IMPACT OF DIGITAL ENTREPRENEURSHIP ON ECONOMIC GROWTH IN NIGERIA

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Abstract
Digital entrepreneurship is one of the fastest-growing industries in the world. Nigerians are facing systemic challenges like infrastructural deficiencies, regulatory bottlenecks, limited finance access, inadequate digital skills, and cybersecurity concerns, hindering its potential to drive economic growth. This study, therefore, seeks to fill these critical gaps by incorporating key digital entrepreneurship indicators namely Internet Penetration Rate (IPR), mobile phone penetration rate (MPR), and the number of internet users (NIU) into a comprehensive analysis of their collective impact on Nigeria's economy. The study used a cross-sectional survey and descriptive survey research design since its primary objective was to determine the impact of digital entrepreneurs on economic growth in Nigeria, focusing on the internet penetration rate, MPR, and number of Internet users (NIU). The study comes to the conclusion that Nigerian's economic growth is greatly boosted by the IPR. It is recommended that to maximize IPR's impact, prioritize investing in internet infrastructure, especially in rural areas.

Keywords: Penetration, digital, internet, and entrepreneurship.

1. Introduction

Economic growth, typically measured by GDP, reflects a country's output and long-term prosperity (Chukwuka & Imide, 2024). In Nigeria, sustained growth is vital for reducing poverty and improving living standards (Romer, 1986). While the government has promoted SME-led growth (Etuk, Etuk &Baghebo, 2014), events like the -1.79% GDP decline in 2020 due to COVID-19 (AfDB, 2023) highlight the need for innovation-driven resilience.

Digital entrepreneurship—driven by technologies like the internet and mobile phones—has become a key driver of productivity, innovation, and cost efficiency in Nigeria's economy (Rahman, 2017; Dutz & Kharas, 2018; Asongu, 2020). Internet penetration reached 47.1% in 2019, and internet users rose from 92.6 million in 2018 to 123.5 million in 2019, spurred by affordable smartphones (NCC, 2021). Similarly, mobile phone penetration, now over 80%, has enabled access to e-commerce, fintech, and mobile services (Aker & Mbiti, 2018; ITU, 2019). Government efforts and population dynamics pushed internet users to 154.3 million by 2021 (Dele, 2024; Awoleye et al., 2017).

However, economic vulnerability persists due to oil dependence and challenges such as poor infrastructure, regulatory complexity, limited financing, low digital skills, and cybersecurity risks (IMF, 2023; Adebayo & Yusuf, 2021; Okeke et al., 2021; Chukwu, 2022). Shortages in digital expertise further constrain business growth (Agbo & Olawale, 2022).

This study fills a research gap by jointly analyzing internet penetration, mobile phone usage, and number of internet users; offering a comprehensive view of how digital entrepreneurship influences economic growth in Nigeria. This integrated approach provides more accurate, context-specific insights for policy and sustainable development (Odeyemi, 2023; Pigola, Fischer & Moraes, 2024).

2. Literature Review

2.1 Conceptual Review

2.1.1 Economic Growth

Economic growth is broadly defined as the sustained increase in an economy's ability to produce goods and services over time. It is commonly measured by the rise in Gross Domestic Product (GDP) and reflects improvements in key indicators such as output, income, employment, and productivity (Acemoglu et al., 2012; Mankiw, 2014). This growth is driven by a combination of factors including capital accumulation, technological advancement, and policy and institutional reforms (Rodrik, 2013; Barro & Sala-i-Martin, 2015). Furthermore, economic growth encompasses structural transformation and technological progress that result in higher per capita income and improved living standards (Krugman & Obstfeld, 2018). Overall, it is both a quantitative and qualitative process involving the expansion and modernization of a nation's economic capacity.

2.1.2 Digital Entrepreneurship

Digital entrepreneurship involves creating, managing, and expanding ventures that utilize digital technologies to deliver innovative products, services, and business models. It is characterized by agility, customer focus, and rapid adaptation (Shane, 2017; Mata & Quesada-Pineda, 2016; Coviello et al., 2017). Entrepreneurs in this domain rely on tools like the internet, mobile devices, and social media to disrupt traditional sectors, create new markets, and boost global competitiveness (Wu & Wu, 2015; Kuckertz& Wagner, 2017; Berthon et al., 2012). By leveraging emerging technologies, digital entrepreneurship contributes significantly to both economic growth and societal (Chen et al., 2015).

