VOL. 11 NO. 7,
FEBRUARY, 2026
E-ISSN 3026-9679
P-ISSN 3026-9423

*African Scholar Publications & Research International*
www.africanscholarpub.com

*Journal of Business Dev. and Management Res. (JBDMR)*

# E-Commerce Diffusion and Rural Entrepreneurship Evolution in Nigeria: Evidence from Agribusiness Value Chains

**Kalu Charles Obasi, DBA[1]; & Ayodele Emmanuel Olowu, PhD[2]**

[1]Department of Business Administration, Universidad Católica de Murcia (UCAM), Spain. [2]Department of Business Management, Ballsbridge University, Dominica.

**DOI:** https://doi.org/10.70382/ajbdmr.v11i7.053

## *Abstract*

The diffusion of e-commerce has emerged as a critical driver of rural entrepreneurship, particularly within agribusiness value chains in developing economies. This study investigates how e-commerce adoption influences the evolution of rural entrepreneurship in Nigeria, with a focus on farmers, cooperatives, and Agro-processors across Oyo, Kaduna, and Rivers states. Using a quantitative survey design, data were collected from 420 rural agribusiness entrepreneurs and analyzed through structural equation modeling (SEM) to examine the relationships between e-commerce diffusion, digital literacy, adoption barriers, and entrepreneurial performance. The results indicate that e-commerce diffusion has a significant positive effect on entrepreneurial performance ($\beta = 0.43$, $p < 0.001$), while digital literacy partially mediates this relationship (VAF = 21%). Adoption barriers, including limited internet access and infrastructural deficits, negatively affect performance ($\beta = -0.22$, $p < 0.001$). The findings underscore that digital transformation, coupled with human capital development, can substantially enhance rural entrepreneurship outcomes. Policy interventions aimed at improving digital literacy, infrastructure, and financial inclusion are recommended to maximize the benefits of e-commerce in Nigeria's agribusiness sector.

**Keywords:** Agribusiness Value Chains, Digital Literacy, E-Commerce Diffusion, Rural Entrepreneurship, Structural Equation Modeling.

# Introduction

E-commerce has emerged as a transformative force in the global economy, reshaping how goods and services are exchanged, particularly in developing countries where traditional market structures have historically constrained rural producers' access to broader markets. Defined as the use of digital networks to facilitate commercial transactions between buyers and sellers, e-commerce extends beyond mere online shopping to include a suite of digital tools that improve market integration, supply-chain transparency, and transactional efficiency (Ana-Cruz, Mendoza, & Santos, 2023). In the Nigerian context, where agriculture accounts for a significant share of employment and gross domestic product, the potential of e-commerce to enhance agribusiness value chains and catalyze rural entrepreneurship is increasingly recognized as a priority for inclusive economic development (Trade.gov, 2025; CABI Agriculture & Bioscience, 2024).

Recent statistics highlight the growing relevance of digital commerce in Nigeria's rural economy. Internet penetration reached about 45 to 50% of the population in 2024, though adoption remains lower in rural areas due to infrastructure and digital literacy constraints (National Bureau of Statistics [NBS], 2024). Mobile broadband subscriptions also exceeded 92 million, indicating expanding connectivity that could support rural e-commerce participation (Nigerian Communications Commission [NCC], 2024). Nevertheless, only a small proportion of rural agricultural producers actively engage in online marketplaces, reflecting a persistent digital participation gap (Morepje, 2024). These trends emphasize the need to examine how e-commerce diffusion can enhance rural entrepreneurial outcomes in Nigeria's agribusiness value chains.

Despite its promise, the diffusion of e-commerce in Nigeria's rural areas remains uneven. Traditional barriers such as limited infrastructure, intermittent internet connectivity, and low digital literacy persistently impede the adoption and effective utilization of digital platforms among rural agrarian communities (Idu, Sennuga, & Owoicho, 2025). Research indicates that while mobile phone penetration in Nigeria is relatively high among rural farming households, actual engagement with internet-based services that support market participation and digital commerce remains limited (Fasakin Idowu James et al., 2025; Khusaini & Yusuf, 2025). These infrastructural and capability gaps constrain farmers and rural entrepreneurs from fully leveraging digital technologies to overcome endemic challenges such as price volatility, information asymmetry, and limited market reach. The literature suggests that when rural producers engage with digital platforms, significant economic benefits can accrue (Sanjay, Aparna & Sarkar, 2025; Azis et al., 2025; Morepje et al., 2024; Baker, Jackson & Cook, 2022). For example, digital marketplaces have been shown to enhance direct connections between producers and consumers, reduce the role of intermediaries, and improve price transparency across agribusiness value chains (Sadiq et al., 2025; Ambrozie, Pirju & Sorcaru, 2023). By enabling access to timely market information

and online trade mechanisms, e-commerce platforms can strengthen smallholder farmers' competitive positions and expand entrepreneurial opportunities (Wanglin et al., 2024). These innovations also facilitate youth participation in agribusiness by lowering entry barriers and enabling scalable business models that transcend traditional marketing limitations (Sadiq et al., 2025).

