

Rural entrepreneurship and ecommerce interlinkage: A multi-country exploration in the African context

Abstract.

Purpose: To explore the challenges facing rural entrepreneurs in adopting ecommerce in an under-researched African context, this study adopts a multi-country exploration involving five countries and offers valuable managerial and theoretical implications.

Design/methodology/approach: With samples covering significant geographical regions – North, South, Northeastern, and West Africa – this research adopted a qualitative method with an interpretivist approach. The empirical data was collected via in-depth semi-structured interviews with 30 rural entrepreneurs drawn from a wide range of sectors in Egypt, Nigeria, South Africa, Sudan and Zimbabwe. The data analysis followed Gioia's suggestions for qualitative rigor.

Findings: The findings reveal institutional voids – political instability and lack of technology savviness, social infrastructure and financial resources. Participants further revealed that these challenges result in loss of valuable opportunities for learning, communication, productivity, and expansion, as well as inability to compete with their urban counterparts. Findings also highlight specific challenges facing rural women entrepreneurs – socio-cultural barriers and gender stereotypes. Despite these challenges, participants who invest in ecommerce revealed significant benefits – improved customers sourcing, customer retention, customer experience, and customer satisfaction. The findings also reveal business expansion, enhanced brand visibility, and improved supply chain management because of ecommerce adoption.

Originality/value: Extending prior theories – the Digital Entrepreneurship Ecosystem (DEE) and the Technology-Organisation-Environment (TOE) frameworks – the current paper demonstrates how technological, organisational, and environmental factors interact in an institutionalized setting, and suggest a hybrid model unique to resource-constrained rural Africa.

Keywords: Rural entrepreneurship, ecommerce, institutional voids, Africa, emerging markets.

1. Introduction

Due to its capacity to stem urbanization, address (rural) poverty and minimize unemployment (Yu *et al.*, 2024; Brenya *et al.*, 2023), rural entrepreneurship is gaining a burgeoning scholarly interest. Rural entrepreneurship (mainly agribusinesses) is one of the most potent tools to address unemployment, unplanned urbanization and poverty challenges facing most African countries (OECD, 2023; African Union, 2022; UN Women, 2021; Sumberg & Hunt, 2019). Yet, significant obstacles include poor access to capital, digital illiteracy and poor connectivity (Garg *et al.*, 2025; Benya *et al.*, 2023).

Researchers have linked these issues to institutional voids in the region (Alo *et al.*, 2024, 2023). Despite these barriers, rural entrepreneurship has shown great potential in reducing rural poverty in Africa, as evidenced in agribusinesses (Komolafe *et al.*, 2022). Consequently, there is a renewed call for increased access to financial resources by rural entrepreneurs (Magdalena *et al.*, 2024) to help address digital illiteracy, digital divide, poverty, unemployment and geographical barriers in Africa (Alo *et al.*, 2025; Nambisan, 2017). Researchers link investment in ecommerce to sustainability in rural entrepreneurship (Arslan *et al.*, 2022; Barragan & Becker, 2024; Zahra *et al.*, 2023).

However, research examining the challenges and benefits of adopting ecommerce in rural entrepreneurship in African is extremely limited if not absent. Notwithstanding the important foundational work on entrepreneurs' challenges in Africa (e.g., Mhlanga, 2021) and ecommerce adoption (e.g., Mhlanga, 2020), a focused, qualitative multi-country inquiry into the challenges and benefits of ecommerce for rural entrepreneurs in Africa remains rather scarce. This is because most prior studies have focused on a single country, which limits the potential generalization of their findings. Recognizing these gaps, this paper undertakes an exploratory qualitative assessment in a diverse set of African countries – Egypt, Nigeria, South Africa, Sudan and Zimbabwe – and tries to answer the following two research questions.

1. What challenges limit ecommerce adoption by rural entrepreneurs in Africa and how do these entrepreneurs navigate these challenges to minimize their impact on their business activities?
2. How do these rural entrepreneurs benefit from adopting ecommerce in their businesses?

The above research questions are complementary and deliberately paired. Research question one addresses the contextual and systemic barriers to adoption, a known but complex area requiring further qualitative insight across varied African settings. Research question two focus on the outcomes and value creation post-adoption, a less explored aspect that reveals strategies, adaptive practices and advantages. Together, they provide a holistic view of the ecommerce journey from barriers to gains. In doing so, this paper offers three critical contributions to the extant literature. Firstly, this study offers a timely and comparative analysis of similarities and differences in ecommerce adoption across several African countries in the context of rural entrepreneurs. Secondly, the study not only focuses on challenges in ecommerce and adaptation but also specifies strategies that help rural entrepreneurs to overcome these challenges. Finally, by examining the readiness level of rural entrepreneurs in these five diverse locations to match their local practices with global standards in ecommerce innovation, this paper makes a complementary but distinctive contribution to the Africa-focused digital ecosystem literature, as existing literature has focused mainly on Asia and developed countries. Theoretically, the

current paper extends the Digital Entrepreneurship Ecosystem (DEE) framework (Nambisan, 2017; Mafimisebi & Ogunsade, 2022) and the Technology-Organisation-Environment (TOE) framework (Baker, 2012), as it examines how the interplay between digital infrastructure, entrepreneurial resources, and institutional voids shape ecommerce adoption outcomes in rural Africa. This integrated theoretical lens helps to advance understanding beyond merely application of ecommerce to understanding the underlying challenges and their benefit in rural African entrepreneurship setting.

2. Literature Review

2.1 Major Challenges in entrepreneurship development in rural Africa.

While countries like Ghana, Nigeria, Cameroon, Kenya, Zambia, Zimbabwe, and South Africa have had a long history of investment in their rural entrepreneurship development (Konczacki, 1999), the digital divide facing the continent has not allowed Africa to exploit the full potentials of its rural entrepreneurship (Allen, 2019). Yet, we also still lack research examining challenges facing rural entrepreneurs in Africa (Utete & Zhou, 2024). Consistent with existing research examining constraints to entrepreneurship development in rural African setting (e.g., Brixiova & Kangoye, 2015) and their impacts on entrepreneurial self-efficacy (e.g., Arshed *et al.*, 2021), this study provides a detailed review of the main challenges facing rural entrepreneurs in Africa.

Researchers have found some obstacles facing rural African entrepreneurs, such as lack of funding, acute skill shortage, lack of digital infrastructure, lack of business support, poor legislation, bureaucratic hurdles, legitimacy, negative attitudes from the society, cultural issues, and unfriendly business climate (Harit, 2015; Fal, 2013). For instance, rural South African entrepreneurs must overcome inadequate electricity supply, poor road networks, transportation issues, lack of funds, and acute skill shortages (Lekhanya & Mason, 2014). Yet, the greatest challenge to entrepreneurship development in Africa is the institutional voids – the absence of supporting institutions, unreliable market intermediaries, unsystematic contract-enforcing mechanisms, and inefficient transportation and communication networks (George *et al.*, 2016). Limited technological infrastructure and low internet services have also been highlighted in West Africa (Madichie *et al.*, 2021). Furthermore, recent studies have noted that African entrepreneurs face systemic barriers related to technological fragmentation and institutional misalignment. Similarly, Magdalena *et al.* (2024) proposed that while digital tools lead to financial inclusion, rural entrepreneurs often lack access to proper training which limits their digitization capabilities. In African context, these challenges could be exacerbated by other challenges (Oliveira & Martins, 2011), such gender discrimination.

