids development, especially in cases of SME clusters, to have a reliable source of power that would be important in digital infrastructure. Such specific measures are vital in terms of addressing the problematic issues within the system that have hindered the development and sustainability of digital projects that could be implemented in rural Nigeria.

Regulatory reforms: Various regulatory reforms are also essential to diminish uncertainties and induce the adoption of technology, including the revision of the existing legal frameworks and intensifying the discussions between the government and business.

Eradicate corruption of the digital economy: Reforming corruption in key areas, including electricity and infrastructure, is of utmost importance to stop the diversion of investments in digital transformation into illicit activities in key sectors. These moves will not only enhance the effectiveness of digital interventions but also the confidence of investors and the larger picture in the digital economy. These reforms will play a significant role in the rectification of long-term challenges facing the operations of small businesses in Nigeria, which include inadequate access to credit, costly operations and poor infrastructure (Ihua & Siyanbola, 2012).

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