However, the impact of e-commerce on rural entrepreneurship is mediated by critical factors such as digital literacy and socioeconomic constraints (Liang, Mundy, & Jagwayan, 2024). Studies in Nigeria highlight that rural farmer with higher digital technology knowledge are more likely to derive enhanced value from e-commerce participation, signifying those digital skills are integral to unlocking the potential of online commerce (Amolegbe et al., 2025). Conversely, low levels of digital competence not only hinder adoption but also worsen existing inequalities, particularly for marginalized groups such as women and low-income households who face compounded barriers in accessing and engaging with digital tools (Nirmani, 2025).

Moreover, rural markets are faced with challenges such as poor transportation infrastructure and limited access to market information, which continue to pose obstacles to inclusive value-chain participation. Empirical evidence from Nigeria reveals that smallholder farmers frequently encounter high transaction costs and spatial market inefficiencies that digital innovation could help alleviate if appropriately supported by policy and investment (Ezeudu & Obimbua, 2024). Hence, the need for targeted interventions that bridge digital divides, improve infrastructure, and enhance financial inclusion is increasingly apparent in both scholarly and policy discourse.

Given these dynamics, a comprehensive analysis of how e-commerce diffusion influences rural entrepreneurship within Nigeria's agribusiness value chains is timely and policy relevant. This study contributes to the literature by examining the mechanisms through which e-commerce adoption affects entrepreneurial performance, the role of digital literacy in mediating this relationship, and the extent to which contextual barriers shape outcomes among rural agribusiness actors. By situating the investigation within the broader framework of digital transformation and rural economic development, the research offers empirical insights with implications for technology adoption strategies, capacity building, and inclusive agribusiness policy formulation in Nigeria.

***Research Objectives***

The study seeks to examine the diffusion of e-commerce and its influence on rural entrepreneurship in Nigeria's agribusiness value chains. The specific objectives are:

i. To evaluate the extent of e-commerce diffusion among rural agribusiness entrepreneurs in Nigeria.
ii. To assess the impact of e-commerce adoption on the performance of rural agribusiness entrepreneurs.
iii. To determine the mediating role of digital literacy in the relationship between e-commerce diffusion and entrepreneurial performance.

iv. To examine the effect of adoption barriers on the relationship between e-commerce diffusion and rural entrepreneurial outcomes.

***Research Questions***

Based on the objectives, the study addresses the following research questions:

i. What is the current level of e-commerce adoption among rural agribusiness entrepreneurs in Nigeria?
ii. How does e-commerce adoption influence the performance of rural agribusiness entrepreneurs?
iii. To what extent does digital literacy mediate the relationship between e-commerce diffusion and entrepreneurial performance?
iv. How do adoption barriers affect the relationship between e-commerce diffusion and rural entrepreneurial performance?

## Literature Review

***E-Commerce Diffusion and Rural Economic Transformation***

E-commerce represents a fundamental shift in how goods are marketed and transacted globally, offering rural areas an avenue to overcome traditional market limitations and integrate into broader economic networks. Studies show that e-commerce adoption in rural regions can generate inclusive economic development by improving market access, fostering entrepreneurial activity, and mitigating income inequality (Ana Cruz et al., 2023). Research on rural e-commerce ecosystems further highlights that digital platform can enhance structural connectivity between rural producers and consumers, bridging geographic and socio-economic divides (Rural e-commerce ecosystem research, 2025). However, pervasive infrastructure gaps, particularly limited internet connectivity and poor logistics, continue to inhibit the pace and scale of e-commerce diffusion in rural economies (Ana Cruz et al., 2023; Rural e-commerce ecosystem research, 2025). These constraints are especially significant in Nigerian agrarian contexts, where rural regions often struggle with basic connectivity and logistical support for digital commerce.

***Digital Platforms in Agribusiness Value Chains***

In agribusiness value chains, digital platforms are increasingly recognised as catalysts for value addition and market integration. Digital marketplaces for agricultural products improve transparency, reduce dependency on intermediaries, and support direct producer–consumer linkages, thereby increasing revenue potential for rural agri-preneurs (Sadiq, Singh, Ahmad, & Sani, 2025). Additionally, digitalization within agriculture enables real-time price discovery and optimized supply-chain coordination, contributing to enhanced market competitiveness for smallholder farmers. These platforms also facilitate youth engagement in entrepreneurship by connecting agribusiness ventures with broader digital economies and new customer segments (Sadiq et al., 2025). Despite these advantages, adoption remains uneven due to

socioeconomic and structural barriers, limiting the full potential of digital agribusiness innovations.

***Rural Entrepreneurship and Digital Adoption***

The intersection of rural entrepreneurship and digital adoption has emerged as a key research focus in understanding how technological innovations drive economic empowerment in underserved contexts (Nipo et al., 2024). Digital tools enable rural entrepreneurs to improve operational efficiency, access financing mechanisms, and leverage new business models (Olatunbosun Olalekan, 2024). However, rural entrepreneurs often face unique challenges, including low levels of digital literacy, limited access to capital, and infrastructural deficits that constrain effective engagement with e-commerce platforms (Nipo et al., 2024). Systematic reviews of rural entrepreneurship in the digital age highlight the need for tailored interventions that strengthen both human and technological capacities to fully leverage digital opportunities (Olatunbosun Olalekan, 2024).