2.1.1. Gender Barriers and rural entrepreneurship development.

While the above challenges are common throughout Africa, empirical evidence shows that men and women face different constraints in entrepreneurship development (Nziku & Struthers, 2017). Researchers have linked challenges facing female entrepreneurs in rural Africa to lack of access to digital technologies resulting on lack of business opportunities (Halkias *et al.*, 2011), family commitments and lack of funding options (Isaga, 2018; Mordi *et al.*, 2010), unlike their male counterparts. Similarly, Rahman *et al.* (2022) revealed that women entrepreneurs in Bangladesh face higher resistance to technology use. Yet, addressing digital inclusion for women requires solving both infrastructural access and established socio-cultural barriers simultaneously (Soluk *et al.*, 2021; Saleminik *et al.*, 2017). Although studies have explored some of the constraints facing rural Albanian women entrepreneurs in North Macedonia (Ramadani & Ramadani, 2021), women entrepreneurs in rural India (Pathak & Varshney, 2017; Garg *et al.*, 2025), rural women entrepreneurs in Bangladesh (e.g., Rahman *et al.*, 2022), small rural businesses in a rural region of Canada (Siemens, 2010) and rural female farmer entrepreneurs in China (Qing *et al.*, 2021; Feng *et al.*, 2024), we still lack research examining challenges facing rural women entrepreneurs in Africa (Utete & Zhou, 2024).

2.1.2. Rurality, digital divide and ecommerce adoption by rural entrepreneurs

In sharp contrast with urbanization which is characterized by more densely populated areas with a different way of life and a focus on commerce and industry, rurality implies rural characteristics – geographical areas situated outside of cities and towns with often lower population density of usually less than 10,000 people, a slower pace of life and relatively wider open spaces (Wallin, 2003). As rural areas include mainly villages, isolated dwellings, hamlets, rural towns and open countryside (Hall *et al.*, 2006) with fewer homes or other buildings, rural communities are home to mostly agriculturists, mountains, forests, farmlands and other natural resources. Consequently, they suffer from digital divide – the gap between people with sufficient access to information communication technology (ICT) and people with inadequate or no access to ICT (Soomro *et al.*, 2020).

Since digital divide is influenced by factors that determine the digital connectivity levels – location, distance to urban area and the level of digital skills available (Gerli & Whalley, 2022) – rural communities struggle to keep up with digital connectivity developments (Velaga *et al.*, 2012). Consequently, rural communities pay the price for living in rural areas (Marsden, 2016), which is also known as ‘*the rural penalty*’ (Malecki, 2003; Hite, 1997). The rural penalty implies significant challenges for rural entrepreneurs in their efforts to adopt ecommerce, unlike their urban counterparts, even in developed countries of the world. For instance, despite improved digital connectivity across

rural areas of Wales, many businesses in rural Wales are still without reliable digital connections (Morris *et al.*, 2022). This limits business opportunities, restricts creativity and innovation capacity and exacerbates the difficulty in overcoming location constraints and industrial challenges, especially, in agribusiness entrepreneurial activities (Bowen & Morris, 2019).

Salemink *et al.* (2017) highlighted that rural entrepreneurs in fragile states face disrupted supply chains and unreliable ICT. Alo *et al.* (2024) highlighted the hyperinflation and sanctions in Zimbabwe that hindered ecommerce adoption. Although Zahra *et al.* (2023) added that digital tools can increase resilience and decentralize the risks, there are very few studies linking unpredictable regulatory changes with ecommerce adoption. As Africa is mostly plagued by huge informal economy, high unemployment rates, endemic poverty and political instability (Mpofu, 2023), researchers argue that these circumstances create barriers to ecommerce adoption by rural entrepreneurs in African (Baalbaki & El Khoury, 2024).

2.2 Other Challenges in the adoption of ecommerce

Digital entrepreneurship literature highlights poor internet services a significant barrier to ecommerce adoption within the rural West African entrepreneurship ecosystems (Madichie *et al.*, 2021). Oblivious of new standards, lack of adequate electricity supply, inability to integrate smart gadgets, high cost of mobile internet devices, and risk of cybercrimes are the top five constraints that hinder ecommerce adoption by rural entrepreneurs in Namibia (Kamutuezu *et al.*, 2022). Ecommerce adoption challenges in rural Africa are also exasperated by inadequate infrastructure, digital illiteracy, digital divide, unaffordable cost of ICT infrastructure, and a fragile political economy (Bakibinga-Gaswaga *et al.*, 2020).

Furthermore, a lack of IT proficiency limits the developmental capacity of women entrepreneurs in sub-Saharan Africa, including their capacity to exploit existing opportunities (Savira & Fahmi, 2020; Irene, 2019). Despite the recent revolution in digitization and the resultant improved business innovation capacity in sub-Saharan Africa (Tagne, 2021), there is still a lack of research examining the capacity of rural entrepreneurs in the region to maximize the benefits of digitization in adopting ecommerce (Bellucci & Otenyo, 2019). For instance, some rural areas in South Africa still lack ICT support, which makes it difficult for small and medium-sized enterprises (SMEs) to expand through the use of digital marketing (Lekhanya, 2015). Similarly, the farming communities in Sub-Saharan Africa still lack reliable mobile phone services to drive their operations (Kabbiri *et al.*, 2018).

Despite a growing body of research linking digital technology, ecommerce adoption and rural entrepreneurship development, there is still a lack of research focusing on rural African communities. While Feng *et al.*, (2024) examined how to widen the digital accessibility divide by arguing that urban-rural digitalization should evolve from divide to inclusion, their study focused on China. Although Morris *et al.* (2022) examined how digital inclusion and bridging the digital divide could boost the resilience level of rural entrepreneurs, their research focused on rural Wales. Consequently, there is a lack of research focusing on rural Africa. Specifically, there is a lack of research examining how digital technologies can influence ecommerce adoption by rural entrepreneurs in Africa. While there may be a few studies in this regard, most prior studies have focused on a single country, which limits the potential generalization of their findings. Recognizing these research gaps, this paper undertakes an exploratory qualitative assessment in a diverse set of African countries including Egypt, Nigeria, South Africa, Sudan and Zimbabwe to explore the interlinkages between rural entrepreneurship and digitalization.