Internet Penetration Rate (IPR) measures the share of a population with internet access and indicates digital development levels. In 2018, the global average was 53.6% (ITU, 2019).

Mobile Phone Penetration Rate (MPR) reflects the percentage of people using mobile phones; in some developed countries, it exceeds 100% due to multiple device ownership (ITU, 2019).

Number of Internet Users (NIU) refers to the total individuals using the internet. In Southeast Asia, there were 360 million users in 2019 with a 63% penetration rate, mostly accessing the web via mobile devices (We Are Social & Hootsuite, 2019).

2.2 Empirical Review

Empirical studies highlight the strong link between digital entrepreneurship, connectivity, and economic growth. In Finland, Kivimaki et al. (2020) found digital entrepreneurship boosts innovation and job creation. Similar results were reported in Australia by Damanpour et al. (2020) and Shanmugam & Swamy (2021), emphasizing enhanced productivity and competitiveness. In Malaysia, Lim et al. (2021) showed that digital entrepreneurship, especially in e-commerce, positively affects profitability and growth.

Haini (2022) and Haini& Pang (2022) demonstrated that internet access and financial inclusion promote business formation in ASEAN countries. In Europe, Bayar et al.

(2021) linked mobile and internet use to improved financial inclusion. Wang et al. (2022) showed that internet development supports green growth in China. In Nigeria, Leo and Clement (2022) found mobile broadband boosts economic growth, though employment effects were mixed, while Salisu and Zainab (2024) reported negative impacts due to ICT sector constraints.

Adam and Alhassan (2021) emphasized the importance of ICT regulation over mere access, and Nakpodia et al. (2024) highlighted digital tools' role in supporting resilience among social enterprises during crises.

Theoretically, the findings align with endogenous growth theory, showing that digital connectivity and entrepreneurship drive economic development. However, infrastructural and regulatory barriers can limit these.

* H_{01}: Internet penetration rate has no significant impact on economic growth in Nigeria.

* H_{02}: Mobile phone penetration rate has no significant impact on economic growth in Nigeria.

* H_{03}: Number of internet users has no significant impact on economic growth in Nigeria.

2.3 Theoretical framework

This study employs two theoretical frameworks—Diffusion of Innovation Theory (Rogers, 2003) and Digital Divide Theory (Van Dijk, 2005)—to explore how internet penetration influences digital entrepreneurship in Nigeria.

Diffusion of Innovation Theory explains how new technologies, such as the internet, are adopted across different segments of society, from innovators to laggards. In Nigeria, increasing internet access has facilitated the spread of digital tools, enabling more individuals to engage in online entrepreneurship, thereby enhancing productivity and economic growth.

Digital Divide Theory addresses the disparities in access to digital technologies, highlighting how factors like infrastructure, digital literacy, and economic status can hinder participation in the digital economy. In Nigeria, these disparities mean that not everyone benefits equally from digital opportunities. Bridging this divide through

targeted policies can promote inclusive digital entrepreneurship and broader economic development.

Together, these frameworks underscore the importance of both widespread technology adoption and equitable access in fostering digital entrepreneurship and driving Nigeria's economic progress.

2.4 Conceptual Framework

The author of this study developed a research model, which serves as the foundation for all of the postulated propositions regarding the study variables. Figure show the link between the variables, Digital Entrepreneurship oneconomic growth was explained by the model.