***Digital Literacy and Technology Adoption***

Digital literacy is widely recognized as a critical determinant of technology adoption and entrepreneurial success in rural settings (Nabil, 2024). Empirical studies demonstrate that farmers with higher digital technology knowledge are more likely to value, adopt, and effectively utilize e-commerce solutions, directly enhancing entrepreneurial outcomes (Amolegbe et al., 2025). Conversely, low digital literacy exacerbates the digital divide, hindering rural actors from fully participating in digital marketplaces (Adeyemi, Magaji & Ismail, 2025). Research further shows that enhancing digital competencies enables rural entrepreneurs to transform e-commerce willingness into actual business practices, increasing sustainable participation in online commerce (Digital literacy impact studies, 2025). Thus, interventions aimed at improving digital skills are essential in unlocking the full potential of e-commerce for rural economic development.

***Barriers to E-Commerce Adoption in Rural Contexts***

Despite the transformative potential of e-commerce, numerous barriers limit adoption in rural areas. Infrastructural constraints, including unreliable electricity, limited broadband access, and inadequate transportation networks, remain central challenges that disproportionately affect rural communities (Ana Cruz et al., 2023; Adeyemi, Magaji & Ismail, 2025). Additionally, socioeconomic factors such as poverty, limited financial inclusion, and gendered digital inequalities further constrain access to digital platforms. For example, studies in Nigerian agricultural systems indicate significant gendered barriers to e-logistics and digital market engagement, with women often less able to leverage digital platforms due to lower digital literacy and restricted access to mobile technology (Daudu et al., 2025). These findings underscore the complex interplay between technology, infrastructure, and social structures in determining e-commerce adoption outcomes.

Given the multifaceted barriers, policy frameworks must prioritize investment in rural digital infrastructure, targeted digital literacy programs, and inclusive financial services to support digital entrepreneurship (Nosike, 2024). Evidence suggests that well-designed digital policies, when coupled with public–private partnerships, can enhance rural market access and the sustainability of agribusiness ventures (Amolegbe et al., 2025; Feed the Future ALL-IN research, 2024). Furthermore, inclusive innovations that address gender gaps and socioeconomic inequalities are essential to ensure equitable benefits from e-commerce diffusion. Without such supportive environments, rural communities' risk being marginalized in the rapidly evolving digital economy.

**Theoretical Framework**

The study is anchored in two complementary theoretical perspectives: the Diffusion of Innovations (DOI) Theory and the Resource-Based View (RBV) of the firm. These frameworks provide a robust lens for understanding how e-commerce adoption influences rural entrepreneurship in Nigeria's agribusiness value chains.

***Diffusion of Innovations (DOI) Theory***

The Diffusion of Innovations (DOI) Theory, proposed by Rogers (2003), explains how new ideas, technologies, or practices are adopted and spread within social systems over time. The theory identifies five key attributes: relative advantage, compatibility, complexity, trialability, and observability, that influence the adoption rate of innovations. In the context of rural Nigerian agribusiness, DOI theory offers a framework for examining how e-commerce platforms are adopted by farmers and rural entrepreneurs, and how adoption patterns vary depending on perceived benefits, accessibility, and usability. Recent studies highlight the relevance of DOI in understanding digital agriculture adoption, showing that perceived utility, ease of use, and observability strongly influence entrepreneurial engagement with e-commerce platforms (Ana Cruz et al., 2023; Sadiq et al., 2025). This study employs DOI theory to analyze how the diffusion of e-commerce technologies facilitates market integration, enhances productivity, and drives the evolution of rural entrepreneurship in agribusiness value chains.

***Resource-Based View (RBV)***

The Resource-Based View (RBV), advanced by Barney (1991), posits that firms achieve sustainable competitive advantage when they possess resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Within rural entrepreneurship, digital technologies and human capital, specifically digital literacy, constitute strategic resources that enable agribusiness entrepreneurs to exploit new market opportunities. Empirical studies suggest that e-commerce platforms function as both technological and organizational resources, while digital competencies represent human capital critical for leveraging these platforms effectively (Amolegbe et al., 2025; Olatunbosun Olalekan, 2024). By integrating DOI and RBV, this

study conceptualizes e-commerce adoption as a strategic resource whose effectiveness is mediated by digital literacy, while adoption barriers may constrain its value.

Integrating DOI and RBV offers a holistic understanding of how technological diffusion and resource endowment interact to shape rural entrepreneurship outcomes. DOI provides insight into the adoption process and the factors influencing uptake, while RBV explains how the possession and mobilization of resources, digital platforms, skills, and knowledge translate into competitive entrepreneurial performance. Together, these frameworks inform the study's objectives.

By applying these theoretical lenses, the study not only contributes to understanding digital entrepreneurship in rural contexts but also offers practical guidance for interventions aimed at enhancing e-commerce adoption and building sustainable agribusiness enterprises in Nigeria.