2.3 The Role of Digitization in ecommerce adoption by rural entrepreneurs in Africa.

The role of digitization entrepreneurial orientation, strategic visioning and in ecommerce adoption, have been emphasized (Niemand *et al.*, 2021; Vadana *et al.*, 2019). Researchers have found that adopting information communication technology (ICT) positively affects rural entrepreneurship in Africa, especially, in agriculture, forestry (Musingafi & Zabroon, 2014), economic and commercial ventures (Iddrisu & Chen, 2022; Adomako *et al.*, 2021). Digitization in Sub-Saharan Africa has also been linked to improved e-commerce in the region, due to improved communications and mobile banking (Myovella *et al.*, 2020). Yet, the application of ICT in rural entrepreneurship has a significant impact on women entrepreneurs. Adopting digital infrastructure in entrepreneurship boosts African women's participation in rural agriculture (Rutashobya *et al.*, 2021), and transforms their capacity to innovate, create jobs, and collaborate with relevant stakeholders, especially in the agriculture sector (Sambrani & Jayadatta, 2020). Furthermore, through e-commerce, women entrepreneurs from rural Africa can circumvent traditional barriers and provide access to global markets (Abeyasinghe & Malik, 2021; Lloyd & Vengrouskie, 2019).

Furthermore, the role of digital entrepreneurship in fostering the bonds between local networks, attracting new investment and people, and bridging geographical barriers in rural areas have been emphasized (Alo *et al.*, 2025; Rodrigues & Franco, 2021). Yet, due to the digital divide and resource constraints, a robust digital economy in Africa requires a systematic approach to unlock the opportunities and foster digital, socio-cultural and socio-economic growth (Mafimisebi & Ogunsade,

2021). For instance, digital technologies, such as smartphone apps, has been found to strengthen relationships between families and communities, fostering entrepreneurship in rural India (Soluk *et al.*, 2021). Through their capacity to maintain long-distance business connections and social ties, and thus radically impacts the social connectedness and wealth creation among agro-entrepreneurs in Africa (Mehta *et al.*, 2011).

Entrepreneurs who embrace ecommerce via social media have an improved capacity to building competitive advantages and creating wealth in the modern global economy (Ukpere *et al.*, 2014; Rahman *et al.*, 2011). Ecommerce tools such as Instagram enables young entrepreneurs in rural Africa to create and maintain online work environments (Benna, 2016). Despite a growing tolerance of new technologies, especially, among the youths (Azu *et al.*, 2021), the low level of ecommerce adoption by entrepreneurs in Sub-Saharan Africa has been found to hinder entrepreneurship development in the region (Madichie *et al.*, 2019).

Theoretical Framework

This study integrates two complementary theoretical frameworks: the Digital Entrepreneurship Ecosystem (DEE) and the Technology-. Organisation-Environment (TOE) framework. This integrated lens allows us to systematically analyze the multi-level factors influencing digital adoption among rural African entrepreneurs and to articulate a clearer theoretical contribution. By examining their interdependencies and how they manifest in the presence of significant institutional voids and gendered constraints, we move beyond simply applying these frameworks to a new context, an underexplored theoretical intersection (George *et al.*, 2016; Soluk *et al.*, 2021).

Digital Entrepreneurship Ecosystem (DEE)

The DEE framework focuses on understanding how the interrelation between digital infrastructure, institutional policies, stakeholder dynamics and socio-cultural norms influence entrepreneurial outcomes (Mafimisebi & Ogunsade, 2022; Nambisan, 2017). This framework helps situate this study within the broader scholarly discourse on how ecosystem fragmentation in emerging economies creates unique challenges (Autio *et al.*, 2018). The rural Africa's entrepreneurs operate in a fragmented ecosystems characterized by lack of access to digital tools, weak policy support and cultural resistance (Prasetyo & Setyadharma, 2022; Rahman *et al.*, 2022). For instance, studies show that Sudan's political instability and Nigeria's infrastructural gaps lead to heterogeneous digital ecosystems that restrict technology adoption (Lekhanya, 2015). Like the current research, previous research that

adopted the DEE theory also utilized multi-country design to discuss how localized gaps in ICT, education and regulation interact with global standards (Baker, 2012). This is also shown for the case of Africa's context (Satyro *et al.*, 2024; Mafimisebi & Ogunsade, 2022) as well as research examining how ecosystem actors like governments and NGOs engage in cross-sector collaboration to increase digital literacy and financial inclusion (Prasetyo & Setyadharma, 2022).

Technology-Organisation-Environment (TOE) Framework

The TOE Framework also complements the DEE by differentiating between technological, organisational and environmental factors in digital adoption (Kraus *et al.*, 2021; Huete-Alcocer, 2017). This three-factor lens (technological, organisational and environmental) directly links to this study's identified challenges – poor internet, limited digital skills and socio-cultural barriers, respectively. More importantly, it provides a structured way to analyze the research questions: research question one – constraints in adopting digital technologies across all three TOE contexts, while research question two – reveals the benefits derived by rural entrepreneurs within given technological, organisational and environmental constraints. This framework effectively integrates considerations of human capital (organisational knowledge/skills) and the environmental context of gendered norms, thereby addressing theoretical perspectives. This framework also addresses the rural-urban digital divide discussed by (Salemink *et al.*, 2017).

3. Research Methodology

Grounded in an interpretivist philosophical stance, this research adopts a qualitative methodology. The research approach is appropriate for examining how rural entrepreneurs in resource-constrained and institutionally fragile contexts experience the adoption of ecommerce (Hennink *et al.*, 2020; Stebbins, 2001). This aligns with the Digital Entrepreneur Ecosystem (DEE) and Technology-Organisation-Environment (TOE) frameworks, which jointly emphasize the role of institutional conditions, technological capabilities, organisational resources, and socio-cultural influences in shaping entrepreneurial behaviour (Nmbisan, 2017 and Tornatzky, et al, 1990). Specifically, this research focused on participants' capacity to adopt ecommerce adoption, the challenges they face and the ensuing benefits. Attaining such *subjective* data requires storytelling through semi-structured interviews (Knight & Jarzabkowski, 2022). In the interview approach, participants were recognized as the key players, whose side of the story needed to be captured uninterruptedly by allowing them to reflect freely on their experiences with ecommerce adoption (Liu & Rong, 2015; Dick & Collings, 2014; Ezzamel & Willmott, 2008). To contact these key players, we relied on the authors' contacts

(Knight & Jarzabkowski, 2022; Harvey, 2011) – as the authors are from the five participating countries. 30 interviews, i.e. six from each country were conducted and consents were sought through a gate keeper from each of the countries. Through snowballing (also known as chain sampling or network sampling) each gate keeper helped us to reach (and build rapport with) additional five participants from their communities. This also enhanced willingness to share their views with us (Patton, 2015).

3.1 Data Collection

To generate a dialogical relationship, this research adopts a relational approach to interviewing. Each interview session started with a conversation around how ethical issues will be dealt with, followed by opening questions that aimed at developing familiarity with each participant. This was followed by outlining the purpose, aim and objectives of this research, as well as the interview structure and process. The interviewer then asked each participant the following questions in table 1.