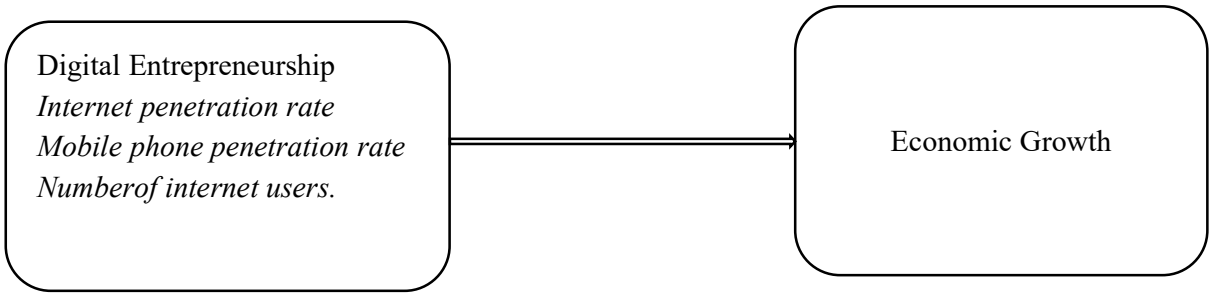


Figure 1. Conceptual framework of the study

3. Methodology

3.1 Research Design

This study used a cross-sectional descriptive survey to assess how digital entrepreneurship affects economic growth among microenterprises in Kaduna metropolis, Nigeria. The target population comprised 15,558 microenterprises registered in the 2019 Kaduna State Bureau of Statistics frame, spanning Kaduna North, Kaduna South, and parts of Chikun and Igabi LGAs.

A sample of 376 was calculated using the Krejcie–Morgan table, then increased by 30% (113 extra) to buffer against non-response, resulting in 489 invited participants.

Stratified proportionate random sampling ensured representation across the four LGAs: Kaduna North (131), Kaduna South (106), Igabi (85), and Chikun (167).

Data collection involved a 25-item Likert-scale questionnaire measuring two constructs;
Digital entrepreneurship: using indicators such as Internet, mobile, and user penetration rates, each with six items drawn from established scales.
Economic growth:assessed via seven items adapted from existing frameworks, covering factors like employment, productivity, wages, business expansion, consumer demand, infrastructure, and living standards.

Instrument validity was confirmed via expert review; a pilot with 35 managers in Zaria (excluded later) showed good reliability via Cronbach's alpha. Out of 489 distributed questionnaires, 406 were returned (83% response rate). Data were analyzed using Structural Equation Modeling (SEM) in SmartPLS 4.0 to test three hypotheses.

4. Results and Discussion

The measurement model's quality was evaluated to confirm the reliability and validity of its constructs:

Internal consistency reliability was confirmed using both Composite Reliability (CR) and Cronbach's Alpha, adhering to the standard threshold of ≥ 0.70 per Bagozzi & Yi (1988) and Hair et al. (2011). All constructs; independent, dependent, and mediators—exceeded this benchmark, demonstrating strong reliability.

Convergent validity was assessed by examining Average Variance Extracted (AVE) and outer factor loadings. All items had loadings above 0.70, except one marginally lower item retained due to its theoretical importance. All constructs achieved AVE ≥ 0.50, confirming they captured sufficient variance from their indicators.

Overall, the constructs demonstrated robust internal consistency and valid convergence, supporting their use in the structural model.

Table 3: Item loadings, CA, CR and AVE values.

Items	Items loading	VIF	CA	CR	AVE
EG1	0.748	2.007	0.778	0.850	0.534
EG2	0.595	1.341			
EG4	0.816	1.832			
EG5	0.785	2.198			
EG6	0.690	1.541			
IPR1	0.661	1.543	0.856	0.894	0.588
IPR2	0.728	1.806			
IPR3	0.604	1.444			
IPR4	0.811	2.276			
IPR5	0.890	4.244			
IPR6	0.865	3.980			
MPR1	0.843	3.755			
MPR2	0.749	1.801	0.895	0.919	0.656
MPR3	0.737	2.023			
MPR4	0.833	3.540			
MPR5	0.859	3.134			
MPR6	0.829	2.306			
NIU1	0.766	1.597	0.838	0.919	0.656
NIU2	0.715	1.844			
NIU3	0.738	1.641			
NIU4	0.734	2.497			
NIU5	0.707	2.224			
NIU6	0.741	1.806			

Source: Smart-PLS Output (2025)

4.1 Discriminant validity

According to Hair et al. (2019), a construct demonstrates convergent validity when its AVE is at least 0.50 and outer loadings generally exceed 0.70. As shown in Table 1, all items met these criteria, with only one item slightly below 0.70, which was retained due to its relevance.

Table 4. Fornell-Lacker criteria.

Constructs	EG	IPR	MPR	NIU
EG	0.731			
IPR	0.838	0.767		
MPR	0.836	0.951	0.810	
NIU	0.688	0.471	0.425	0.734

Source: Smart-PLS Output (2025)

Table 5. Heterotrait-Monotrait ratio (HTMT).