## Methods

### *Research Design*

This study adopted a quantitative explanatory survey design to investigate the relationship between e-commerce diffusion and the evolution of rural entrepreneurship within agribusiness value chains in Nigeria. The explanatory design is suitable for examining cause-and-effect relationships between digital adoption and entrepreneurial outcomes, including market access, income generation, and operational efficiency (Creswell & Creswell, 2021; Okoro et al., 2022). By integrating structured survey instruments and empirical data from rural agribusiness actors, the study aimed to generate statistically robust evidence on how e-commerce influences rural entrepreneurial dynamics.

### *Population and Sample*

The target population comprised rural agribusiness entrepreneurs, including farmers, cooperatives, and agro-processors, across three Nigerian states with prominent agribusiness activities: Oyo, Kaduna, and Rivers. These states were selected to represent diverse agro-ecological zones and digital adoption contexts. Based on the National Bureau of Statistics (2024) estimates, the population of registered agribusiness operators in these regions is approximately 45,000.

Using stratified random sampling, the study selected respondents proportionally from each state to ensure representation across gender, age, and enterprise type. The final sample consisted of 420 respondents, surpassing the minimum recommended threshold for structural equation modeling and regression analyses in social sciences (Hair et al., 2022).

### *Data Collection Instrument*

Data were collected using a structured questionnaire, comprising closed-ended items measured on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The instrument covered four constructs:

i. E-commerce diffusion – access to digital platforms, frequency of use, and platform diversity (Sadiq et al., 2025).
ii. Entrepreneurial performance – income growth, market reach, and operational efficiency (Abdulquadri et al., 2024).
iii. Digital literacy – skills in navigating e-commerce platforms and online transactions (Daudu et al., 2025).
iv. Barriers to adoption – infrastructural challenges, connectivity, and financial limitations (Feed the Future ALL-IN, 2024).

The questionnaire was pre-tested on 30 rural entrepreneurs in Ekiti State to ensure clarity, reliability, and contextual relevance. Cronbach's alpha for all constructs exceeded 0.78, indicating acceptable internal consistency.

***Data Collection Procedure***

Field data collection was conducted between October and December 2025. Enumerators were trained to administer questionnaires in local languages where necessary to enhance comprehension. Ethical considerations, including voluntary participation, informed consent, and confidentiality, were strictly observed in accordance with global best practice.

***Data Analysis Techniques***

Data were analyzed using SPSS v28 and SmartPLS v4. Descriptive statistics (frequencies, means, and standard deviations) were used to summarize demographic and baseline variables. For inferential analysis, structural equation modeling (SEM) was applied to examine relationships between e-commerce diffusion, digital literacy, and entrepreneurial outcomes, while accounting for mediating and moderating effects. Effect sizes, path coefficients, $R^2$, and $Q^2$ values were computed to determine the strength and predictive relevance of the model (Hair et al., 2022). Additionally, hierarchical regression analysis was employed to identify key barriers influencing adoption levels and performance outcomes.

***Ethical Considerations***

The study adhered to established ethical standards for research involving human participants. Participation was voluntary, and respondents were informed about the purpose of the study, the confidentiality of responses, and their right to withdraw at any time. No personally identifiable information was collected, and all data were used strictly for academic research purposes (Creswell, 2014).

**Results**

***Measurement Model Assessment***

Each construct in the questionnaire was measured using multi-item scales adapted from validated digital entrepreneurship and technology adoption studies. E-commerce diffusion captured platform access, transaction frequency, tool diversity, online market engagement,

and digital payments. Entrepreneurial performance included income growth, market expansion, sales efficiency, and productivity. Digital literacy assessed skills in navigating platforms, conducting transactions, managing digital records, and accessing market information, while adoption barriers covered connectivity, infrastructure, financial constraints, and technological complexity. All items were contextualized to the Nigerian agribusiness environment based on established literature (Okoro et al., 2022; Hair et al., 2022; Nabil, 2024).

**Table 1: Measurement Model Statistics**

| Construct | Factor Loading Range | Cronbach Alpha | Composite Reliability | AVE |
|---|---|---|---|---|
| **E-commerce diffusion** | 0.71–0.88 | 0.84 | 0.89 | 0.61 |
| **Digital literacy** | 0.73–0.86 | 0.82 | 0.88 | 0.59 |
| **Adoption barriers** | 0.70–0.85 | 0.80 | 0.86 | 0.56 |
| **Entrepreneurial performance** | 0.72–0.90 | 0.87 | 0.91 | 0.64 |

**Source: Author Computation (2026)**

**Objective 1:** To evaluate the extent of e-commerce diffusion among rural agribusiness entrepreneurs in Nigeria

Descriptive statistics were used to assess the level of e-commerce diffusion among rural agribusiness entrepreneurs. Indicators included access to digital platforms, frequency of online transactions, and diversity of e-commerce tools used across agribusiness value chain activities.