Table 1: INTERVIEW QUESTIONS (IQs) AND RELATED RESEARCH QUESTIONS (RQs)

IQs	LINKED RQs
Please can you give an account of your experience with the application of digitization tools in your business, including the type(s) you use?	1, 2
Have you faced any challenges while applying those technological tools to run your business?	1
What were those challenges and how did they affect your business?	1
How did you deal with such a challenge?	1
Have you made any adjustment(s) in the way you run your business in the face of new technology?	1
Please can you give some examples of those changes you've made in the way you run your business due to new technology?	1
Have you adjusted your existing structure and existing resources in response to the challenges posed by technological tools?	1
If yes, please can you give some examples of those changes you made in your structures and existing resources in response to challenges posed by technological changes?	1
Have you adjusted your sources of raw materials and your processing techniques in response to the adoption of digitization tools?	1
If yes, please can you describe such changes you have made in these areas?	1
Have you adjusted your approach to networking in response to the adoption of digitization tools?	1
Please can you describe such changes you have made?	1
Have you adjusted the way you serve your customers in response to new technological tools?	1
If yes, please can you describe such changes you have made in these areas?	1
Can you reflect on if, and how, those adjustments affected your business operations and profitability?	2

Please can you reflect on what these responses reveal about your ability to respond to the challenges brought by new technology?	2
Where do you feel you were most successful in responding to digital transformations?	2
Where do you think you could have done better in responding to digital transformations?	1
What areas do you think were out of your control?	1
Is there any other thing you would like to add to what you have said?	1,2

Based on some unique characteristics – economic, political, and socio-cultural features, shaped by their histories and natural resources – the five participating countries were selected. Nigeria, with a GDP of \$252.74 billion (IMF, 2024), depends largely on oil and gas exports for government revenue. Agriculture also plays a significant role, employing a large portion of the population, while fintech and entertainment are emerging industries. However, issues like unemployment, poverty, inequality, and corruption hinder broader economic development. Infrastructure gaps and unreliable power supply further limit industrial growth. Sudan’s economy is primarily agricultural – producing crops such as cotton, wheat, and sorghum. After losing most of its oil reserves due to South Sudan’s 2011 secession, gold mining has grown in importance. Despite a GDP of \$26.87 billion (IMF, 2024), the economy suffers from sanctions, conflicts, inflation, and poor governance. Prolonged political instability and civil war have further weakened both the economy and infrastructure (The World Bank, 2024). Zimbabwe, once a strong agricultural producer, especially for tobacco, has experienced economic collapse due to hyperinflation, currency instability, and land reforms that hurt agricultural output. Mining, particularly gold and platinum, remains critical, but hyperinflation, currency devaluation, and a lack of investment have severely damaged the economy (African Development Bank, 2019). The country also faces high unemployment, significant debt, political repression, corruption, and weak judicial independence.

South Africa, with a GDP of \$373.23 billion, is Africa’s most industrialized country, boasting a diversified economy driven by mining (gold, platinum, diamonds), finance, manufacturing, and tourism. As a BRICS member, it remains an important emerging economy but faces challenges like high youth unemployment, economic inequality, and social unrest. In addition, unreliable power supply from the state utility Eskom hampers economic growth in South Africa. Egypt has a diverse economy, with major sectors including tourism, agriculture (cotton, fruits, vegetables), manufacturing (textiles, chemicals), and natural gas. With a GDP of \$347.59 billion (IMF, 2024), the Suez Canal is a key source of revenue from international trade. However, economic progress is slowed by unemployment, inflation, political instability, and rising public debt (The Observatory of Economic

Complexity, 2023). Importantly, these nations occupy strategic roles within African geopolitics: Nigeria and South Africa are widely recognized as regional powerhouses; Egypt wields considerable influence in both North Africa and the Arab world; while Sudan and Zimbabwe have attracted global attention due to periods of political instability and external engagement (Ogunyemi *et al.*, 2022).

The data were collected during visits to rural communities in each country, and occurred simultaneously in the five countries, between August and November 2023. The interviews were all face-to-face and lasted an average of 35 minutes, with each session being recorded and transcribed, before coding and analysis. All key sectors of each country's economy were duly represented in the sample. This is evidenced in table 2 (see appendix 1) below, which shows participants' information which also includes the predominant technologies used by these respondents.

3.2 Data analysis

To explore the research topic in depth this study utilized Braun's thematic analysis approach to investigate rural African entrepreneurs' challenges in adopting ecommerce. The data analysis started by carefully listening to the recorded oral interview to develop familiarity with the primary data before data transcription. This was followed by data transcription, and then comparing the transcribed data with the recorded oral data to ensure no single word was missing. Consistent with the thematic analysis approach, the data analysis has followed previous discursive analyses of subjectivity (e.g., Knight & Jarzabkowski, 2022; Mantere & Whittington, 2021), by the authors' constantly going back and forward between the dominant literature and the transcribed raw interview data. A thorough understanding of participants' responses allowed for an easier identification of the common patterns in the data and the emergent themes. Based on the identified patterns attempts were made at grouping the data. At this stage it was observed that these initial groupings of data were overwhelming (Gioia *et al.*, 2013), and thus the authors needed to make sense of these data sets by using open coding (Strauss and Corbin, 1998), a process akin to Gioia's (2004) idea of *hanging them together* by tagging these sets of data together to generate the 1st-order concepts (Gioia *et al.*, 2010). The next step was to compare each of the coded sets of data against their corresponding interview transcript (Patton, 2015). Having completed the 1st-order analysis at this stage, these sets of data needed to be further condensed down to a more manageable number by tying up as many categories as required, based on their differences and similarities. This process required the adoption of axial coding (Strauss and Corbin, 1998). The axial coding matched the large sets of initial codes (i.e., the set of first-order concepts) against the corresponding existing literatures on ecommerce and entrepreneurship development, resulting in a range of second-order themes. To enhance meaning making, the second order themes were further

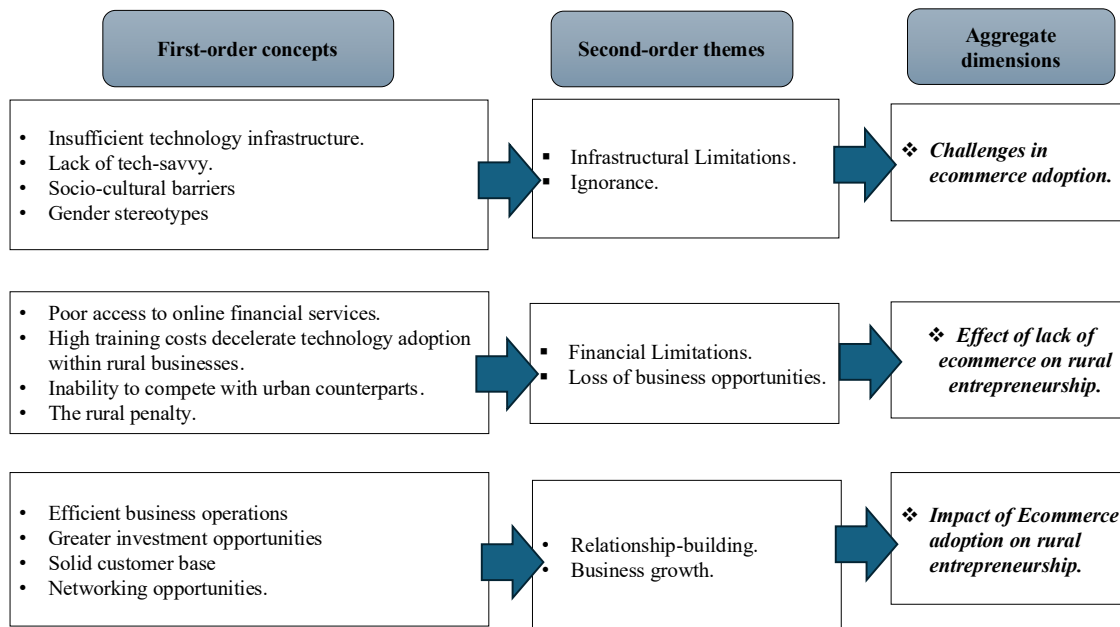
condensed with a set of aggregated themes that joined these codes together (Gioia *et al.*, 2013). See Figure 1 below. In the findings section below, data presentation has followed the set-up, quote and comment (SQC) approach to analyzing and presenting qualitative data.