Constructs	EG	IPR	MPR	NIU
EG				
IPR	0.999			
MPR	0.968	1.088		
NIU	0.792	0.504	0.425	

Source: Smart-PLS Output (2025)

4.2 Model Fitness

Before evaluating the structural model, multicollinearity was assessed using the Variance Inflation Factor (VIF). Following Hair et al. (2019), VIF values below 5 indicate no multicollinearity issues. All exogenous variables in this study had VIF values under 5, confirming the absence of multicollinearity, as shown in Table 3.

4.3 Structural Model Assessment

The **coefficient of determination (R^2)**is a key measure in PLS-SEM used to assess the explanatory power of the model. It represents the combined effect of exogenous latent variables on the endogenous construct (Hair et al., 2014). In this study, digital entrepreneurship indicators; **Internet Penetration Rate (IPR), Mobile Phone Penetration Rate (MPR),** and **Number of Internet Users (NIU)**, explain **83.7%**of the variance in **economic growth (EG).** Additionally, the **Q^2 value of 0.441,** being above zero, indicates that the model has good predictive relevance.

Bootstrapping with **5,000 resamples** was conducted using **SmartPLS 4**to examine the standardized path coefficients and their significance. The direct relationships between the independent and dependent variables are presented in **Figure 1** and **Table 4.**

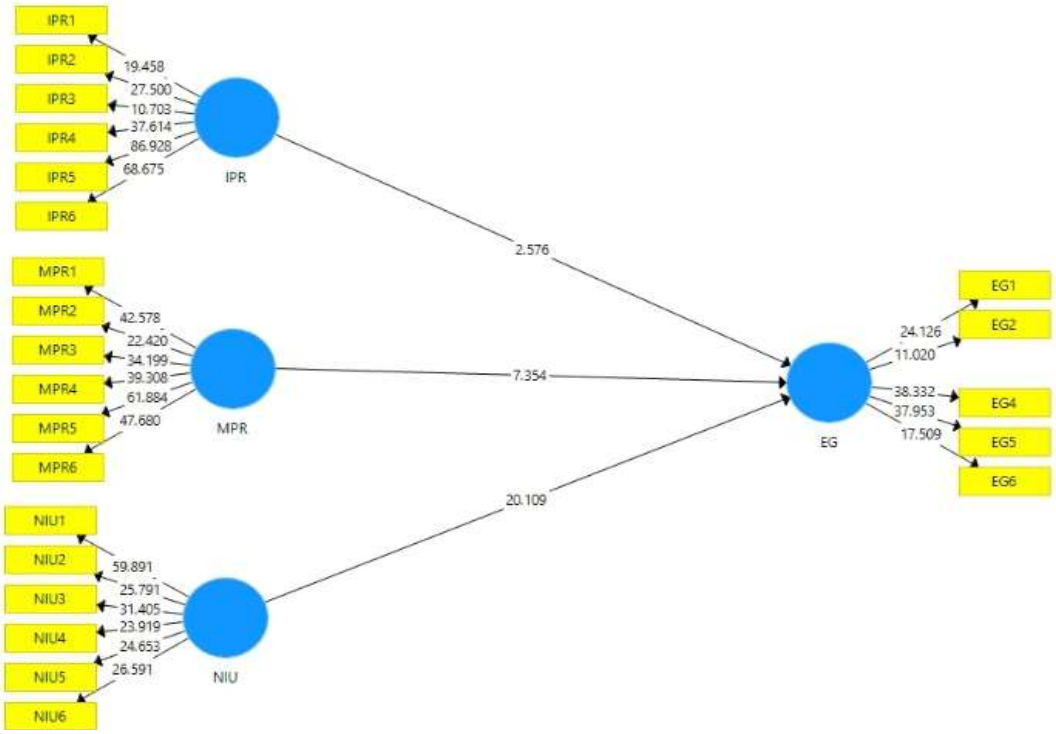


Figure 1. PLS-SEM StructuralModel.

Table 6: Path coefficient Results.