**Table 2: Descriptive Statistics for E-Commerce Diffusion**

| Indicator | Mean | SD | Interpretation |
|---|---|---|---|
| **Access to e-commerce platforms** | 3.81 | 0.72 | Moderate–High |
| **Frequency of online transactions** | 3.68 | 0.66 | Moderate |
| **Use of multiple digital platforms** | 3.79 | 0.65 | Moderate–High |
| **Overall e-commerce diffusion** | 3.76 | 0.68 | Moderate–High |

**Source: Author Computation (2026)**

The results in Table 2 indicate a moderate to high level of e-commerce diffusion among rural agribusiness entrepreneurs (M = 3.76). This suggests that while many rural entrepreneurs have begun integrating digital platforms into their business operations, adoption is not yet optimal. The findings reflect a transitional phase of digital engagement, where basic usage, such as mobile-based marketing and price inquiries, is more prevalent than advanced e-commerce functionalities like integrated logistics or digital payment systems.

This result is consistent with empirical evidence from Nigeria showing that rural farmers increasingly use digital platforms for market information but face constraints in fully operationalizing e-commerce due to infrastructural and capability limitations (Fasakin Idowu

James et al., 2025; Khusaini & Yusuf, 2025). Similar patterns have been reported in sub-Saharan Africa, where e-commerce diffusion progresses incrementally rather than uniformly across rural economies (Ana-Cruz et al., 2023).

**Objective 2:** To assess the impact of e-commerce diffusion on rural entrepreneurial performance

Structural equation modeling (SEM) was used to examine the direct effect of e-commerce diffusion on entrepreneurial performance.

**Table 3: Path Coefficients for Direct Effects**

| Path | β | t-value | p-value | $f^2$ | Decision |
|---|---|---|---|---|---|
| **E-commerce diffusion → Entrepreneurial performance** | 0.43 | 6.21 | <0.001 | 0.19 | Supported |

**Source: Author's Computation (2026)**

The results in Table 3 show that e-commerce diffusion has a positive and statistically significant effect on rural entrepreneurial performance ($\beta = 0.43$, $p < 0.001$). The effect size ($f^2 = 0.19$) indicates a moderate substantive impact, suggesting that digital commerce is a meaningful driver of performance improvements such as income growth, market expansion, and operational efficiency.

This finding supports the Diffusion of Innovations Theory, which posits that innovations perceived as advantageous tend to enhance performance outcomes once adopted (Rogers, 2003). Empirically, the result aligns with studies demonstrating that e-commerce platforms reduce transaction costs, enhance price transparency, and strengthen producer–consumer linkages in agribusiness value chains (Sadiq et al., 2025; Abdulquadri et al., 2024).

However, the magnitude of the coefficient, while strong, also implies that e-commerce alone does not fully explain entrepreneurial success, reinforcing arguments that complementary capabilities and enabling environments are essential (Okoro et al., 2022).

Objective 3: To determine the mediating role of digital literacy in the relationship between e-commerce diffusion and entrepreneurial performance

A bootstrapped mediation analysis was conducted using 5,000 resamples.

**Table 4: Mediation Analysis Results**

| Path | Direct Effect | Indirect Effect | Total Effect | VAF (%) | Mediation Type |
|---|---|---|---|---|---|
| **E-commerce → Digital literacy → Performance** | 0.43 | 0.12 | 0.55 | 21% | Partial mediation |

**Source: Author's computation (2026)**

Digital literacy was found to partially mediate the relationship between e-commerce diffusion and entrepreneurial performance (VAF = 21%). This indicates that while e-commerce

adoption directly improves performance, a significant proportion of its impact operates through enhanced digital competencies.

This result strongly supports the Resource-Based View (RBV), which emphasizes that technological resources yield competitive advantage only when effectively combined with human capital capabilities (Barney, 1991). Rural entrepreneurs with higher digital literacy are better positioned to translate e-commerce adoption into tangible performance gains.

The finding is consistent with recent Nigerian studies showing that digital skills significantly condition the economic returns from technology adoption in agriculture (Amolegbe et al., 2025; Daudu et al., 2025). In contrast, some earlier studies assumed technology adoption alone was sufficient for performance improvement (Ali et al., 2022; Palad, 2023). The present result challenges this assumption by empirically demonstrating the importance of capability mediation.

Objective 4: To examine the effect of adoption barriers on rural entrepreneurial performance

Adoption barriers were modeled as a direct predictor of entrepreneurial performance.

**Table 5: Effect of Adoption Barriers**

| Path | B | t-value | p-value | $f^2$ | Interpretation |
|---|---|---|---|---|---|
| **Adoption barriers → Entrepreneurial performance** | –0.22 | 3.58 | <0.001 | 0.08 | Negative, significant |

**Source: Author's Computation (2026)**

Adoption barriers exert a significant negative effect on entrepreneurial performance ($\beta = -0.22$, $p < 0.001$). Although the effect size is small-to-moderate ($f^2 = 0.08$), its statistical significance highlights the persistent constraints imposed by poor infrastructure, unreliable internet connectivity, and limited financial access.

This finding corroborates evidence from rural Nigeria showing that infrastructural deficits systematically reduce the effectiveness of digital technologies in agribusiness (Feed the Future ALL-IN, 2024; Adeyemi et al., 2025). It also aligns with broader African studies, indicating that digital divides continue to moderate the inclusiveness of e-commerce diffusion (Ana-Cruz et al., 2023).

Notably, the result contrasts with studies in more digitally mature rural economies where infrastructural barriers play a diminishing role, underscoring the context-specific nature of digital entrepreneurship outcomes.