4. Findings

Focusing on technology adoption, this section presents empirical data from the five countries studied – Nigeria, Sudan, Zimbabwe, South Africa, and Egypt. To maximize the interview data, we have utilized three main themes which have been systematically refined to accurately reflect the data sets, with quotes illustrating key points and providing a more detailed understanding of the issues. The Word Clouds depicted in this section serve as visual representations of the most frequently occurring words in the data set, with each word size, corresponding to how often it appears following analysis of data obtained through participants' interviews. This visual representation allows for quick identification of prominent themes (codes) or sentiments in this research. The word clouds were generated from textual data derived from interview transcripts.

The breakdown of themes is detailed in Figure 1 below:

Figure 1: Aggregated Themes, Second-order Themes, and First-order Concepts



4.1 Challenges in Implementing Ecommerce for Business Operations

The above theme examines significant challenges facing rural entrepreneurs in Africa in relation to ecommerce adoption in business operations. Challenges revealed include infrastructural limitations such as low digital literacy, unreliable electricity supply, high cost of installation, limited availability of technology investments and internet connectivity in rural areas, which hinders the deployment and maintenance of technological investments relative to financial resources. Cultural barriers and resistance to change within rural communities also impede the effective introduction and integration of technology solutions. These are highlighted below.

4.1.1 Digital Literacy:

Low digital literacy significantly hinders individuals from fully leveraging technology's capabilities, leading to limited engagement, misunderstanding, or misuse of digital tools and resources, and poor participation in the digital economy. This is demonstrated in participants' responses as highlighted in the quotes below:

Participant 10, a Sudanese dealer on medical equipment revealed that, *"... we are not up to date, especially in medical technologies."*

A fellow Nigerian trader added that: *"....one has to be well groomed in the use of technology to be able to use it effectively."* (Participant 12).

Digital literacy, which encompasses the knowledge, skills, and competencies needed to navigate and utilize digital resources effectively, is key for digitization of business operations in the 21st century, as a lack of technical expertise not only impact revenue generation but also socio-economic and socio-cultural development. Consequently, the need for improved investment in digital training and education:

"..... if the government can arrange people to teach us how to use this technology ... it will help those of us in the villages who run our businesses ..." (Participant 14, Nigeria).

Although majority of the participants viewed digital literacy as limiting their entrepreneurial growth, a few confirmed their ability to effectively utilize digital technology to improve their businesses:

"Our website and social media presence on platforms like Instagram showcase our completed projects and attract new clients" (Participant 2, Egypt).

Enhancing digital literacy is vital for empowering individuals to leverage technology's benefits and navigate the digital realm. In rural Africa, a notable gap in digital literacy exists between rural residents

and urban entrepreneurs (Kala, 2023). This discrepancy hinders the exploitation and maintenance of technological solutions (Oshikoya and Hussain, 1998). Cultural barriers and resistance to change within rural communities also impede the effective introduction and integration of technology solutions (Mhlongo *et al.*, 2024; Musingafi & Zebron, 2014).

4.1.2 Financial Limitations:

Acquiring technological devices like computers, smartphones, and tablets needs significant financial investment, and sometimes, may need government support. Otherwise, insufficient funds may impede smaller businesses from aligning their operations with established technological standards universally. This also shows costly data plans in the region of Africa which could also impede urban entrepreneurs. This limits their capacity to build and reconfigure their dynamic capabilities:

“The cost of using technology here in Nigeria is high. Data is not cheap, ... purchasing a smartphone, computer, paying for Wi-Fi; none of these are cheap.” (Participant 12, Nigeria)

“Staying updated with the latest hardware, software, and repair techniques requires ongoing investment” (Participant 30, South Africa).

Without adequate financial resources to access or purchase these software solutions, businesses risk missing out on valuable opportunities for learning, communication, productivity, and expansion. In addition, inflation, coupled with the rising cost of technology tools, makes it an uphill task for rural entrepreneurs to stay afloat and competitive in the current business landscape:

“..... we have to import them from China, and we have to pay in US dollars which is not available in here.” (Participant 7, Sudan).

Improved accessibility to digital tools and expertise will unlock new possibilities across various domains, promoting resilience, efficiency, global market access, improved public services, transparency, accountability, and employment opportunities (International Monetary Fund, 2020).

4.1.3 Infrastructural Limitations:

Insufficient technological infrastructure in rural regions can significantly affect rural enterprises. The absence of reliable internet access and communication networks makes it challenging for rural

entrepreneurs to stay updated on market trends, engage with customers and suppliers, or utilize online resources which are crucial for business operations:

“We need good internet connection in Sudan. We only have two internet providers, so there is no competition in terms of service quality.” (Participant 6, Sudan).

This limitation increases the cost of internet service, restricts their customer base and revenue potential. Additionally, the integration of digital tools such as inventory management software or online payment systems is hindered by insufficient infrastructure, resulting in increased costs, slower processes, and reduced competitiveness:

“...the biggest challenge is network. We have very poor network in Nigeria...” (Participant 13 from Nigeria)

This limitation hampers their cash flow management and growth opportunities. Internet providers view the rural areas of Africa as a less lucrative market due to unfavorable business conditions – low population density and absence of infrastructure (Wang, 2020). Yet, unreliable internet connections worsen inefficiency and productivity problems by disrupting the use of crucial digital platforms:

“When these internet-linked platforms fail, they will cause a catastrophic disaster for small businesses.” (Participant 23, South Africa).

The above quotes illustrate that insufficient technological infrastructure and digital tools in rural areas not only restrain innovation and productivity but also creates skills gap among business owners and workers. This obstructs innovation and rural businesses' competitiveness in dynamic markets (Gopaldas, 2021), as technological adoption plays a key role in business growth and innovation.

4.1.4 Training Requirements and Associated Costs:

Technology savvy is essential for enhancing productivity, efficiency, and profitability (Mng'ong'ose et al., 2018). However, the associated costs of technology training can pose barriers, particularly for small enterprises with limited resources:

“... ensuring that all team members are tech-savvy and can adapt to new tools can be a hurdle.” (Participant 2, Egypt).

Despite the potential benefits of technology, the traditional norms of over-reliance on word-of-mouth business practices persist. Furthermore, the informal institutional and patriarchal values in rural Africa, including gender stereotypes contribute to hindering women's capacity to utilize technology for entrepreneurship (Rutashobya *et al.*, 2021). For instance, access to technology is sometimes perceived as a means for women, especially married ones, to engage in extramarital relationships:

"Sometimes, as women, our men feel that allowing us to use phones or all these other technologies like WhatsApp will make us to be promiscuous. They feel that women should not be allowed to use these things because it will make them to be seeing other men." (Participant 15, Nigeria).