	Original sample (O)	(STDEV)	T statistics	P values
IPR -> EG	0.168	0.065	2.576	0.010
MPR -> EG	0.500	0.068	7.354	0.000
NIU -> EG	0.403	0.020	20.109	0.000

Source: Smart-PLS Output (2025)

The results reveal that all three digital entrepreneurship indicators have significant relationships with economic growth in Nigeria. As shown in Table 4.7.1, Internet Penetration Rate (IPR) is significantly related to economic growth ($\beta = 0.168$, $T = 2.576$, $p < 0.000$), leading to the rejection of H_{01}. Similarly, Mobile Phone Penetration Rate (MPR) shows a significant negative relationship with economic growth ($\beta = -0.500$, $T = 7.354$, $p < 0.000$), resulting in the rejection of H_{02}. Lastly, the Number of Internet Users (NIU) also has a significant positive impact on economic growth ($\beta = 0.403$, $T = 20.109$, $p < 0.000$), leading to the rejection of H_{03}. These findings confirm

the empirical significance of digital connectivity indicators in driving economic growth in Nigeria.

4.4 Discussion of Findings

The Internet Penetration Rate (IPR) has a positive and significant effect on Nigeria's economic growth at less than 1% significance level. This indicates that increased internet access reduces barriers for digital entrepreneurs, enabling microenterprises and startups to thrive in sectors like e-commerce and finance. The finding aligns with Haini et al. (2022), Bayar et al. (2021), and Wang et al. (2022). It underscores the importance of incentivizing digital enterprises and investing in digital literacy and infrastructure. While IPR drives productivity and innovation; supporting both Diffusion of Innovation and Digital Divide Theories; efforts must also address access gaps in underserved areas to ensure inclusive growth.

Mobile Phone Penetration Rate (MPR) also shows a significant positive impact on economic growth at the 5% level. This highlights mobile phones as not just communication tools but engines for financial inclusion and entrepreneurship. Consistent with Bayar et al. (2021) and Adam & Alhassan (2021), mobile technology in Nigeria enables access to fintech services and digital platforms, fostering innovation and job creation. Adoption aligns with Diffusion of Innovation Theory, and targeted policies and subsidies can enhance uptake. However, barriers like affordability and digital literacy remain critical challenges.

The Number of Internet Users (NIU) has a strong, positive impact on economic growth at a significance level below 5%. Greater internet usage boosts access to global knowledge, digital services, and online markets, thereby enhancing innovation, competitiveness, and entrepreneurship. Rising NIU expands e-commerce and reduces transaction costs, supporting a dynamic digital economy. While this trend aligns with Diffusion of Innovation Theory, the Digital Divide Theory reminds policymakers of existing inequalities; particularly among rural and low-income groups; that must be addressed to ensure equitable digital development.

4.5 Managerial implications of the findings

To bridge the digital divide, managers should invest in digital infrastructure, implement transformation initiatives, focus on underserved areas, fund employee training, and collaborate with stakeholders.

4.6 Theoretical implications of the findings

The study supports the diffusion of innovation theory, confirms the impact of internet adoption on economic growth, validates the Mobile Phone Revolution theory, and extends the Digital Divide Theory by addressing internet access disparities.

4.7 Methodological Implications

The study emphasizes the importance of quantitative approaches in understanding the link between economic growth and digital issues, highlighting the need for reliable data and considering factors like infrastructure development and digital literacy.

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that Internet Penetration Rate (IPR), Mobile Phone Penetration Rate (MPR), and the Number of Internet Users (NIU) all have significant positive impacts on Nigeria's economic growth. Increased internet and mobile access foster entrepreneurship, innovation, e-commerce, financial inclusion, and productivity, making them key drivers of economic development.

5.2 Recommendations

The study recommends that to enhance IPR's impact, the government and stakeholders should invest in internet infrastructure, especially in rural areas, and promote digital literacy. Public-private partnerships should be encouraged to extend coverage and reduce costs. For MPR, expanding mobile network infrastructure, offering affordable devices and data plans, and developing localized digital solutions are essential. Policymakers should also strengthen regulatory frameworks to attract private investment. Lastly, boosting internet access, affordability, and inclusion—particularly for marginalized groups—will help bridge the digital divide and unlock broader economic benefits.

5.3 Suggested Areas for Further Study

The study recommends further research on the impact of internet and mobile usage across different regions in Nigeria to identify regional disparities and growth

opportunities. Future studies should also explore how digital literacy enhances the economic benefits of digital access, assess the role of government policies in promoting digital adoption, and examine the influence of emerging technologies such as blockchain, 5G, and AI on economic development. Additionally, longitudinal studies are suggested to track the long-term effects of digital penetration on Nigeria's economic growth.

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