**Model Explanatory and Predictive Power**

**Table 6: Coefficient of Determination and Predictive Relevance**

| Construct | $R^2$ | $Q^2$ | Interpretation |
|---|---|---|---|
| **Entrepreneurial performance** | 0.52 | 0.35 | Substantial explanatory and predictive power |
| **Digital literacy** | 0.46 | 0.29 | Moderate–strong predictive relevance |

**Source: Author's Computation (2026)**

The $R^2$ value of 0.52 indicates that over half of the variance in entrepreneurial performance is explained by e-commerce diffusion, digital literacy, and adoption barriers. $Q^2$ values above zero confirm strong predictive relevance, validating the robustness of the SEM model (Hair et al., 2022).

Overall, the results demonstrate that e-commerce diffusion is a significant catalyst for rural entrepreneurship evolution, but its effectiveness is contingent upon digital literacy and the alleviation of structural barriers. The findings empirically integrate DOI and RBV perspectives, advancing the literature by showing that digital technologies must diffuse alongside human capital development to generate sustainable entrepreneurial outcomes in rural agribusiness value chains.

**Discussion**

The findings of this study provide empirical evidence on how e-commerce diffusion shapes the evolution of rural entrepreneurship in Nigerian agribusiness value chains. The positive and significant effect of e-commerce adoption on entrepreneurial performance ($\beta = 0.43$, $p < 0.001$) confirms that digital trading platforms play a pivotal role in expanding market access, improving operational efficiency, and enhancing income generation among rural agribusiness operators. These results align with prior studies emphasizing that digital marketplaces reduce transaction costs, facilitate direct linkages with consumers, and enhance the competitiveness of rural producers (Abdulquadri et al., 2024; Sadiq et al., 2025). The integration of e-commerce within agribusiness value chains thus serves not only as a commercial tool but also as a catalyst for rural entrepreneurship development.

The study further reveals that digital literacy significantly influences entrepreneurial outcomes ($\beta = 0.28$, $p < 0.001$), acting as a partial mediator in the relationship between e-commerce adoption and entrepreneurial performance. This underscores the importance of human capital in the digital economy, suggesting that the benefits of e-commerce are contingent upon the ability of rural entrepreneurs to navigate online platforms effectively. These findings are consistent with the Technology Acceptance Model (TAM), which posits that perceived ease of use and digital competency are critical determinants of technology adoption and its subsequent impact (Davis, 1989; Daudu et al., 2025). In the Nigerian context, rural operators with higher digital literacy are more capable of leveraging online tools to expand their customer base, access price information, and coordinate supply chain activities efficiently.

Despite the overall positive outcomes, adoption barriers—such as poor internet connectivity, inadequate infrastructure, and limited financial resources—exert a negative effect on entrepreneurial performance ($\beta = -0.22$, $p < 0.001$). This finding corroborates recent evidence highlighting the persistent digital divide in rural Nigeria, which constrains the equitable diffusion of e-commerce and limits its potential impact on inclusive rural development (Feed the Future ALL-IN, 2024; Okoro et al., 2022). Policy interventions aimed at improving rural broadband infrastructure, digital financial inclusion, and capacity building are therefore

essential to enhance the effectiveness of e-commerce platforms as instruments for rural entrepreneurship evolution.

The $R^2$ value of 0.52 for entrepreneurial performance indicates that over half of the variance in rural entrepreneurship outcomes is explained by e-commerce diffusion, digital literacy, and adoption barriers. This substantial explanatory power confirms the critical role of digital transformation in shaping rural entrepreneurial ecosystems in Nigeria. The $Q^2$ values above zero further indicate that the model has predictive relevance, affirming the utility of SEM for investigating technology-driven entrepreneurial phenomena in agribusiness contexts.

The study contributes to the literature in several ways. First, it extends the understanding of e-commerce diffusion beyond urban SMEs, highlighting its impact on rural entrepreneurship and agribusiness value chains—a relatively underexplored area in Nigerian research. Also, by demonstrating the mediating role of digital literacy, it integrates human capital considerations into models of digital technology adoption and entrepreneurial performance. Finally, the study provides actionable insights for policymakers and development agencies: targeted training programs, infrastructural investment, and digital financial inclusion strategies are likely to enhance rural entrepreneurs' capacity to capitalize on e-commerce opportunities.

In conclusion, the evidence underscores that e-commerce diffusion, coupled with adequate digital literacy, is a key driver of rural entrepreneurship evolution in Nigeria's agribusiness value chains. Addressing adoption barriers remains crucial to ensuring that digital transformation translates into sustainable economic empowerment for rural communities.

**Limitations of the Study**

Despite the empirical and theoretical contributions of this study, limitations are acknowledged in interpreting the findings. First, the study employed a cross-sectional research design, which captures respondents' perceptions and behaviors at a single point in time. While this design is suitable for examining relationships among variables, it limits the ability to make strong causal inferences regarding the long-term effects of e-commerce diffusion on rural entrepreneurship evolution. Changes in digital adoption and entrepreneurial outcomes may occur over time and cannot be fully captured within the study period.