Furthermore, in rural Africa, the traditional method of communication, known as the 'grapevine' or Word-of-Mouth (WoM), remains prevalent and is preferred by residents. This poses some challenges for technology acceptance (Eisingerich *et al.*, 2015; Huete-Alcocer, 2017) and integration in entrepreneurial development (Priyalatha & Malar Mathi, 2012):

"The word-of-mouth as you call it, works faster for me here." (Participant 16, Nigeria).

Apart from an over-reliance on the traditional WoM for business transactions, the intersection of digitalization and gender gap in Africa's rural entrepreneurship remains largely unexplored. Further investigation into these areas is necessary for future research.

4.2.2 Political Instability:

Political instability poses significant barriers to technology accessibility in various ways. Firstly, it disrupts infrastructure development, including telecommunications, power, and transportation networks from spreading across communities, particularly limiting technological access in remote or disadvantaged areas. Secondly, economic instability stemming from political turmoil reduces investment in technology infrastructure and innovation, exacerbating difficulties in individuals and communities' accessing and affording technology. Thirdly, frequent changes in governmental policies and regulations create uncertainty, discouraging investment in technology projects and hindering technology adoption. Lastly, armed conflicts and population displacement disrupt technology access by damaging infrastructure, displacing communities, and diverting resources from technology development efforts (Nadeem *et al.*, 2020). Consequently, participants voiced concerns about the

detrimental effects of political instability on their businesses and their long-term impact on entrepreneurial growth and development in Africa:

“I wish that the war in Sudan stops, as my business has been impacted badly by it. Actually, it is on hold now until the country becomes stable again.” (Participant 5, Egypt).

“.... my business completely stopped because of the war in Sudan.” (Participant 3, Sudan).

The above quotes highlight how political uncertainties deter both domestic and foreign investors, leading to reduced investment in technology projects and initiatives (Bastian, 2016). As a result, technological progress slows down and access to cutting-edge technologies becomes restricted in the affected regions. Addressing political instability and advocating for stability and effective governance are crucial steps in improving technology accessibility for rural entrepreneurs.

4.2.3 Lack of Technological Awareness:

Geographical location plays a crucial role in an individual's awareness of technological infrastructure. Entrepreneurs in rural areas often fall behind urban counterparts in technological knowledge due to slower dissemination of information caused by factors such as limited internet access, inadequate transportation infrastructure, and geographic distance:

“In the urban areas, these services are better but for us in the rural areas (laughs), something needs to be done because we don't have access to technology in this area...” (Participant 15, Nigeria).

In today's digital era, a large portion of information is disseminated through online platforms and digital media. Individuals and communities with limited technological access/literacy may struggle to access this information, resulting in knowledge gaps. Due to difficulty in staying abreast of entrepreneurial trends and lack of access to business development resources, decision-making is affected:

“I cannot use Twitter, Instagram and Facebook because of lack of skills and knowledge to operate these platforms” (Participant 29, Zimbabwe).

Technological literacy correlates closely with socio-economic status, as technology illiteracy increases vulnerability to cybersecurity threats such as phishing scams, malware, and identity theft. This puts

4.3.1 Client Sourcing:

Client sourcing involves identifying and acquiring potential clients and is crucial for business development and sales. Technology has transformed this process, with digital marketing channels like social media and search engines playing a key role. These platforms expand businesses' reach and enable effective engagement with potential clients. Online networking platforms provide opportunities for rural entrepreneurs to establish connections and build relationships with potential clients, facilitating client-sourcing efforts and fostering relationship-building:

“Our website and social media presence on platforms like Instagram showcase our completed projects and attract new clients.” (Participant 3, Egypt).

The above quotes highlight the advantages of utilizing technology for client sourcing. The findings specifically suggest that some entrepreneurs in rural Africa are actively using mobile devices and social media platforms like Facebook and WhatsApp for marketing purposes:

“I make use of WhatsApp and online digital marketing on platforms like Facebook and Instagram to advertise my goods.” (Participant 12, Nigeria).

This creates a mutually beneficial situation, as marketing extends beyond rural regions to target potential customers in urban areas and across various regions, countries and continents, thereby fostering opportunities for growth and expansion:

“Facebook and Pinterest have allowed us to visually showcase our bag designs, connect directly with potential buyers and also identify potential leads to sell our goods to” (Participant 30, South Africa).

By leveraging advanced tools and platforms, rural businesses can stay competitive in the modern digital landscape and effectively attract and retain new clients.

4.3.2 Customer Retention, Experience, and Satisfaction:

By leveraging data analytics and machine learning technologies, technology significantly influences customer retention, experience, and satisfaction. This empowers enterprises to customize offerings and marketing communications to individual preferences (Robinson, 2023), enhancing satisfaction and fostering loyalty. The application of AI-powered chatbots and virtual assistants has revolutionized

customer support with instant assistance and efficient issue resolution. In the area of customer relationship marketing (CRM), these advanced technologies aid in tracking customer interactions, predicting needs, and delivering personalized assistance (Miceli, 2023; Cavaliere *et al.*, 2021). Moreover, technology facilitates gathering real-time feedback through surveys, reviews, and social media platforms, enabling prompt adjustments to enhance customer experience:

“Yes, technologies have significantly improved inventory management and customer engagement through online orders and feedback systems.” (Participant 20, South Africa).

“The new technologies like smartphones, online digital platforms ... have assisted a great deal ... to meet the customers’ expectations.” (Participant 28, Zimbabwe).

Embracing technology for personalized interactions, efficient support, and feedback collection enhances the overall customer experience, which can significantly enhance customer satisfaction and retention for rural entrepreneurs. Innovations like the Internet of Things (IoT) further enhance convenience by enabling connected devices to anticipate customer needs and automate repetitive tasks, ultimately enhancing overall satisfaction.

4.3.3 Enhanced Brand Visibility and Business Expansion:

Technology offers numerous opportunities to enhance brand visibility and drive business growth. Leveraging digital marketing channels such as social media, Search Engine Optimization (SEO), content marketing, email campaigns, and online advertising can significantly increase brand exposure. Well-designed and user-friendly websites further enhance brand visibility. Incorporating technologies like responsive design and intuitive navigation enriches the user experience, leading to increased visibility and improved customer engagement:

“Modern technologies have opened up new opportunities for collaboration and global exposure.” (Participant 3, Egypt).

The above quote highlights the need for rural entrepreneurs to stay abreast of the latest technological developments to help them adapt to evolving consumer preferences to maintain competitiveness in the digital age. Active engagement on social media platforms allows businesses to build relationships, boost brand recognition, and promote products/services. The next set of quotes further shows that rural entrepreneurs are increasingly embracing this approach:

“I recently joined TikTok, and the way people advertise their business and get views and likes is really great. I have seen the power of TikTok ... I plan to start pushing my business on social media.” (Participant 13, Nigeria).

By providing cost-effective alternatives like online storefronts and remote work capabilities, technology reduces overhead costs linked to growth. In essence, by enabling agile expansion strategies and rapid response to emerging opportunities, technology equips businesses with the tools and flexibility necessary to swiftly adapt to evolving market conditions and customer preferences. Researchers have found that digital platforms enable businesses to reach a broader audience and overcome geographical constraints (Dwivedi *et al.*, 2021).

4.3.4 Efficiency in Sourcing and Distribution of Goods:

Technology plays a significant role in transforming procurement and distribution processes across various sectors. With advancements like the Global Positioning System (GPS) and IoT sensors, rural entrepreneurs can now monitor the movement of goods in real-time throughout the supply chain:

“... Technologies like GPS tracking and project management software play a significant role in optimizing the distribution process” (Participant 2, Egypt).

E-commerce platforms have revolutionized the sourcing and distribution of goods, granting consumers global access to products (Kraus *et al.*, 2021). Rural business owners are increasingly recognizing and benefiting from using technology to overcome the unique challenges facing supply chain management (SCM), especially in rural areas. Technology adoption not only enhances the efficiency of rural businesses but also connects them to the global market, fostering economic development and sustainability in these regions:

“Now, I don’t need to physically visit a supplier or any of my customers to get their orders... I use WhatsApp for most of my business discussions.” (Participant 12, Nigeria).

“...The impact is time saving and avoidance of unnecessary travel to look for goods.” (Participant 24, Zimbabwe).

The above quotes have shown that technological integration addresses challenges related to SCM. Overall, drawing insights from primary data sources and direct testimonies from participants, this section examines the significant role of technology in transforming rural entrepreneurship across

Africa. It highlights both the opportunities and challenges associated with technology adoption. Addressing these challenges requires a comprehensive approach tailored to the unique needs of rural African communities. Collaboration among corporations, government entities, NGOs, and community stakeholders are crucial to devising strategies that facilitate the seamless adoption of technology. Bridging technological disparities in rural areas is essential for driving economic development, enhancing competitiveness, and fostering innovation and business ventures. Achieving this goal requires expanding broadband infrastructure, providing digital skills education, and offering specific support for technology adoption and innovation aligned with the needs of rural enterprises.

5. Conclusions

Like previous studies on the role of entrepreneurship in transforming modern societies, this research has found that entrepreneurship development in rural Africa plays a crucial role in creating employment opportunities, improving food security, and supporting overall sustainability. However, across all five countries studied, rural entrepreneurship still exists predominantly within the informal sector (aka, the grey economy), but limited integration of modern technology limits their scalability. These entrepreneurs face financing difficulties, bureaucratic red tape, and poor infrastructure, which challenge business growth, particularly in politically unstable regions. Colonial legacies have influenced their political systems, often resulting in authoritarianism, centralized power, and corruption. Social unrest is widespread (Vines, 2023), fueled by economic struggles and governance issues. Ethnic and religious diversity contributes both to cultural richness and to conflicts in the studied regions. Although modernity and gender equality movements are emerging, their traditional values of patriarchal societies remain strong and still affecting rural women entrepreneurs in these regions. Yet, these countries also have large youth populations, offering both opportunities for growth and risks of instability. As globalization is increasingly shaping their economies and cultures, this offers both benefits and challenges, including rising inequality and dependency (African Centre for Economic Transformation, 2023). However, participants highlighted the transformative effects of mobile phones and internet access, especially for rural entrepreneurs. Specifically, these technologies have improved access to information and opened new market opportunities, with rural entrepreneurs reporting increased sales and revenue due to e-commerce and digital financial services. Mobile banking and payment platforms have addressed financial exclusion, while technology in agriculture has boosted productivity. Despite these gains, challenges remain, such as inadequate infrastructure, cybersecurity risks, and socio-cultural resistance to technology adoption, which limit its full entrepreneurial potential.

in rural areas. The findings offer several contributions to the extant literature along with offering specific practical implications, as discussed in next sub-sections.

5.1 Theoretical implications

This paper contributes to the current debate on the role of rurality and spatial contexts in rural entrepreneurial activities (e.g., Tuitjet & Thompson, 2025; Müller & Korsgaard, 2018). Although researchers have highlighted some aspects of rurality (e.g., Calispa Aguilar, 2021) which affects both entrepreneurship in the rural, and rural entrepreneurship (Korsgaard et al., 2015). Also, rural entrepreneurs' capacity to respond to increasing dynamism and complexity in social, cultural, and economic environments through rural innovation (e.g., Hunt et al., 2021), and the impact of such entrepreneurship activities on rural communities (Barber III *et al.*, 2021), have also been explored. The role of place-sensitive conditions as key determinants of strong entrepreneurial ecosystems has also been explored (e.g., Muñoz & Kimmitt, 2019). Despite this burgeoning literature on rural context and theory, there is a dearth of research examining the practical challenges (and opportunities) facing rural entrepreneurs in rural Africa, especially, in a digital era. The paper addresses this gap by exploring the interlinkages between rural entrepreneurship and digitalization in rural Africa, and the findings offer theoretical implications for rural entrepreneurship, digitalization and African management literature streams. First, it advances the DEE and TOE frameworks by contextualizing and testing their integrated applicability in a setting of pronounced institutional voids. The paper demonstrates how technological factors (infrastructure deficit), organisational factors (low human capital, gendered self-efficacy), and environmental factors (unstable governance, patriarchal norms) are not merely additive but interact in complex, multiplicative ways to constrain or enable digital adoption (George et al., 2016; Soluk et al., 2021). These finding challenges prevailing assumptions in digital entrepreneurship literature that treat these factors as independent and instead it reveals their contingent interplay in under-institutionalized contexts, thus contributing a novel theoretical insight beyond empirical replication. This application moves beyond applying known relationships to revealing their contingent interplay in institutionalized contexts. Second, by integrating gender, the study enriches gendered entrepreneurship frameworks (Brush et al., 2009) within digitalization discourse. It empirically shows how digital tools can both circumvent and reinforce traditional gender constraints, suggesting that the relationship between technology and empowerment is mediated by entrenched socio-cultural environmental factors. Therefore, expanding on recent literature (Ghouse et al., 2017, 2021), this detailed insight clarifies that digital inclusion is ineffective for rural women unless socio-cultural barriers are addressed at the same time. Moreover, by revealing the readiness level of rural

entrepreneurs in five different African countries, this paper presents evidence on pitfalls of generalizing research findings in African context, as significant differences exist in countries despite some similarities, including in the areas of digitalization and digital readiness. Hence, theorization needs to incorporate these locational differences, including in the context of rural entrepreneurship, particularly in Africa. A major implication relates to contextual theorization of the role of digitalization for rural entrepreneurship as several factors including cultural characteristics, infrastructure limitations, lack of training opportunities, political instability and lack of awareness, among others emerged as major challenges. Hence, while theorizing digitalization's role in rural entrepreneurship, the focus should be on contextual attributes and limitations, as well, along with discussing potential benefits associated with it. Finally, the paper contributes to the literature on entrepreneurship as an interplay between tradition and modernity, where innovation plays a critical role (e.g., Yamauchi & Hjorth, 2024). It provides empirical evidence of 'frugal' or 'bricolage' innovation, where rural entrepreneurs adapt limited digital tools within traditional business models and social structures. This model questions the belief that technology always evolves in a predictable, step-by-step manner. It introduces a fresh conceptual angle that differs from previous studies, which typically assumes that full digital transformation is the only viable direction. This reveals a hybrid model of digital entrepreneurship unique to resource-constrained, rural settings, challenging assumptions of linear technological progression. Rural entrepreneurship in Africa in many cases have traditional roots including inherited businesses, while at the same time, increased digitalization is bringing in modernity elements along with ensuring (frugal) innovation, which influence both operations and strategies in several ways.