Also, data were collected using self-reported survey instruments, which may be subject to response bias, including social desirability and recall bias. Rural entrepreneurs may overstate their level of e-commerce usage or entrepreneurial performance, particularly in contexts where digital adoption is socially perceived as progressive or desirable.

Although the study covered multiple Nigerian states to enhance contextual diversity, the findings may not be fully generalizable to all rural agribusiness contexts in Nigeria. Variations in infrastructure, institutional support, cultural practices, and agro-ecological conditions across regions may influence the diffusion and impact of e-commerce in ways not fully captured in the selected sample.

Finally, the study focused primarily on e-commerce diffusion, digital literacy, and adoption barriers, potentially overlooking other influential factors such as institutional trust, platform

governance, digital financial inclusion, and the role of cooperatives or intermediaries in facilitating digital market participation.

### Suggestions for Further Research

Building on the limitations identified, several directions for future research are recommended. First, future studies could adopt a longitudinal research design to examine how e-commerce adoption and rural entrepreneurial performance evolve. Such an approach would provide deeper insights into causality, learning effects, and the sustainability of digital entrepreneurship outcomes.

Subsequent research may incorporate qualitative or mixed-methods approaches, such as in-depth interviews or case studies, to complement quantitative findings. This would enable a richer understanding of how rural entrepreneurs experience e-commerce adoption, negotiate platform constraints, and adapt digital tools to local agribusiness realities.

Future studies could expand the analytical model by including institutional and policy variables, such as regulatory support, digital payment infrastructure, trust in online platforms, and the role of government or donor-led digital initiatives. Examining these factors would enhance understanding of the broader ecosystem shaping rural e-commerce diffusion.

Also, comparative research across different countries or regions in sub-Saharan Africa would help determine whether the observed relationships are context-specific or generalizable across similar developing economies. Cross-country studies could also identify best practices and policy lessons applicable to Nigeria.

Finally, future research may explore disaggregated effects of e-commerce adoption, particularly across gender, youth, and enterprise size categories, to better understand inclusion dynamics and differential impacts within rural agribusiness value chains.

### References


Abdulquadri, A. O. A., Aliyu, A. O., Suleiman, W. O., & Yahaya, B. O. (2024). Transforming Nigeria's agricultural value chains: The role of digital platforms in market access and price transparency. *UNIZIK Journal of Marketing, 1*(2), 37–57. https://journals.unizik.edu.ng/ujofm/article/view/4541

Adeyemi, O. J., Magaji, S., & Ismail, Y. (2025). Technology tracks tradition: Investigating the obstacles to digital agriculture in rural Nigeria. *African Journal of Sustainable Agricultural Development*. https://doi.org/10.5281/zenodo.17260290

Ali O., Murray P.A., Muhammed S., Dwivedi Y. K., Rashiti S. (2022). Evaluating Organizational Level IT Innovation Adoption Factors among Global Firms, Journal of Innovation & Knowledge, Vol 7(3), https://doi.org/10.1016/j.jik.2022.100213.

Ambrozie, A., Pirju I., Sorcaru, S. (2023). Digital transformations in modern supply chains: An integrated analysis. Communications of International Proceedings. https://doi.org/10.5171/2023.4229023.

Amolegbe, K. B. (2025). Digital technology knowledge and farmers' e-commerce valuation in Nigeria. *China Agricultural Science Journal*. https://www.chinaagrisci.com/Jwk_zgnykxen/EN/abstract/abstract565161.shtml

Ana-Cruz, A., Mendoza, G., & Santos, A. (2023). E-commerce adoption in rural areas: Challenges and opportunities. *International Conference on E-Business*. https://doi.org/10.55606/iceb.v2i1.489

Azis, A., Bilyaro, W., Dani, M., Ramadhanti, N., Chaniago, R., Mahfudz, A. A., Hamka, M.S., & Saputri, K. (2025). Innovative Business Models in the Livestock Sector for Sustainable Development. Bulletin of Tropical Animal Science. 6(2), 111-122. DOI:10.31186/bpt.6.2.111-122

Baker D., Jackson E. & Cook S. (2022). Perspectives of digital agriculture in diverse types of livestock supply chain systems. Making sense of uses and benefits. Frontiers in Veterinary Science, 9. https://doi.org/10.3389/fvets.2022.992882.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

CABI Agriculture & Bioscience. (2024). Challenges and strategies in Nigerian agribusiness entrepreneurship for sustainable development. *CABI Agriculture and Bioscience*. https://doi.org/10.1186/s43170-024-00303-5

Creswell, J. W., & Creswell, J. D. (2021). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Daudu, A. K., Aderinoye-Abdulwahab, S. A., & Kareem, O. W. (2025). Gendered access to e-logistics platforms in urban agriculture: Micro-level evidence from Nigeria. *Journal of Innovation and Entrepreneurship, 14*, 143. https://doi.org/10.1186/s13731-025-00605-6

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Ezeudu, T. S., & Obimbua, E. N. (2024). Enhancing rural market access and value chain integration for sustainable agricultural development in Nigeria. *International Journal of Research and Innovation in Social Science*. https://doi.org/10.47772/IJRISS.2024.803039

Fasakin Idowu James, Adesanya, O. T., Ajayi, K. O., & Adedigba, M. Y. (2025). Gender perspective on the drivers of ICT (mobile phone) usage among rural farming households in Nigeria. *Journal of Global Economics, Management and Business Research, 17*(3), 486–503. https://doi.org/10.56557/jgembr/2025/v17i310005

Feed the Future ALL-IN. (2024). *Digital literacy, output market access, and demand for rural e-commerce in Nigeria*. USAID. https://basis.ucdavis.edu/project/digital-literacy-output-market-access-and-demand-rural-e-commerce-nigeria

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.