5.2 Practical implications

Digitalization represents a significant growth option along with being a tool to circumvent resource and access limitations for rural entrepreneurs in Africa. Hence, to overcome the myriads of challenges found in this paper, there is a need for cross-sector collaboration between public sector bodies (policy institutions), third sector organisations (including NGOs and CSOs), and businesses to ensure that rural entrepreneurs can use these technologies for economic empowerment and growth. Specifically, policymakers and development agencies should move beyond generic broadband rollout. Initiatives must be integrated, combining infrastructure investment (Technology) with targeted digital literacy programs that build human capital and self-efficacy (Organisation), and regulatory reforms that create stable, gender-inclusive business environments (Environment), as guided by the TOE framework.

Also, rural entrepreneurs, despite having some similarities, can differ a lot based on the sector they are operating in, e.g., agricultural entrepreneurship, tourism, construction retailing, logistics, or other services. Consequently, the need for training and intervention by other stakeholders, including policymakers, tends to be different across sectors. Hence, these stakeholders should recognize these differences and develop targeted intervention and support mechanisms ensuring rural entrepreneurs gain competitiveness in their sector, rather than generic policies, whose effectiveness tends to be lower in most cases. For ecosystem builders (e.g., incubators, NGOs), the findings indicate the need for gendered support programmes. Initiatives must address not only skill gaps but also socio-cultural barriers, perhaps by engaging community leaders and designing women-only training spaces to build confidence and mitigate the ‘penalty’ identified in the DEE. Financial inclusion efforts should be coupled with digital tool training, as access to mobile money alone is insufficient without the skills to leverage it for business growth (Koomson et al., 2022). Drawing directly from the findings on socio-cultural barriers (e.g. from Participant 15, Nigeria), the paper recommends that financial institutions design gender-sensitive digital lending products that do not require male guarantors, alongside community-based digital literacy workshops specifically for married women to address patriarchal constraints. For entrepreneurs, the study highlights the tangible benefits of incremental digital adoption—even basic tools such as WhatsApp can enhance customer sourcing and supply chain efficiency. The success stories within the data serve as relatable models, demonstrating that strategically, context-appropriate technology use can yield significant returns despite systemic constraints. Forming local peer networks can facilitate knowledge sharing and collective bargaining for better digital services. For entrepreneurship education, the findings suggest curriculum redesign to include “frugal digital entrepreneurship” modules that teach low-cost, low-bandwidth digital solutions rather than assuming high-speed internet access. Ultimately, building a supportive digital entrepreneurship ecosystem in rural Africa requires a synchronized, multi-stakeholder approach that aligns technological solutions with deep organisational and environmental realities.

5.3 Limitations and future research directions

The paper has limitations as well. Firstly, there are sectoral differences due to the nature of businesses in which rural entrepreneurs are operating. For example, agricultural entrepreneurship is different than retailing which is different compared to other services such as construction, logistics or tourism, as mentioned above. The paper did not consider these sectoral differences, which can be considered a limitation and influences the findings' generalization. Future studies can build on this work and explore

these sectoral and other operational differences in rural entrepreneurs to offer more specific insights to this under-researched phenomenon in African context. Also, gender plays a critical role in rural entrepreneurship, and female entrepreneurs may face some extra challenges as well, along with the identified ones. Specifically, future research should integrate human capital and self-efficacy perspectives (Ghouse et al., 2024) with institutional and financial inclusion frameworks to examine how digital literacy and entrepreneurial confidence interact with structural constraints in rural Africa. Longitudinal and comparative designs (e.g., across African regions or between Africa and Asia) would capture entrepreneurial dynamics over time and enable cross-contextual theory development. Future studies can explore this aspect also and see if the interlinkage between digitalization and rural entrepreneurship differs among male and female entrepreneurs in Africa. The Sudanese war, while mentioned in one theme, had minimal impact on its entrepreneurial development due to its ongoing nature and limited impact beyond Sudan, except for Egypt. Additionally, the study lacked representation from East Africa, despite covering significant geographical regions like North, South, Northeastern, and West Africa. Therefore, the conclusions drawn from this study do not encompass the entire African continent, indicating the need for further extensive research. Such further studies could incorporate samples from the entire continent and utilize a mixed method to make up for the weaknesses in purely qualitative research. Finally, there is a need to undertake more studies on how modernity including digitalization is influencing traditional business especially in African rural context. Hence, specific studies on artisans, animal herders, micro-retail, logistics and services in this concern, as such studies have potential to enrich several literature streams including rural entrepreneurship.

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Appendix 1

Table 2: Participant information.

Participant Number	Gender	Age	Years in Business	Founding Year	Industry/Sector	Predominant Digital technology
1	M	62	41	1983	Luxury Furniture	Email, basic accounting software. Website, Instagram and project management tools
2	M	41	11	2013	Construction	
3	M	38	8	2016	Construction	
4	M	40	7	2017	Construction	
5	M	55	7	2017	Import – Export	
6	F	47	20	2004	Food and Beverage Packaging	
7	F	51	14	2010	Food Production	
8	M	50	30	1994	Travel and Tourism	
9	M	35	4	2020	Financial Services	
10	M	56	11	2013	Health Insurance	
11	F	28	2	2022	Online Clothing Vendor	
12	F	63	5	2019	Rice & Cooking Oil Distributor	WhatsApp, Telegram, Facebook Marketplace.
13	F	36	7	2017	Fabrics Wholesaler	WhatsApp, Instagram, Facebook Marketplace.
14	F	57	9	2015	Vegetables Wholesaler	Nil
15	F	62	5	2019	Tomatoes Wholesaler	WhatsApp
16	M	43	3	2021	Poultry Farmer	WhatsApp, Internet (Google search engine)
17	F	39	5	2019	Caterer	WhatsApp, Facebook
18	M	42	3	2021	Beauty & Cosmetics	
19	F	40	5	2019	Bakery	
20	M	38	3	2021	Hospitality	
21	M	50	4	2020	Electronics	
22	M	49	2	2022	Micro Finance	
23	M	51	5	2019	Logistics & Transport Management	
24	F	30	9	2015	Groceries Retailer	
25	M	35	11	2013	Hardware Business	
26	M	55	14	2010	Haulage	

27	M	35	1	2023	Furniture	
28	F	43	9	2015	Furniture & General Merchandise	
29	M	50	30	1994	Welding & Steel Fabrication	
30	M	43	8	2016	Computer Solutions & Repairs	GPS tracking software, cloud storage