Idu, E. E., Sennuga, S. O., & Owoicho, A. (2025). Assessment of the socioeconomic factors affecting smallholder rice farmers' use of ICTs to access market information in Nasarawa State, Nigeria. *Direct Research Journal of Agriculture and Food Science, 13*(1), 64–71. https://journals.directresearchpublisher.org/index.php/drjafs/article/view/33

Khusaini, N. & Yusuf, M. (2025). The Importance of Digital Record-Keeping Among Urban Agriculture Communities: A Review. *Journal of Information Systems and Technology Management.* 10. 170-185. 10.35631/JISTM.1040012.

Liang, J., Mundy, R. & Jagwayan, S. (2024). E-Commerce in Africa: Divergent Impacts on Rural and Urban Economies. 10.48550/arXiv.2412.03879.

Morepje, M. T., Sithole, M. Z., Msweli, N. S., & Agholor, A. I. (2024). The Influence of E-Commerce Platforms on Sustainable Agriculture Practices among Smallholder Farmers in Sub-Saharan Africa. *Sustainability*, *16*(15), 6496. https://doi.org/10.3390/su16156496

Nabil A. (2024). The impact of digital literacy and technology adoption on financial inclusion in Africa, Asia, and Latin America. Vol 10 (24). https://doi.org/10.1016/j.heliyon.2024.e40951.

National Bureau of Statistics. (2024). *Information and communication technology (ICT) sector report 2024*. Abuja: NBS. Home | National Bureau of Statistics

National Health Research Ethics Committee. (2021). *Ethical guidelines for research involving human participants in Nigeria*. Federal Ministry of Health.

Nigerian Communications Commission. (2024). *Subscriber statistics and internet penetration report*. Abuja: NCC. Annual Reports | NCC

Nipo, D. & Lily, J, & Fabeil, N. & Jamil, I. (2024). Transforming Rural Entrepreneurship Through Digital Innovation: A Review on Opportunities, Barriers, and Challenges. Journal of Management and Sustainability. 14. 114-114. 10.5539/jms.v14n2p114.

Nirmani, P. (2025). Barriers to digital participation in developing countries: Identifying technological, social, and cultural obstacles to community involvement. GSC Advanced Research and Reviews. 23. 061-071. 10.30574/gscarr.2025.23.2.0130.

Nosike, C. (2024). Digitalization in Developing Countries: Opportunities and Challenges. 4. (PDF) Digitalization in Developing Countries: Opportunities and Challenges

Okoro, E. C., Udeh, F., & Nwosu, P. O. (2022). Digital adoption and entrepreneurial performance: Evidence from Nigerian SMEs. *African Journal of Economic and Management Studies, 13*(4), 510–528. https://doi.org/10.1108/AJEMS-08-2022-0145

Olatunbosun, O. O. (2024). Rural entrepreneurship in the digital age: A systematic review. *International Journal of Sustainable Rural Development, 1*(1), 1–18. https://doi.org/10.54536/ijsrd.v1i1.2586

Palad, J. (2023). Strategies for Improving Organizational Efficiency, Productivity, and Performance through Technology Adoption. Journal of Management and Administration Provision. 2. 88-94. 10.55885/jmap.v2i3.230.

Punch Nigeria. (2025). *How rural e-commerce in Nigeria is transforming communities*. https://punchng.com

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Rural e-commerce ecosystem research. (2025). Rural e-commerce ecosystem development paths amid digital transformation. *SAGE Open*. https://doi.org/10.1177/21582440251382573

Sadiq, M. S., Singh, I. P., Ahmad, M. M., & Sani, B. S. (2025). Digital marketplaces for farm products: Building an online platform for youth-driven agribusiness in Nigeria. *Innovare Journal of Agricultural Sciences*. https://journals.innovareacademics.in

Sanjay V.C., Aparna J.R., & Sarkar, T. (2025). Digital Marketplaces and E-Commerce Platforms for Agricultural Producers. E-Extension in Agriculture: Digital Platforms for Knowledge Dissemination (PDF) Digital Marketplaces and E-Commerce Platforms for Agricultural Producers

Trade.gov. (2025). *Nigeria – Agriculture sector overview*. U.S. Department of Commerce. https://www.trade.gov/country-commercial-guides/nigeria-agriculture-sector

Wanglin M., Dil-Bahadur R., Tetsushi S., Binlei G. (2024). Linking farmers to markets: Barriers, solutions, and policy options. *Economic Analysis and Policy*, Vol 82;1102-1112,https://doi.org/10.1016/j.eap.2024.05.005.